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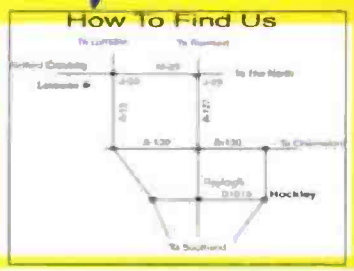

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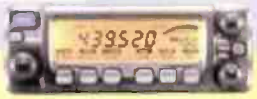

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David Butler G4ASR devotes 'VHF Report' to this year's expected LEONIDS METEOR SHOWER!

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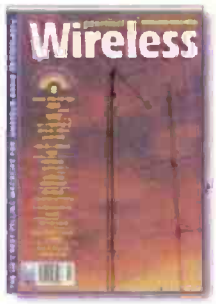

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ROB G3XFD THANKS READERS FOR ALL THEIR CO-OPERATION AND PARTICIPATION, BUT ADDS SOME WORDS OF CAUTION!

The buying of new equipment and the constant re-circulation of second-hand equipment within the radio hobby is one sign of a living (despite what some say to the contrary!) pastime. One look at our 'Bargain Basement' pages every month will confirm that very many of us are truly active. My own occasional adverts in the column prove the point!

However, the very success of our free 'Bargain Basement' advertisements are still continuing to cause some problems and, although the difficulties caused by poorly prepared and badly written adverts have decreased, thanks to the co-operation of everyone involved (and the bold '??' marks!) I'm dismayed at the number of people using the 'BB' service who do so (from their own admission!) without supporting the magazine itself!

It seems very unfair to me that there's a chance of someone not having bought a magazine themselves, and thus not helping to ensure the future of the magazine, could have their advert published whereas someone (a little later in 'the queue') who had bought a magazine had lost out because we didn't have room that month. So, to be fair **to those who do support** *PW* every month, whether by subscription or buying it locally, I am in future going to ensure that everyone who does buy the magazine can be recognised as a 'regular' reader whenever they submit an advert.

So, from this issue onward we will be publishing a monthly colour-coded and dated 'corner flash' which must be attached to the advert sent in. We will always endeavour to include an advertising coupon in each issue, depending on space and the number of adverts (we try to 'clear' the backlog each month) and this can be photocopied if you don't wish to deface your magazine. However, **all advertisements** must be accompanied by a 'corner flash' if they are to be accepted. **And those arriving in the Editorial office after Friday 29th of October WITHOUT a corner flash 1999 will not be accepted for publication.**

Incidentally, I must thank those readers, very often 'first time buyers' who (when sending in an enquiry or request for help) very kindly send evidence that they have bought a magazine. This gesture, **although not a requirement, is always very much appreciated** by the Editorial team of a magazine which is struggling for 'shelf space' amongst the 3500 or so different publications available for sale on the bookshelves each month. Thank you all!

Finding *PW* To Buy

As I've just hinted at, specialist publications such as *PW* are becoming particularly difficult to find and buy in England, Wales and Scotland. Although in Northern Ireland and The Republic of Ireland - thanks to the survival (at the moment) of smaller shops - it's easier (again, at the moment anyway) from my own experiences to find the magazine displayed for sale.

In early July I had a very enjoyable visit to the Moorlands & District Amateur Radio Society in Stoke-on-Trent. Here, in the pleasant surrounding of the Creda Factory (No, I **did not** get presented with a new tumble drier!) the difficulties in finding *PW* 'on the shelves' came up during a lively 'Question & Answer' session after the talk.

Several MADARS members said they found *PW* virtually impossible to find in the area as previous outlets closed down in favour of other shops following trade 'mergers' and the resultant single newsagent did not carry *PW* unless it was a 'firm order'. In reply, another club member said he'd found several enterprising smaller newsagents in the area who still stocked the magazine, and this answer gave me an idea!

The idea is that, in future, we will provide the most comprehensive list we can to help

readers find *PW* on sale in their area and to start off this month we're publishing (see 'News' section) a list of all the radio dealers where you can buy *PW*.

To help everyone further, I would be very pleased indeed if those readers who buy from a newsagent/bookshop, etc. could write in to us with the details so we can compile a list to help others find *PW* on sale in their area. Please provide the name, full address and telephone number (if possible please) of the source you either use or have found and I think it will also be a good idea to tell the shop owner/manager what we are trying to achieve.

As an alternative, you can also leave a message on our marvellous new digital telephone answering machine if you wish. The list will be kept on hand here in the office so we can assist anyone who telephones in asking where *PW* can be found in their area. We will also aim at publishing the list eventually to help those who've read the magazine elsewhere, but would like their own copies.

Although we'll not be able to acknowledge individual assistance - you can be assured how grateful we'll be for your help.

Channel Island Import

Following the publication of **Bill Strickland M1BRB's** letter ('A Bargain ... after import duty'?) in the September issue, regarding the imposition of import duty on second-hand Amateur Radio equipment from the Channel Islands, there was a great deal of interest and comment from readers. Many expressed surprise as they'd found Customs & Excise Officers to be helpful and understanding when they were dealing 'face to face'.

However, I'm sorry to say that Bill M1BRB's 'appeal' to the Customs & Excise people was unsuccessful and it's been ruled that duty was 'correctly applied'. This obviously caused embarrassment to both Bill and the Channel Island based Amateur who sold the equipment.

All I can say is this: Bear in mind that it could be to your advantage to combine a purchase from outside the European Union (which the Channel Islands are for this argument) with a holiday as the C&E 'Enforcement' Officers have and are able to exercise common-sense and discretion in individual cases. Anyone who has travelled on the heavily laden return flights from the Dayton HamVention will know how true this is! So, by all means buy 'abroad' - but to get full advantage ... perhaps you should have a holiday too?

Please Enter 'Officially!

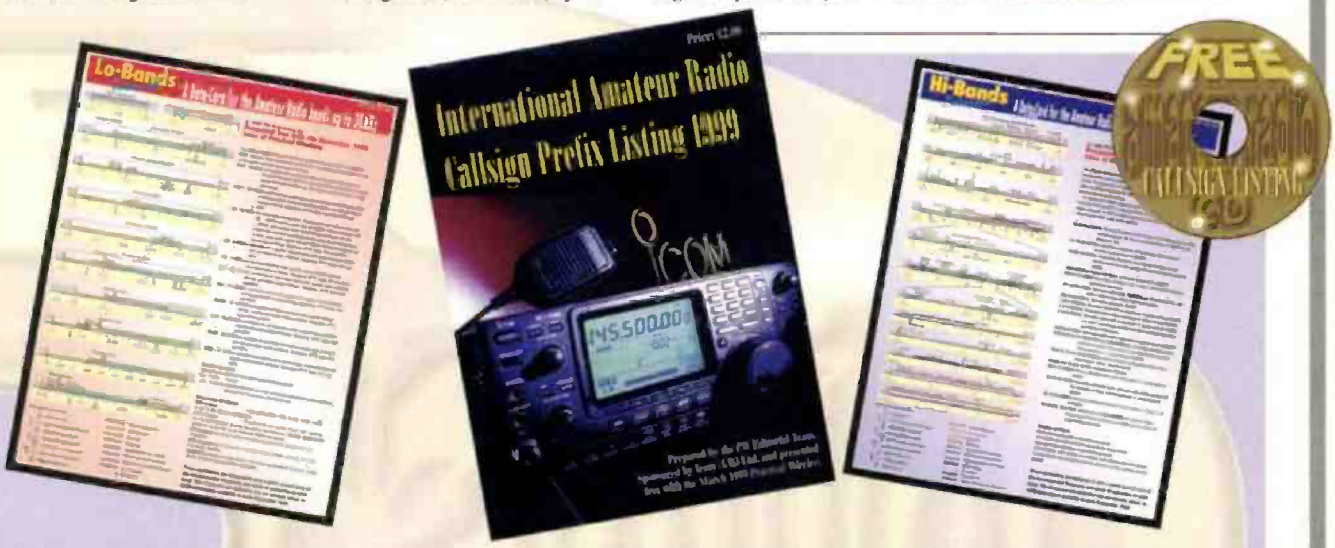
I'll end up this month by writing a plea to all those stations who, although they came up on air and joined in the fun during the *PW* 144MHz QRP Contest in June, did not send in an 'official entry'. Although I don't normally like to criticise all our friends in Northern Ireland and The Republic - you were the main culprits!

As reported, I thoroughly enjoyed being on air and it was delightful to work so many EI and GI stations, along with those from Cornwall and Wales - **but I ask you as a friend ... could you all please spare a little time to send in those logs?** As you'll see (on pages 20 to 23) Contest Adjudicator **Neill Taylor G4HLX**, comments on this point. So, although it was wonderful to talk to you on the day - how about an 'official entry next year?

The 'Millennium' contest on **Sunday 18th June** is to see the introduction of some very special encouragement for Novice Radio Amateurs to enter and a particularly 'collectable' souvenir for everyone who submits an entry.

So keep your antennas 'beamed on' for further announcements! Cheerio for now.

Rob G3XFD



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When the two coupons (from November & December) have been collected all you have to do is to attach them to the final combined coupon/form (in the January 2000 issue) and send two £1 coins (details later) for UK addresses, or $5US (overseas) as a contribution to postage and packing, and in return you'll get your CD ROM!

CD Offer Nov '99

LETTERS

COMPILED BY ROB MANNION

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

Long Term Morse Memory

Dear Sir

First of all thanks for your kind wishes on my recent illness when I telephoned the *PW* office. I'd suffered a stroke and during a bedside conference in Glasgow Royal Infirmary, one of the Doctors - a pretty Sudanese lady - noticed *PW* on my bedside table and asked about it. "We are concerned about your long-term memory" she said and asked if I could remember the Morse code. I said that I probably could but had not really used c.w. since passing the 'dreaded' test about 10-12 years ago.

So, I was instructed/requested to write out all the letters and numbers I could remember and next morning gave over a sheet of paper with only X and Y missing. She took the paper and said that since she couldn't read Morse, could I please write it all out again and she would collect it in 30 minutes and compare one against the other. I wonder if any other reader has been tested in such a way?

Neil Barrowman GM0LTQ
Glasgow

Editor's reply: We've been in contact with Neil quite a bit recently and I'm pleased to say he's very much 'on the mend'. Yet another use for Morse!

More On Morse!

Dear Sir

I have read many reasons for dropping the Morse code and can accept the argument that the code does not make the person a better operator and I can accept that Morse code is a very old form of communication. Perhaps it's because it is old and effective that its usefulness must be denigrated.

I do not accept, however, the argument that it is difficult to learn or "I have no interest in Morse so why should I bother". The history of radio and, for that matter, telegraphic communication relied on Morse and would not have progressed very far without it. It is part of our heritage, fun to use and, once it has been mastered, most rewarding. If you doubt this, just listen to the c.w. part of each band and listen to the activity. It's the 'real ale' of Amateur Radio and I am sure no one would suggest that we should stop brewing it because it's old!

Clearly, the RAE is not very difficult and anybody who can read and add up would be able to pass it. It may take some people a little longer than others. However, if a person really wants to succeed in what is a technical hobby, he or she will be able to pass the RAE if real effort is put into it.

The same applies to the code, anyone can learn to send and read at 12 words per minute. They must, however, want to do so. I was one of those people who had difficulty. I actually worked on my own with an old Sinclair computer and it took about six months at ten minutes a day. To begin with I was hopeless, but I really did want to succeed and gradually I improved and began to read Morse, off air. This did wonders for my morale.

It's clear that Morse is still a useful medium for communication. People who have lost the ability to see or hear, or perhaps both, can communicate by use of the code. It would not be hard to imagine the sheer joy experienced by a person who suddenly became unlocked from his silent and/or sightless existence to a new dimension of local and world-wide communication. And how sad it would be if, having achieved success in the code, there was no one with whom he/she or they could communicate.

Let's hear no more about Morse being out-moded or unnecessary. If you really want to do it, you most certainly will succeed. After all, I did and it was a small price to pay for the many hours of enjoyment I have experienced over the last 18 years.

John Collins G0DHU
Plymouth

Kinship With CB? - Not Me!

Dear Sir

Walter Farrar G3ESP ('Letters' August) may admit kinship ('Letters' pages, page 8, August *PW*) with the disgraceful foul-mouthed, ill-disciplined IQ-zeros on 27MHz but I most certainly do not! The general theme of his letter, though, makes me wonder if he is privy to something not yet widely known.

Insofar as you might argue that the use of the microphone and black box by the Gas board man, the CBer, the taxi driver, etc., does not make them a radio operator in any real sense of that phrase, formal log-keeping may be unwarranted. You must, though, extend this reasoning to say that **any** civilian operation of type-approved, fixed channel, non-adjustable radio equipment should not require logging. After all, such operation of a telephone-without-wires is a no skill, no knowledge matter - that is the whole objective. Why log it?

Has Mr Farrar had a sneak preview of the RSGB's next triumph? After their current master strokes of flooding the scarce amateur allocations with CBers and the ridiculous A/B half-licence for the half-interested and half-qualified, will we awake one day to more ads in *PW* and childishly secretive press releases announcing the inestimable value or their latest negotiations: ... no logs!? "Oh and, er, no v.f.o.s, adjustable p.a. stages, home-brew, that sort of thing ..."
Amateur Radio RIP!

Philip V Pimblott
West Yorkshire

Magic of Wireless

Dear Sir

As a young boy I was introduced to the 'magic of wireless' when an older friend showed me a crystal set he had built - a toilet roll former with some cotton covered wire wound around it attached to a pair of ex government headphones! With a length of wire stretched from his bedroom window down the garden to the top of a clothes line post and the headphones clamped firmly on my head I could hear the BBC West of England Home Service. To me, it was **MAGIC** and nearly 50 years later it still is MAGIC!!

After my experience with my friend's crystal set and discovering that it did in fact use a crystal and a condenser as well as a toilet roll former I was well and truly hooked on Wireless. With help from my father and later magazines such as *PW* and *Radio Constructor* I was able to build my own sets and was listening to stations from all over Europe and eventually the World. I joined the School Science Club and later, having heard some local Radio Amateurs talking on 1.8MHz on a wireless that covered the 'Trawler Band', discovered Amateur Radio.

I also joined the National Society for Radio Amateurs, the RSGB and became a Short Wave Listener. The Society's magazine was my 'window on the world' and I had a great sense of belonging to a world wide brotherhood of radio enthusiasts. Over 40 years later, *RadCom*, as it is now known is still a 'good read' and worth every penny of my subscription to RSGB.

In the 1960s, I joined the South Dorset Radio Society. Over 30 years ago most members were middle aged or over and for a while it seemed I was the only person under 40. **These days, far from what some suggest, there are many young people in the hobby** and the activity on the bands is at least as high as it was 30 years ago. Morse Code is still in daily use by thousands of Radio Amateurs all over the world and the greatest problem for most h.f. operators is QRM caused by the high level of activity!

Although I held a 'B' licence for almost 20 years, I had learned the Morse code in my teens. I can't imagine Amateur Radio without Morse. Even before I obtained the full 'A' licence, the ability to read the code was essential for the identification of beacons and later repeaters as well as weak signal working for which no other mode is it's equal.

Some things have changed of course, that's the nature of science and human nature as well. However, I have a copy of the RSGB *Amateur Radio Handbook* published during the Second World War and much of it, probably MOST of it, has not changed. I suspect that the same holds true for human behaviour!

There is a general trend, at the moment, for people not to join clubs any more but this applies to all hobbies and interests and is certainly not unique to Amateur Radio. Nowadays, a Radio Amateur can talk to friends every day with ease. We can chat on the local repeater while walking the dog, on the way to and from work and even, in some cases, while working. Yes, this is when we chat about the Internet and E-mail, etc. and anything else in which we share a common

interest including, of course, Wireless!

This is a change. When I joined the local radio club it was the only place where like minded people could converse about the hobby that fascinated them. The few that were licensed could use wireless of course but for the most part that meant being at home in the shack. It was also much more difficult and expensive to obtain a licence and set up a station than it is now.

The privileges that we, as Radio Amateurs, enjoy did not come easily. They were won for us over the years by the hard work and dedication of an army of volunteers organised together under the auspices of our national society. I believe that it is my duty to support the National Society that represents us all so that it can be seen by the authorities as having a mandate to negotiate on our behalf. If there is a problem in our hobby it is that without that mandate the RSGB will find it increasingly difficult to argue our case with the authorities. That is the real threat as I see it.

Wireless as we know it is less than 100 years old. It came after the telephone and was not replaced by it. I use the Internet, E-mail and the telephone and even watch TV occasionally HI! My **HOBBY** is Amateur Radio and using Wireless I can communicate with others all over the world. I operate on all bands from 1.8 to 430MHz and use many different modes. I enjoy using the latest technology, much of it like Packet Radio developed by Radio Amateurs and now used by the professionals. However, I could (if I had to) manage with just a few watts on h.f. and the 150 year old Morse Code and do without the local repeater, the PC and the land-line. There has always been a wire down the garden at my QTH and I hope there always will be. Amateur Radio is a wonderful hobby. It's easy and it's fun and above all it's MAGIC !

73 de Geoff G0EVW
Dorset

Editor's comment: Geoff's letter is much longer than can be usually 'fitted in'. However, (like myself) I have no doubt that many readers will have similar memories, experience and opinions. Long live Amateur Radio!

Repairing My FT-101ZD

Dear Sir

I have just rung Castle Electronics re: my FT-101ZD for a possible service, unfortunately I was told they don't do them anymore. Although it's only about 20 years old they cannot get the spares very easily nowadays.

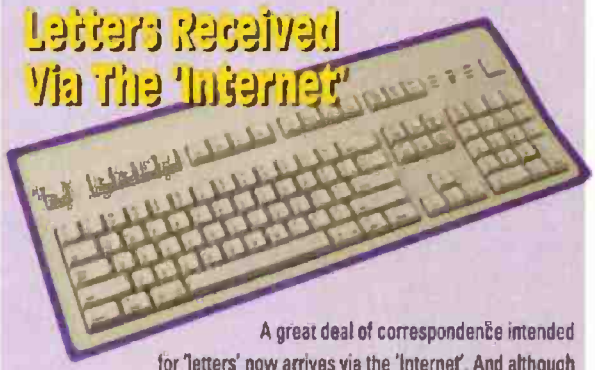
With your wide range of contacts could you possibly come up with an alternative, the 'old girl' works well but I think a good service is most certainly in order.

I hope you are keeping well, when I am asked I always say most of 'my parts' are working, you cannot ask for more! I remain a very faithful reader of *PW*.

David Arnold G0BID
27 Stonewell Park Rd, Congresbury
North Somerset BS49 5DP

Editor's comment: No doubt someone will be able to assist you David and along with our equipment, we age all the time but struggle on! Incidentally, we continually receive excellent reports on the service and abilities of Castle Electronics, but getting spares for older equipment must be difficult for them at times. Radio Amateurs are fortunuate ... try getting spares for other 'consumer electronics' - it's virtually impossible for anything over 10 years old!

Letters Received Via The 'Internet'



A great deal of correspondence intended for 'letters' now arrives via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and callsign along with your E-Mail hieroglyphics! All letters intended for publication on this page must be clearly marked 'For Publication' (on the letter itself). **Editor**

International Standards For RAE

Dear Sir

I reply to Bob Clements ('Letters' September *PW*). The exam for the RAE has never been easy and has been set at an internationally agreed standard. This to ensure that all wireless operations, whether amateur or professional, know what they are doing when let loose on the short wave bands with long range transmitting equipment. It was set at its present standard for good reason.

I am very sorry Bob failed but so do many people taking all sorts of exams, you pick yourself up, keep studying and take it again. I took the RAE 41 years ago and failed, six months later I took it again and failed. Six months after that I PASSED! I have just completed 40 wonderful years on short wave bands - don't give up Bob!

Good luck with the December exam. I hope to hear you on '40m' in the New Year!

Bill G3NQX
Preston

Sprites & VHF Propagation

Dear Sir

I hope that the Editor is well and recovered from 'running out of battery' during the *PW 144MHz QRP* contest! I'm also writing to say I think that the **Patrick Allely GW3KJW** article ('Red Sprites & Blue Jets', page 58 September *PW*) on sprites and v.h.f. propagation was first class. It brought back thoughts that I had after Professor Jennison's article in the April *RadCom* about five years ago (which I thought was an April Fool's joke at the time!).

The Professor made an antenna from short coils with a metal plate top and bottom. Maxwell's equation and the theory of Displacement current was given as the antennas mode of operation, e.g. the field set up by the r.f. in the coil created a virtual conductor through the middle of the coil which assisted in the transmission of radio waves, etc.

When I first saw film of sprites from space I was again reminded of the Professor's antenna. With masses of power from the lightning I wonder if electrons are made to spiral to create a virtual conductor which will re-radiate any r.f. that hits it? I have an electrical background but not enough knowledge or maths to sort out Maxwell. I guess that I am putting my head into the lion's mouth writing about ideas like this. Perhaps a reader with all the right knowledge could clear up the matter?

Albert Heyes G3ZHE
Cheshire

Editor's comment: Car battery now OK Albert - and it's over to you readers, to write (further) on sprites!

Software For Morse Operation

Dear Sir

I am responding to the letter from **Paul Morrison G0VHT** (August 'Letters', p.8). In that letter, Paul questions whether someone is capable of designing software to allow him to use a PC to operate c.w.

My response is that c.w. via a PC **is already available.** Software such as G4BMK's *BMKMulty* offers a c.w. mode. Multi-mode TNCs such as the KAM and PK232 also offer c.w. The Patcomm PC-16000 transceiver (recently reviewed for *PW* by **Roger Cooke G3LDI**) includes a keyboard with which to operate c.w. and RTTY. I believe there have been one or two c.w. keyboards* (***see below***) - you type, they key the radio (but you have to decode the receiver c.w.).

I agree with Paul that it should not be too hard to link the output from a voice recognition program into a c.w. program and operate c.w. by talking into a microphone. I guess this would lead us to the logical step of digitising the audio and shipping it via r.f. as digital data ... but who wants to eliminate c.w.?

Ian Brothwell G4EAN, 9H3YI
Secretary, British Amateur Radio Teledata Group (BARTG)

*The MFJ-451 Morse Keyboard was reviewed in the June 1994 *PW* by G0SKR. Copies available from the *PW* Book Service, see page 78.

A LETTER PUBLISHED IN PW WINS YOU A VOUCHER TO SPEND ON ANY PW SERVICE

COMPILED BY JOANNA WILLIAMS & ROB MANNION G3XFD

Headline News

Kenwood's New Millennium Transceiver

Practical Wireless readers in Japan, the USA and New Zealand - who have been fortunate enough to visit the major Japanese trade show in the summer - have confirmed the rumours that Kenwood are planning to launch a new 'Super Rig' - probably in the Spring of 2000 .

Much speculation, even down to the look and model number of the h.f. and 50MHz 'major rig' has been promoted in Europe and the USA recently and this led the *PW* 'Newsdesk' to contact **Kenwood Electronics** in Watford for a statement.

While neither confirming or denying the existence of Kenwood's new 'Millennium' package, the Kenwood spokesperson said that "*PW* will be the first magazine to know about and review any new h.f. rig coming from Kenwood". Knowing **what we already know here** at *PW* from those attending the Japanese show ... that means there's a nice surprise coming our way. So, watch this space!

Amateur Radio Via The Net?

The ever-growing influence of the Internet has led to a parallel growth of Amateur Radio related 'Web sites' and 'links'. This has also led - especially in the USA - to the computer based system enabling European Amateurs to gain access to the Amateur Radio bands in the United States. This in turn - so **Rob Mannion G3XFD**, Editor of *PW* writes - has generated many rumours regarding the possibilities of **authorised** Amateur Radio operation **via the Internet** here in the UK and Europe.

On behalf of *PW* readers, G3XFD then contacted the **Radiocommunications Agency** (RA) in London to separate fact from fiction asking "Just what's going on"? In reply, a senior RA spokesperson confirmed that discussions regarding the extension of Amateur Radio operations via the Internet **"at an early stage" are underway** between themselves, the Amateur Radio hobby "and other very interested parties". The "other very interested parties", so G3XFD was able to confirm, are the various telecommunication organisations who are concerned about possible loss of revenue, despite the fact that they play a major part in the necessary telephone links.

It remains to be seen whether extending our hobby via the Internet will become officially possible within the European Union - but whatever the decisions are, the *PW* news desk will keep you informed with **facts and not fiction!**

Kitmaster

David Johns has been in touch with *Practical Wireless* to tell us all about the new business which he has started up. **Kitmaster**, of which David is the proprietor, is a business based in Colchester which specialises in radio and electronic kits and manuals (modern radio, valve radios and many more) - you might have seen his advert in last month's *PW*.

David tells us that he has **50 types of kits** to sell and all of the radio circuits use common transistors and components and he says that they are easy to build. What's different about Kitmaster's kits? Well, since retiring, David tells us that all the spare time which he had on his hands led him to building a large workshop in his garden and it is from here that he began to "study and develop many interesting radio circuits, whether valve or using solid state design".

"It is quite interesting what you can achieve when you put your mind to it", David tells *PW*, "I built a particular two valve regenerative set in my radio shack and it picks up from all over the world. All the parts can be picked up from the radio rallies and club meetings for a few pounds". David says that his kits will "centre on the practical side of building circuitry with basic, easy to get hold of components, only after much study of building techniques".

So, fancy having a go? **Why not contact Kitmaster, 37 Gosbecks Rd, Colchester, Essex CO2 9JR. FAX: (01206) 396226.** The kits and manuals will be sold via mail order and **their advert can be found on p.47 of this issue.**

Icom's New HF 32bit DSP Transceiver

Dale Blackman at **Icom (UK) Ltd** has been in contact with the *PW* news desk to tell us all about the brand new **IC-756PRO h.f. plus 50MHz, 32bit DSP transceiver** which was launched at the JAIA fair in Tokyo in the middle of August this year.

The press release which we received from Dale was actually under a **publications embargo until the 19 September 1999** (when the product will appear in the Japanese *CQ* magazine) and so we've been unable to mention it until this issue, but it is quite exciting news.

This new rig, Icom state: "places a whole range of new and improved features within reach of the serious h.f. operator and DX enthusiast". It contains a **32bit floating point, i.f. DSP** which, Icom say, will improve noise reduction and provide auto-notch functions as well as a 5 inch (127mm) TFT (Thin Film Transistor) colour l.c.d. - **"A first in an h.f. transceiver"** they claim! (The l.c.d. displays the following information: dual frequency display; memory frequency and memory name; i.f. filter bandwidth; RTTY tuning indicator and received characters; real-time spectrum scope and voice memory/c.w. memory keyer contents).

The IC-756PRO also contains the following operations: a digital voice memory; digital twin pass band tuning; real-time spectrum scope; dual-watch; a.g.c. loop operation; digital i.f. filter; low distortion, r.f. type, speech compressor; built-in RTTY demodulator/dual-peak APF as well as a built-in a.a.t.u. (with 50MHz coverage), an electronic keyer and a memory keyer function and

OBITUARY.....

Rob Mannion G3XFD, provides a tribute commemorating the passing of a gallant Dutchman who was one of the many 'unsung heroes' who served in the Merchant Navy during the Second World War.

As time goes by I'm having the sad duty to write an increasing number of obituary tributes of old friends - and these include those who have become friends because of our associations with *PW*. Such a friend was the quite, unassuming Dutch-born **Jan Lutterot G0LUT** who, we were informed, became a 'Silent Key' on 1st July 1999.

I think it's a tribute to our hobby, one which knows no frontiers and promotes international friendship, that the letter informing me of Jan's passing came from **Hasso Eesemann G4BYJ**, a great friend of his who originates from Hamburg in Northern Germany. Hasso, who'd known Jan for 27 years also kindly provided some of the 'fill in' details of Jan's life and career as he - like many of his generation - was not over-keen on talking about himself.

I first met Jan and his delightful wife Gaby in 1994 when we presented a prize - the SG-2000 transceiver, donated by

Jan 'Lucky Lutterot' G0LUT - A Tribute

SGC, that he'd won in one of our competitions. Jan's delightful Dutch-English accent was joined by Gaby's gentle Bristolian burr and such was their wonderful cheerful nature that they left a lasting mark here in the *PW* offices and the resultant photograph was published on page 13 of the July 1994 issue of the magazine.

At my request, Jan - a retired Merchant Marine Radio Officer who had survived numerous incredibly 'Close Encounters' during the Second World War - then wrote an article entitled 'Lucky Lutterot' which was published in the March 1996 issue of *PW*. The stories outlined (and they could only be outlined even though they deserved a book of their own) included that of the time when a direct hit on the bridge and radio room of the Royal Dutch Shell tanker killed everyone except him. Despite this and many other 'adventures' Jan survived (in his own words) "floating around on volcanoes". Despite that, both he and the ship survived until 'retirement' after the war!

In fact, Jan Lutterot, originally PA0LUT, eventually gaining G0LUT, spent the rest of the Second World War and the rest of his sea-going career on aviation fuel tankers. Jan was one of only two survivors of his Marine Radio Officer's Course that had been organised by Radio Holland (which was operated in a similar fashion to Marconi in the UK).

Jan Dirk Lutterot was born in Alkmaar in the Netherlands on 4th July 1919 and died in Bristol on 1st July 1999. He met Gaby (Gabrielle, his wife) in Bristol and they were married in 1942. After retiring from the Merchant Navy Jan became a TV Service Engineer for Granada (and other organisations) before ending up with his own TV & Radio Shop - eventually taking up Amateur Radio with gusto.

However, as he never formally adopted UK Citizenship he had one of the 'rare' G5 three letters callsigns and after several 'hiccups' he eventually obtained G0LUT permanently. A very keen member of the Shirehampton Club (only a stone's throw from Avonmouth Docks) he helped many members through their Morse Tests and made many more life-long friends.

Such a man was Jan Lutterot G0LUT* and our sympathies and admiration go to Gaby, their Daughter and Son-in-law and relatives in Holland. It was a privilege to have known him.

(*I'm sorry to say that my short tribute can only 'scratch the surface' of such an eventful life and in 'condensed' form cannot do justice to the subject. However, I will be pleased to forward photocopies of the 'Lucky Lutterot' article and the notes supplied by Hasso G4BYJ as a continuing tribute to Jan in exchange for a stamped addressed envelope (s.a.e.) sent to me at the *PW* offices in Broadstone).

Rob G3XFD

much more. (Icom state that the details given in the press release are subject to change).

Keep your eyes on the *PW* news pages for an update on when the rig will be available here in the UK. In the meantime, **for more information please contact Icom (UK) Ltd on (01227) 741741, FAX: (01227) 741742, Sea Street, Herne Bay, Kent CT6 8LD. E-mail: info@icomuk.co.uk or why not visit their Web site at: www.icomuk.co.uk**

The Toughest Hand-Held Ever?

Yaesu UK Ltd sent the *PW* news desk some information about their brand new **50/144/430MHz triple-band heavy-duty f.m. transceiver** the **VX-5R** which, they claim is the "most durable hand-held ever" - and we're not prepared to argue with them!

The VX-5R, with its die-cast aluminium construction, Yaesu tell us, provides transceive operation on 50, 144 and 430MHz amateur bands with 5W of power output (4.5W on 430MHz) as well as ultra-wide frequency coverage of the v.h.f./u.h.f. spectrum plus a.m. medium and short wave broadcast reception - and the radio only measures 58(w) × 87(h) × 28(d)mm (without knob and antenna)! Yaesu also tell us that the VX5R includes an "optional Barometric Pressure/Altimeter Unit (SU-1), which can help alert you to changes in weather conditions".

Other features of the Yaesu VX-5R (all listed on promotional literature) include: easy-to-read dot matrix l.c.d.; dual watch for checking activity on two frequencies; 'Spectra-Scope' for monitoring adjacent frequencies; Automatic Range Transponder System (ARTS); extensive memory system with alphanumeric labels and finally CTCSS and DCS encoder/decoded built-in.

For more information on this - or any other Yaesu product - please contact them direct on Tel: (01962) 866667, FAX: (01962) 856801, Unit 12, Sun Valley Business Park, Winnall Close, Winchester SO23 0LB. Or why not visit their Web site at: www.yaesu.co.uk

Swindon's 'Breaker' Baker Silenced!

A Swindon-based CB operator - **Mr Victor Albert Baker** - has now been silenced thanks to the response by the **Radiocommunications Agency (RA)** to a petition from the local CB radio community regarding his use of illegal high power transmissions on 27MHz.

The RA press release, issued by them on 17th June - and released to *PW* on 8th September, states that the offences were committed on March 22 1999 and the resultant Magistrate's Court case was heard on 16th June.

The press release states:

NEWS

COMPILED BY JOANNA WILLIAMS & ROB MANNION G3XFD

"Swindon Magistrates heard yesterday how Mr Baker's use of a power amplifier with a CB radio had made the radiated power level 33 times greater than that permitted by a CB licence, taking him outside the terms and conditions of a licence.

The press release continues: "The 52 year old man, who used the callsign 'Gunsmoke', pleaded guilty to unlicensed use of a CB, contrary to Section 1 (1) of the Wireless Telegraphy Act 1949, on three dates in March 1999. He also pleaded guilty to having three kinds of illegal CB transceivers contrary to Section 7 of the Act. He was fined a total of £2,000 plus £1,000 costs. All his equipment, including seven CB transceivers, was forfeited. The court heard that Mr Baker was previously convicted by Swindon magistrates in August 1991, when he had equipment forfeited for similar offences. In May 1997 he handed over unlicenseable CB transceivers and was also given a warning letter".

***PW* Editorial Note from Rob Mannion G3XFD:** In her accompanying letter, **Mrs Karen Scott** (Head of Amateur & Citizens' Band Radio Section) stated that "As a result of this prosecution, the Agency has now revoked Mr Baker's CB Radio Licence". In the accompanying 'Notes to Editors' information the press release states; "There are 37 500 licensed CB operators in the UK". **(Comment on the RA's action will be published in the December 'Keylines' Editorial).**

Web Watch

Yaesu UK Ltd's Web site:	**www.yaesu.co.uk**
Nevada's Web site:	**www.nevada.co.uk**
Icom (UK) Ltd's Web site:	**www.icomuk.co.uk**
Waters & Stanton's Web site:	**http://www.waters-and-stanton.co.uk**

Analyse Your Antenna?

News in from **Waters & Stanton (W&S)** regarding the new **MFJ-269 Antenna Analyser** which will, they tell us, retail at **£299.95 inclusive of VAT.** (Free delivery is available on the MFJ-269 ,especially for *PW* readers!). "Following on from the great success of the MFJ-259B antenna analyser, MFJ have now developed model 269 which extends the frequency range to include u.h.f. and in addition to reading v.s.w.r. and frequency up to 70cm (430MHz) ...".

There are a couple of changes which have been made to the '269 and for more information on these, please see the **Antennas-In-Action pages in this issue** where you will find a review of the MFJ-269 by **Tex Swann G1TEX.**

Waters & Stanton can be contacted on (01702) 206835, FAX: (01702) 205843, Spa House, 22 Main Rd, Hockley, Essex SS5 4QS. E-mail: info@wsplc.demon.co.uk Alternatively, why not visit their Web site: http://www.waters-and-stanton.co.uk

Dealers Selling Practical Wireless

As announced in 'Keylines' (**please see page 8**), from this issue onwards we're planning to assist readers who are having difficulties in finding *PW* 'on sale'. The service starts this month with a list of dealers who stock *PW* each month.

Amateur Radio Communications
Tel: Merseyside (01925) 229881

Axon Systems
Tel: Newbury (01635) 33033

BBC World Service Book Shop
Tel: The Strand, London 0171-557 2576

Breakers World
Tel: Bordon, Hants (01420) 474684

Jaycee Electronics
Tel: Glenrothes, Fife (01592) 756962

LAR Communications
Tel: Wakefield 0113-252 4586

Lowe Electronics
Tel: Derbyshire (01629) 580800

Micron
Tel: Belfast (01232) 438610

Modern Radio
Tel: Bolton (01204) 526916

Northern S/W Centre
Tel: Carlisle (01228) 590011

Poole Logic
Tel: Poole (01202) 683093

The QRP Component Company
Tel: Haslemere (01428) 661501

Radioworld
Tel: West Midlands (01922) 414796

Short Wave Shop
Tel: Christchurch (01202) 490099

SMG Communications
Tel: Tiverton, Devon (01884) 259090

Unicom
Tel: Herne Bay, Kent (01227) 3655

Waters & Stanton
Tel: Essex (01702) 206835.

Licence Free Listening

Mike Devereux at Nevada wrote to *Practical Wireless* to tell us all about the brand new PMR-446 transceiver - the **Alinco DJ-SR1** which was released at the end of August. It is small enough to fit in a top pocket, Mike says, but still has many features including selectable CTCSS, switchable high/low power, superb receive/transceive audio quality, scan facilities and companion-channel finder facility.

Mike goes on to say that there is also a range of "compatible accessories" from the "existing Alinco range". The DJ-SR1 will retail for **£99.95** (batteries and drop-in charger not included). **Look out for the review of the DJ-SR1 in next month's *Practical Wireless*.**

For more information about this or any other Nevada products, please contact Nevada on Tel: 0239-266 2145, 189 London Road, North End, Portsmouth PO2 9AE. E-mail: info@nevada.co.uk or visit their Web site: www.nevada.co.uk

RADIO DIARY

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

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

October 24: The Galashiels & DARS is to be held at The Volunteer Hall, St. John Street, Galashiels, Scottish Borders. Doors open at 1100 (disabled access from 1045). There will be all the usual attractions. **Jim Keddie GM7LUN** on **(01896) 850245**, E-mail: **jimk@gm7lun.freeserve.co.uk**

October 24: The North Monaghan Hobby Radio and Computer exhibition will be held this year on Sunday 24 October in the Four Seasons Hotel, Monaghan (in the Backwater Function Room). Doors open at 1130 and finishes at 1630. All the usual retailers will be in attendance including large displays of computer equipment and a Bring & Buy. Refreshments are available in the hotel along with full facilities for QSLing via the brewery. Talk-in will be on S22 from 1000 and will be manned until 1400. More details from **Stephen Hand** Tel: **(01365) 751479** evenings, FAX: **(01365) 751200**, Mobile: **(0872) 932438**, E-mail: **stephen@g17uim.freeserve.co.uk** or **Ken O'Reilly** Tel: **(01365) 723283, FAX: (01365)722970**, Mobile **(07801) 526460**, E-mail: **kenoreilly@enterprise.net**

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

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

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

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

November 16: South Normanton & District ARC are holding their Mini Radio & Electronics Equipment Fair at New Street Community Centre, South Normanton near Alfreton, Derbyshire starting at 1800. Easy access from the M1, J28, or the A38. Everyone welcome, refreshments available. Limited number of tables available, strictly on a first come, first served basis so early booking is essential. Further details from (and to book tables) **Russell Bradley G0OKD** on **(01773) 863892** or E-mail **Duncan Walters G4DFV** on **tesla@cwcom.net**

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

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

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

December 4: The Rochdale & DARS are holding their traditional radio rally **(yes, on Saturday!)** at St Vincent de Paul Catholic Church Hall, Caldershaw Road, off the A680 Edenfield Road, approx two miles west of Rochdale. Follow the orange arrows from M62 J 20. Doors open 1100 (1045 for disabled visitors). There will be refreshments and a rest area. **John G7OAI**, evenings, on **(01706) 376204**.

2000

January 23: The Lancastrian Rally will be taking place at Lancaster University. Routes from south - M6 off of junction 33, routes from north - M6 off on junction 34. opens at 1100, 1030 for disabled visitors. Entrance fee is £1.50. There will be a Bring & Buy, Morse tests on demand - two passport photos required. Licensed Café on site. For booking details contact **(01772) 621954**.

February 6: The 15th South Essex Amateur Radio Society are holding their Radio & Computer Rally at the Paddocks, (situated at the end of the A130), Long Road, Canvey Island, Essex. Doors open from 1030 and features include Amateur Radio, Computer & Electronic components exhibitors, Bring & Buy, RSGB Morse testing on demand (two passport photos required). There will also be home-made refreshments, free car parking with space outside main doors for disabled visitors. Admission is just £1. More information from **Brian G7IIO** on **(01288) 756331** before 2100 please.

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

The Editorial Staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. - Editor

Lift Off At Leicester!

Practical Wireless and *Short Wave Magazine* were both present at the **Leicester Show** this year at Donington Park on the 24 and 25 September 1999. The PW Publishing stand had a number of books on sale as well as the special 'One Year Free' subscription offer which promised three years for the price of two!

Thank you to everyone who visited the stand and told us how much you are enjoying both magazines. We always look forward to meeting the readers who always, without fail, give us very valuable feedback - all opinions are important to both magazines and we hope that you will continue to show your support - both through buying the magazines and through your continuing support at the various shows and rallies which we visit throughout the year. There will be more news about the Leicester Show in next month's *PW*. I hope to see you at **Picketts Lock** – in March 2000 – the next rally which the Editorial team will be attending!

Joanna Williams (*PW* News & Production Editor)

THIS MONTH GORDON KING G4VFV STARTS TO LOOK AT THE IF AMPLIFIER

LOOKING AT...

The IF Amplifier

Part 1

This month it's Gordon King G4VFV's turn to continue his 'Looking At' series by taking a look at intermediate frequency (i.f.) and he begins with the superhet ...

The intermediate frequency (i.f.) stages of the superhet are located between the mixer and detector and it's here where the main gain and selectivity of the receiver are established (**Fig. 1**). There are sometimes two different i.f.s, each produced by its own mixer and local oscillator (**Fig. 2**) - this is double-conversion. A triple-conversion uses three mixers and three different i.f.s.

The i.f. of early superhets was just above the audio spectrum in the supersonic range, around 30kHz. The word superhet is a shortened version of **supersonic-heterodyne**, as this kind of receiver was originally Christened in 1918 by its American inventor **Edwin Howard Armstrong**. Most amplitude modulation (a.m.) i.f.s are now in the region of 450 to 480kHz, while the i.f. for v.h.f. f.m. receivers has been standardised at 10.7MHz.

Tuned bandpass couplings to and from the i.f. amplifier stage(s) provide the required response shaping and selectivity, sometimes aided by ceramic or crystal filters along, perhaps, with Q-multiplication, in some amateur and more specialised receivers.

Double-Conversion Receivers

The first i.f. of double-conversion receivers is generally in the megahertz range and the second i.f. in the kilohertz range. The first mixer receives the antenna signal, which may be amplified by an r.f. stage, plus the local oscillator (l.o.) signal to produce the first i.f.

The second mixer receives amplified first i.f. signal plus a signal from its own oscillator to produce the second i.f. Although double-conversion is found mainly in professional and communications receivers, there has been a British f.m./a.m. hi-fi tuner-amplifier, engineered for the domestic market (the Armstrong Model 626), whose a.m. section was designed for double-conversion, using first and second i.f.s of 3.1MHz and 455kHz respectively.

Interesting Design

The first l.o. in the interesting Armstrong 626 design consists of a voltage-controlled oscillator (v.c.o.) tuned by a solitary capacitor diode (varicap) over the range of 3.245 to 4.725MHz. The varicap's reverse bias is adjusted by a tuning potentiometer, which facilitates continuous coverage of both the long and medium wavebands without band switching.

The design includes a balanced dual-diode first mixer, to which the antenna signals are fed via a low-pass filter of 1.7MHz turnover, along with the first l.o. signal. The first i.f. is thus produced by this mixer from antenna signals ranging from 145kHz at the start of the long waveband right through to 1.625MHz at the end of the medium waveband as the v.c.o. is tuned. The first i.f. signal is then fed to the second mixer along with the second l.o. signal to produces the second i.f.

To simulate the capacitance swing of a mechanical tuning capacitor from around 250 to 10pF with, say, a voltage change of 1 to 30V, a varicap needs to have a large junction area. Many latter-day designs include varicaps arranged in series-opposed pairs, often encapsulated. The trick here is to minimise losses with the maintenance of a high *Q*-factor, while helping with the required linear capacitance swing.

Such devices are often found in r.f., mixer and oscillator stages, the tuning being accomplished by a potentiometer which alters the reverse bias of all the varicaps together. The resistance of a varicap is high and its leakage current low when reverse biased. It then exhibits capacitance owing to the depletion layer acting like a dielectric between the two *p* and *n* regions. As the reverse bias is increased so the depletion layer widens and the capacitance reduces. (Varicaps in frequency synthesisers were looked at in last month's instalment).

It's easier to achieve high gain and the required bandpass characteristics at a low rather than a high i.f. At frequencies in kilohertz stray capacitances are less troublesome and coupling circuit *Q*-factors are easier to keep higher than at frequencies in megahertz. This is probably one reason why E. H. Armstrong chose 30kHz for the i.f. of his first superhet!

Image Frequency

As the i.f. is reduced so the image frequency becomes closer to the signal frequency. For example, the main response of an a.m. receiver tuned to 800kHz and with the l.o. at 830kHz occurs at 30kHz (830-800), which is the i.f. However, an incoming signal of 860kHz (two times the i.f. above the receiver-tuned frequency) would also produce the 30kHz i.f. (860-800kHz). This is the **image response**.

The higher the i.f., therefore, the less difficult it is to attenuate the image response by enhancing the selectivity of the tuned stages prior to the mixer. A 470kHz i.f. is certainly better than one of 30kHz in this respect, but a fair degree of pre-mixer selectivity is still desirable. Good pre-mixer selectivity also helps to tame the potential for other spurious responses.

For example, an f.m. receiver tuned to 95MHz will produce an i.f. of 10.7MHz when the l.o. is tuned to 105.7MHz. If a strong antenna signal at 100.35MHz is also present its second harmonic would be 200.7MHz.

The second harmonic signal, along with the second harmonic of the l.o. at 211.4MHz (105.7 × 2MHz) would appear at the mixer, the two producing the 10.7MHz i.f. (211.4-200.7MHz). This is called the **half i.f. response** because the response occurs at a frequency which is half the i.f. away from the tuned frequency. When the l.o. is operating at the i.f. **above** the signal frequency the image and repeat spot responses also occur **above** the tuned frequency and vice versa.

With double-conversion, the first i.f. keeps the image and other spurious responses well away from the receiver-tuned frequency, while the lower second i.f. is designed for gain and response tailoring. Rejection filters may also be included to prevent the i.f. stages themselves from responding to signals within their passbands.

The next instalment will continue with the i.f. amplifier and will look at circuits and response characteristics. So, stay 'on frequency' until then. Cheerio!

PW

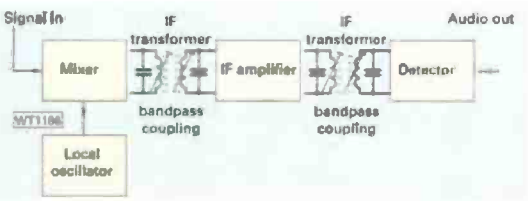


Fig. 1: Block diagram of single-conversion superhet.

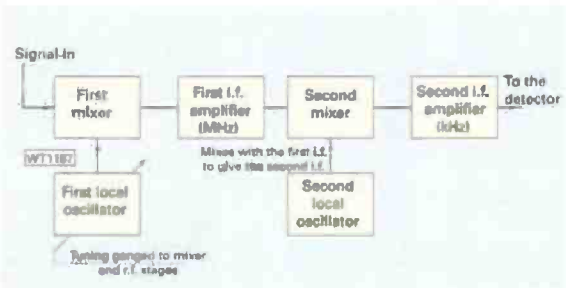


Fig. 2: Block diagram of dual-conversion superhet.

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F-303I	8 pin "Icom" round	£18.95
F-303YP	Modular "Yaesu" phone	£18.95
F-303KP	Modular "Kenwood" phone	£18.95
F-303IP	Modular "Icom" phone	£18.95

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GC-038 Lower mast clamps.....£25.00
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RS-101	1.8-60MHz (3kW) £79.95.....£69.95	p&p £5
RS-40	144/430MHz Pocket PWR/SWR Meter (200W) (SO239).....£34.95	p&p £1
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NEW GPS-III +.....only £329.95

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

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Rechargeable Alkaline. No memory effects. 1.5V cells. 3 x capacity of nicads.
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Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

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

MS-109 Fist microphone to fit Kenwood, Yaesu, Icom & Alinco.

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REGULAR-GAINER RH-770

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

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

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Deluxe over the ear earpiece.

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Boost reception of your scanner with this pre-amp. 25-1500MHz, variable gain, band pass filters.

Superb value **£59.95** P&P £3.50

RADIO BASICS

This month, now that he's completed the description of the constructional side of the 'Basi-Probe' and 'Basi-Tracer' projects, Rob Mannion G3XFD provides some hints and tips for using them on other projects built during the series.

Now that we've built the 'Basi-Probe' (**BP***) and the 'Basi-Tracer' (**BT***) projects, I'm going to describe how you can use them in a practical fashion and, as it seems an ideal way to go about the job ... I'm going to use the projects we've built together so far during this series.

***Note:** All references to the Basi-Probe will be made as BP and those to the Basi-Tracer will be made as BT. On the reproduced circuit diagrams the test points (where the probes of BP or BT are to be placed) will be indicated with the appropriate abbreviation and coloured Blue for BP and Pink for BT. Don't forget that the 'RF' probe on the BT is that which uses a diode detector and the 'AF' is that using a capacitor.

Crystal Diode Receiver

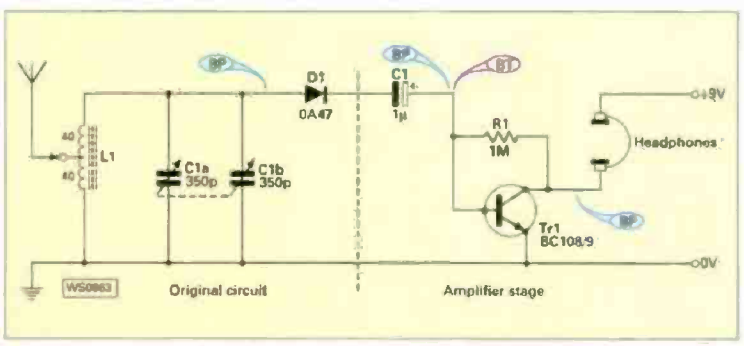
So, to start off the procedure I'm going to look at the simple 'crystal diode' receiver (**Receiver 1, Fig. 1**) with one stage of audio amplification, which was published in April 1998 on page 17.

Firstly, the crocodile clip lead should be attached to the 0V ('chassis' or 'earth') when using either the BP or BT units. But don't forget to 'switch on' the probes each time they're used (or temporarily 'bridge' the switch gap to free up one of your hands).

Secondly, don't forget to switch on the receiver under test and connect the antenna and earth! If your receiver and headphones are working OK you should hear the tone from the BP at the headphone input, it won't be very loud, but if you don't hear anything ... suspect the headphone circuitry (including socket if used). Using BP at the junction connection of C1 and R1 it should be louder as Tr1 provides amplification.

If not, suspect problems with the BC108 stage. Applying the audio frequency (AF) probe of the BT at the same point should provide audio from a broadcast station. However, if you're not sure whether the detector stage is working - apply the BP to the r.f. side of D1 (tuning side). If nothing's heard - change the diode and make sure the polarity is correct.

Fig. 1: Test points for Receiver 1 (see text).



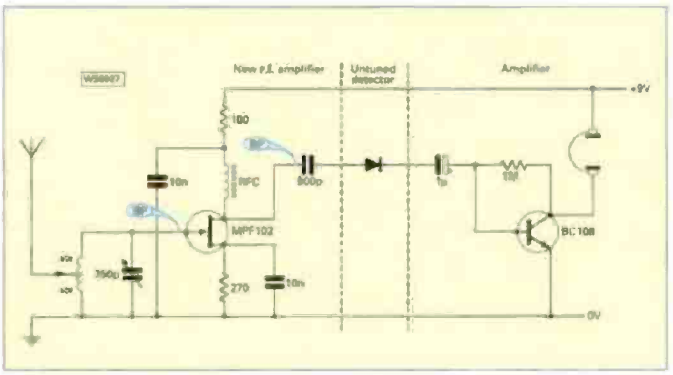


Fig. 2: Testing the r.f. amplifier on Receiver 2 (see text).

Radio Frequency Amplifier

Next, we move on to the receiver featured in May 1998 on page 16 (**Receiver 2, Fig. 2**). Here the same tests for Receiver 1 can be applied. However, to test that the interstage coupling is OK, you should apply the BP to the MPF102 side of the 500pF capacitor. If all is well, then apply BP to the tuned input (Gate) of the MPF102.

You can also apply the radio frequency (RF) probe of the BT to either side of the 500pF capacitor to listen for the signal coming from the BP. If neither test produces a signal, check the resistors, the choke (r.f.c.) and the MPF102 itself.

The Traditional TRF

Now we're moving on to the 'traditional' tuned radio frequency receiver (t.r.f.) (**Receiver 3, Fig. 3**), which was featured on page 17 of the September 1998 *PW*. This receiver employs a very sensitive (but easily overloaded) regenerative detector stage (Tr2).

You can check for any a.f. output by using the BT 'AF' probe on either side of C7. You should hear a gentle 'plop' from the tracer's loudspeaker as the regeneration control R6 is operated - accompanied by a gentle 'hiss' if the stage is operating satisfactorily, which is caused by the regenerative detector stage.

If all is well, leave the BT connected (either side of C7 will do) and apply the probe of BP **very close to, but not actually touching** (this is **very important!**) the L2 side of C5. In this way you'll be applying enough multivibrator signal to the (sensitive - if it's working!) detector, but at the same time avoiding 'blocking' it.

Very many experienced constructors have been caught out by thinking that a regenerative detector is insensitive when, in fact, they've actually 'blocked' it with too much signal! So, please avoid this trap! However, if all is OK and you can hear the multivibrator's tone - you can proceed to test the input side of L2 on the L2 side of C4. Suspect the coil, its tuning or coupling if you can't receive anything as you tune the receiver.

Next, if the receiver seems rather 'deaf' apply BP to the Gate (G) on Tr1. If the stage is working well (in other words - amplifying the signal) a signal applied to G on Tr1 should appear to be louder than a signal produced by applying the BP to the Drain (D) side of C4. If not, carry out the tests and replacements already described for Receiver 2.

The 3.5MHz Converter

Next in line for treatment is the 'Radio Basics' 3.5.MHz to medium wave converter project (**Receiver 4, Fig. 4**) described on page 13 of the November 1998 *PW*. This, as

you'll remember, was used in conjunction with a car radio operating over the lower end of the medium waveband.

Obviously, you can easily check that the car radio is working satifactorily by connecting a suitable antenna to the coaxial input. But to familiarise yourself with how the BP's test signal will sound after passing through the receiver's circuitry, you can apply the probe near to (**but not actually touching** - you can place a thin sleeve over the probe if you wish) the antenna input socket to provide enough coupling so as not to overload the receiver. This action will provide a useful reference experience for (possible) future fault finding.

Testing of the converter's i.f. (medium wave with the 'down converted' 3.5MHz signals) output can be done at the BP test points on either L3A or L3B. On the L3B side you'll probably hear the BP signal plus medium wave stations as the probe will also act as a simple antenna. The L3A side provides a complete check for the assembly (which is of course the i.f. output tuning and coupling circuitry for the tuneable intemediate frequency [i.f.] provided by the car radio).

Test point BP on the Gate (G) of the Mixer's MPF102 should provide a fairly loud signal, although this stage does not provide much signal 'gain'. However, the test signal should be heard. Test the r.f. stage in the same way as I suggested for the r.f. stage in Receiver 2.

Basic testing of the two oscillators used in the converter, the local oscillator and the beat frequency oscillator (b.f.o.), is best carried out with an electronic 'sniffer' device. Much favoured by 'Carrying On The Practical Way' author, the **Rev. George Dobbs G3RJV** (and myself) - they are very simple to make and use.

All you need is either a sensitive multimeter, a diode (the same type used for your 'crystal' diode receiver will do) and some 'stiffish' copper wire (preferably enamelled to provide insulation). Using a pencil as a former you should then wind a coil of about 10 turns and provide 'lead out' of around 100mm to enable connection to the meter.

The assembly can be made on a length of plastic tube (an old ball-point pen casing minus the ink reservoir is ideal). Position the 'sniffer' coil so that it's just clear of the pen barrel and tape the wire leads to the sides. One lead (eventually terminating in flexible wire), can go straight to the meter's - (negative or 'common') socket. It should be switched to 1V or less range for this test - but when testing other equipment **you should always** start off with a 10V (or similar higher range) and then select a suitable range to provide full scale deflection (f.s.d.) with the signal produced. This precaution could save your meter from damage!

The other lead is cut (either side of the tape) so that a diode can be connected. Connect one end of the diode (polarity not important) to the coil end and the other to the meter lead.

(Polarity is not important, because if the meter needle moves in the wrong direction you simply change over the connections).

***Note:** A suitable probe was described - full details complete with simple printed circuit board design - in his 'Getting Started The Practical Way' article by the Rev. George Dobbs G3RJV on page 32 of the August 1991 PW. Photocopies are available from PW Book Service.*

In use, you just place the probe near the drain (D) circuits of the MPF102 f.e.t. transistors. Depending on your meter you should get a strong deflection if the oscillator is generating r.f. signals. Generally speaking the oscillators are relatively 'generous' in output and you should have no problems in detcting their outputs with the 'sniffer'.

If you've built the 'Tinny Dipper' you can (with the appropriate coil plugged in) 'tune' for the signals with the power off (Dipper switch in 'Wavemeter' position) and look for an indication on the meter. This should move upwards (with 'edge reading' type) or from 'zero' - depending on the meter you've used.

No Space!

I've decided - as I've no space left this time - to prepare a separate project to provide modulation on the 'Tinny Dipper' project rather than within this edition of 'Radio Basics'. However, I hope you'll enjoy the test procedures I've described this month. You'll perhaps find them testing yourself - but interesting I'm sure!

Cheerio for now! PW

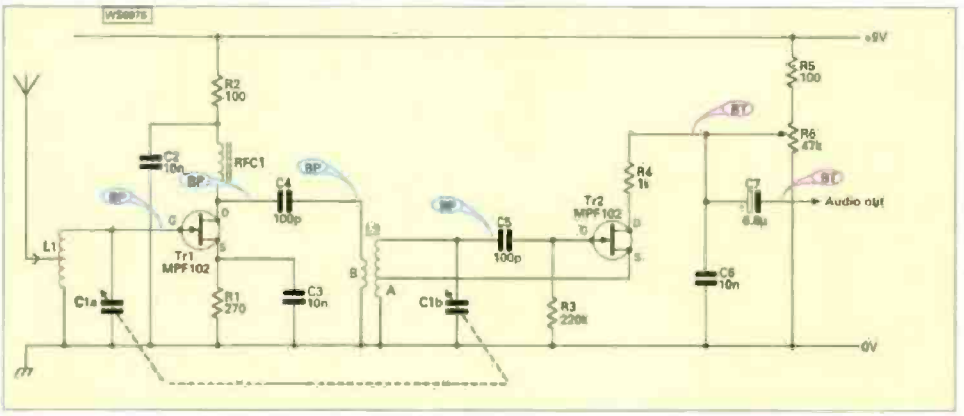


Fig. 3: Test points on the regenerative detector receiver, Receiver 3, with r.f. amplifier (t.r.f.). See text for details on 'anti-swamping' procedure adopted for testing purposes.

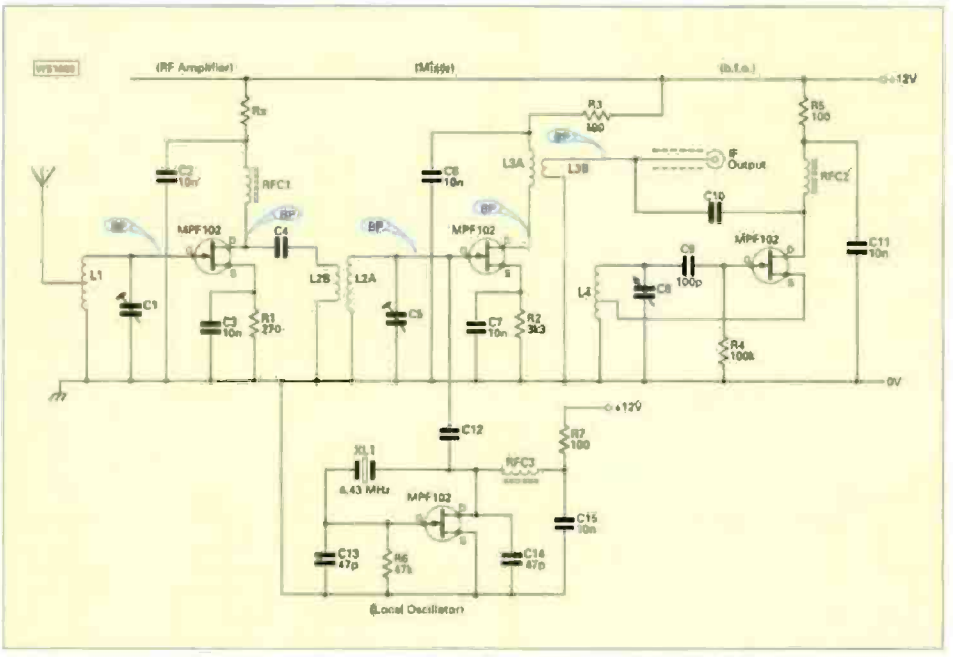


Fig. 4: Test points adopted for use on the 3.5MHz to medium wave converter project (Receiver 4). See text for details on testing car radio i.f. unit and 'sniffer probe' used for checking oscillator output.

1999 Results

Practical Wireless 144MHz QRP Contest

It's that time of year again and Neill Taylor G4HLX, our long-serving adjudicator, has been busy collating all the entries and here he is with the 1999 *PW* 144MHz QRP Contest Results ...

The 17th *Practical Wireless* 144MHz QRP Contest on 20th June included all those features that we have come to expect from this day of low-power v.h.f. activity on a summer Sunday, with many good QSOs for most operators. Some additional highlights this year included a sporadic-E (sp-E) opening, bringing signals from as far away as Romania and a welcome appearance on the band from our esteemed editor, **Rob Mannion G3XFD**.

This year, entries were received from 63 stations with about half of them single operators and, although many more stations were active during the contest, the winners worked 283!

Rob Mannion G3XFD/P joined in the fun this year, and here he is on site on private farmland approximately 750m from the main road between Shaftesbury and Blandford Forum.

Overall Winners!

Amongst the entries were many of our regular competitors and, of course, a number of individuals and groups were entering for the first time - **and it was one of these** who achieved the number one spot in the results table! Congratulations to the **Bristol Contest Group (MW1BCG/P)** who achieved an impressive margin over our regulars the **North Wales Wafflers (GW0NWR/P)** in second place and **Oldham Radio Club (G1ORC/P)** in third place (who have both been overall winners in recent years).

Fig. 1a: one of the photos sent in to Neill Taylor G4HLX, showing the sites chosen by this year's contenders, this is EI5IF/P in his four-by-four.

The Bristol group comprises **Matthew Jeffery G7ORR, Neil Powell M0AXF** and **Steve Tombs M1AHH**. They operated from the summit of Pen-y-Gadair Fawr, one of the highest peaks in The Black Mountains, at 800m a.s.l., using an array of four 5-element yagis.

The rate at which they held QSOs at the start of the contest was phenomenal, with 91 contacts completed in the first hour. This gave them a lead which they maintained throughout the day, also clocking up an amazing 43 locator squares, including almost all UK squares plus a good number on the continent.

Their own comment was: "We used a new site with a 360° view, so worked lots of squares which were unusual for us, e.g. in EI/GI and north-west France". Their efforts win them the ***Practical Wireless* QRP Contest Winners Cup** and also the special prize of a **100m drum of Japanese-made "Super Low Loss" 5D-5B coaxial cable**, kindly donated by **Mike Devereux G3SED** of **Nevada**. The North Wales Wafflers, as runners up, will receive some **solar panels from Key Solar Products**, generously offered by **Bob Keyes GW4IED**.

Scottish Stations

Amongst the Scottish stations, **David Dodds (GM4WLL/P)** achieves the top spot to gain the **Tennamast Trophy in Memoriam to Frank Hall GM8BZX**, donated and sponsored by **Tennamast (Scotland) Ltd**. David's success as a single-operator breaks the four-year sequence of wins by the Cockenzie & Port Seton Amateur Radio Club (GM0CLN/P).

Comments sent by the Cockenzie & Port Seton club show that they are most gracious in defeat: "We reckon that GM4WLL/P has won the Tennamast Trophy this year by a good margin. Many congratulations to him and if we can't win it with GM0CLN/P then at least it has gone to another Cockenzie & Port Seton ARC club member"!

Eire & Northern Ireland

A disappointing number of entries from Eire and Northern Ireland (see **'Keylines'**), considering a reasonably high level of activity heard there during the contest. The chart is led by **Peter Lowrie (GI7JYK/P)**,

to win the ***PW* EI/GI Trophy Clock** for the **third successive year.**

Single Operator Stations

Dave Hewitt continues to dominate the single operator stations, leading for the **fourth year running,** this year as **2C8ZRE/P**, making use of the special commemorative prefix for the launch of the Welsh Assembly.

Dave had a serious challenge this time, though, from **Mike Baguley (2C7LQD/P)**, only 18 QSOs behind Dave after careful scrutiny of the logs. The friendly rivalry between Dave and Mike has been evident in a number of recent 2m (144MHz) contests, but this is the closest they have been in a *PW* QRP contest, although both have been entering regularly for many years.

Other Results

You'll find lists of all the other results in the tables. Certificates go to all those listed under "Leading Stations" and also to the leading station in each locator square.

Congratulations to all. The full detailed results table will be sent shortly to all who submitted an s.a.e. with their entry. You can also get a copy by sending an s.a.e. now to the ***PW* offices, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or by visiting the contest Web site: **http://home.neill.org/contest** where you will find not only this year's results table but also an archive of older results and various other information about the contest.

Appalling Weather Conditions?

For many hill-topping portable stations, appalling weather conditions made getting to the site and setting up the station a real challenge. The story told by **Oldham Radio Club (G1ORC/P)** is typical: "The day started nice and bright when we left, but as we got within 500 yards (457m) of the site the heavens opened and we were subjected to a very heavy shower which lasted for an hour and completely soaked the whole team.

"Our shelter is a big blue canvas sheet which we drape over a rock and make a lean-to shelter, whilst trying to erect this in the wind and heavy rain, it looked more like a scene from the wreck of the Hesparus than a radio contest".

Those who travelled to their site the previous evening had it no easier, as at the North Wales Wafflers (GW0NWR/P): "The weather through the night was so windy, I was amazed we stayed on the mountain".

The high winds gave some entrants a hard time getting their antennas aloft, such as **Barry G1JDP** and **Maurice G1JGE**, operating as **G1JDP/P**: "The weather was windy, about 30/35mph (48/56kph) and caused a few problems erecting the mast and antenna. We used two 10ft poles joined together with a new internal scaffolding connector, but we found that this was not strong enough to take the weight of the rotator and the 17-element beam - while being hosted up, it bent. We tried a second connector, but it did the same".

The **Macclesfield & District Radio Society (GX4MWS/P)** were another group suffering from the weather: "Our start was delayed by heavy rain while erecting the antenna mast (not too nice operating when soaked to the skin)". But for most stations it had become dry by the time the station had to be dismantled.

Tony Crake (G0OVA/P) experienced "torrential rain and a howling gale rather like being at the wrong end of a jet washer", but later "the weather did improve greatly and I was able to take off my clothes and hang them on the roof rack to dry out!" It wasn't wet for everyone though. For example, the comment of the **Cornish Choughs DX Group (G4STB/P)** is simply: "WX brilliant".

Fig. 1b: This photo is of G0VJR/P in his mobile home.

Poor Propagation?

For most of the day, the poor weather was matched by generally poor propagation, according to most operators. Dave Hewitt (2C8ZRE/P) found "no real DX this year from my QTH, the afternoon conditions were terrible, with long periods of noise".

David Dodds (GM4WLL/P) writes "conditions could best be described as peculiar. At 1030UTC I was seriously considering digging the linear out of the boot, giving away points and then going home! An hour later things were really quite lively but conditions were up and down all day." Peter Thompson (G8DDY/P) goes further: "propagation was poor, I think that my score is the worst since I started doing the contest".

However, although many operators didn't notice it, for a period of about an hour around midday there was a major sp-E opening to Hungary and Romania, from a fairly broad area of southern Britain.

Several contacts well in excess of 2000km were made. Some who heard a little of this could not believe their ears, like **Lawrence Atkinson (G4FAA/P)**: "thought I heard a YO but probably only in my dreams!" Some others succeeded in working the DX and were very happy about it, such as **Mark Tuttle (G0TMT)**, who "worked YO3JW in KN34. My best contact on 2m! Ever"!

But many stations who heard the Romanians, found it hard or impossible to get through to them with 3W, partly because the opening suddenly attracted a number of high-power stations onto the band.

Tony (G0OVA/P) noted "the major sporadic-E event in the middle didn't help. This brought out the QRO stations so the racket was terrible for about an hour". **Dirk Everaet (ON1AEE)** also notes: "there was trouble working stations because there was sporadic-E and the big guns working over the long distance. I have heard YO4FR/P in KN34AW, YO4BWD/P in KN27GD, YO4WZ/P in KN44EW, but with 2.5W I wasn't able to work them".

Fig. 1c: This photo is of Graeme Wormald G3GGL/P with that wonderful view!

Another problem

Thankyou Neill!

On behalf of everyone on the *PW* Editorial team and the many enthusiasts who enter the contest every year, I would like to pay tribute to Dr. Neill Taylor G4HLX's continuing hard work organising, adjudicating and overseeing the event. It's a truly year-round effort and Neill manages despite tremendous international commitments ranging from the USA to Geneva.
So, thank you Neill - for all your many years hard work. Here's to the future and the 18th event!

Rob Mannion G3XFD, Editor *PW*.

was that some of the YO stations appeared uninterested in working contest stations. Tony (G0OVA/P) writes "I worked YO6DBA/P (KN36) but he yelled at me 'no contest, no serial numbers'. I actually logged seven other unco-operative YOs". At the **Burnham Beeches Radio Club (G6WIR/P)**, too, "stations in YO-land were heard, but wanted DX not G contest stations".

Editorial Excitement

Apart from this opening, another bit of excitement was hearing our very own *PW* Editor, **Rob Mannion (G3XDF/P)**, on the air. The Cornish Choughs DX Group (G4STB/P) remarked "nice to hear Rob on the air", as did several other entrants - and yes, G4HLX/P was back on air for the contest this year, after a two year absence while overseas. It was pleasant to work many of our regular contest operators again, assisted by my daughter **Katherine 2E1HFX** (See **Fig. 2**).

You will probably have read more about Rob's exploits in the contest in his article in the September 1999 issue of *Practical Wireless*. Rob sent me his log as a checklog, since he probably felt that his famous callsign put him at an unfair advantage in attracting QSOs. Actually I'm not so sure, as everyone wanted to stop and chat with him, which might have slowed down his contact rate.

Anyway, I'm pleased to say that, if Rob's log had been scored as a normal entry, it would have put him at a very creditable 20th place in the results list.

Fig. 2: G4HLX/P with assistant Katherine 2E1HFX on the Berkshire Downs near Wantage.

While some operators were having trouble believing the YO callsigns they were hearing, others were puzzled by the 2C prefixes used by some of the Welsh stations. At least one operator wrote the calls in his log believing that he must have made a mistake.

Mike Baguley was one who used the special commemorative prefix, as 2C7LQD/P. His comment is "the 2C callsign proved novel, although I did spend quite a lot of time explaining what it was all about. It was rather a mouthful and I shall be glad to get back to GW".

Declining Numbers

It's sad to see the number of stations entering the contest declining again this year, continuing the gradual downward trend since the peak in 1983. There has been a similar pattern in all v.h.f. activities and not just this contest.

When it was announced that Novice licensees were to be given access to the 2m (144MHz) band, we hoped that this would be in time for the contest. Unfortunately, the new regulations came into effect just one day too late, on 21st June! Still, we hope that Novice stations will boost the activity in next year's QRP Contest. It's an ideal event for the newcomer and, as an inducement, we hope to be offering a special award for the leading Novice station entering our year 2000 contest.

There were, of course, a number of Novice operators as members of the team in some of the groups in this year and, as always, some operators were having their first taste of v.h.f. contesting. **Derek Southey G0EYX** and **Stan Houlding G0BYA**, both keen c.w. operators, were in the contest as **G0EYX/P**.

Derek writes: "this was our very first contest and we both had a super day's activity and all so friendly. We intended to do the contest using only c.w., but this was not to be - we called for 20 minutes and achieved only one QSO"!

It is regrettable that there is not more c.w. activity, as this ought to be one way of getting the most out of QRP. Some stations do revert to this mode towards the end of the contest, when it all gets rather quiet, presumably in the hope of 'winkling' out those few really distant contacts which couldn't quite be achieved on s.s.b.

Now here's an idea from the North Wales Wafflers (GW0NWR/P): "The camp cook's Chilli con Carne was even better than last year (it seems to get hotter each year!). We really ought to have a contest operators recipe spot in *PW*"! Any other contest groups care to share with us their culinary secrets for a successful portable station?

Next Year

So, that brings us to thoughts about next year's contest. Several entrants remarked about their plans to make improvements to their stations. The **Macclesfield and District Radio Society (GX4MWS/P)** were one group who vowed "we will be back next year and hopefully we will be a bit slicker, quicker and better prepared" and it's never too soon to start that preparation!

Most entrants could think of a few things they would like to improve: whether it's a better portable site; a better antenna or one that's easier to erect (in bad weather!); some improvement to the receiver performance maybe (how did yours cope with all those strong signals?); lower loss feeder; better microphone and headsets; better logging arrangements - be they paper-based or by computer; better power supply (one that doesn't involve flattening the car battery!); or maybe just a hotter Chilli! Whatever your needs, now is the time to start planning.

The date of the **next *PW* 144 MHz QRP Contest** will be **Sunday 18th June 2000**. Let's hope that we'll all be able to make it a really special event - look out for the rules and other details in *Practical Wireless* next year.

Finally, my thanks to all who supported the contest this year. The logs were generally in good form for my job of adjudication and I really did appreciate the substantial number of entrants who made use of the new facility to send their logs by E-mail. So until next year ...!

Neill Taylor G4HLX

Practical Wireless 144MHz QRP Contest 1999 Result Tables

Practical Wireless 144MHz QRP Contest 1999

Pos.	Callsign	Points	Pos.	Callsign	Points
1	MW1BCG/P	12169	32	G6WIR/P	540
2	GW0NWR/P	5539	33	G4FAA/P	484
3	G1ORC/P	3738	34	G4DFV/P	460
4	2C8ZRE/P	3220	35	G0WRS/P	440
5	2C7LQD/P	2860	36	G4ZVN	390
6	G0ROC/P	2750	37	G0EYX/P	344
7	G0OVA/P	2016	38	G4JYN/P	341
8	GI7JYK/P	1840	39	G0DLR	324
9	G6FQZ/P	1827	40	G6FLY/P	320
10	G3VGG/P	1598	41	G7TUA	315
11	GW0PZO/P	1568	42	G1DWI/P	288
12	GM4WLL/P	1440	43	G8WYR	272
13	G0TOO/P	1280	44	G7AXE/P	264
14	G0HDV/P	1235	45	M0AYB/P	247
15	GX4MWS/P	1184	46	G0RRC	242
16	G8DDY/P	994	47	G4KVI/P	238
17	G1JDP/P	990	48	GW3LNR/P	234
18	G3BPK/P	954	49	G3GGL/P	222
19	G7SKM/P	880	50	G7SBV	217
20	G0CRW/P	812	51	M0BAO/P	216
21	G1WKS/P	798	52	G0JVR	202
22	GM0CLN/P	756	53	ON1AEE	189
23	M1ASE/P	741	54	GM0AYR/P	176
24	G0WZL/P	735	55	G4STB/P	175
25	G5ZG/P	720	56	G0PZR/P	156
26	EI5IF/P	702	57	G0TMT	136
27	G4NVM/P	700	58	G7IIO	85
28	G0OKD/P	690	59	GW7EVG	66
29	G1POS/P	684	60	M0BHE/P	64
30	2C0GZI/P	675	61	M0BUW	14
31	G3MAE/P	585	62	GM7OKX	4
			63	G6YYU/P	1

Leading Stations In Each Locator Square

Square	Name	Callsign	No. entrants in square
IO63	Pat Molloy & Gareth Martin	EI5IF/P	1
IO70	John S. Rule	G0JVR	3
IO73	Roland Jeffery	2C0GZI/P	1
IO74	Peter Lowrie	GI7JYK/P	1
IO75	Ayr Amateur Radio Group	GM0AYR/P	2
IO80	Axe Vale ARC	G7AXE/P	5
IO81	Bristol Contest Group	MW1BCG/P	4
IO82	North Wales Wafflers CG	GW0NWR/P	5
IO83	Dave Hewitt	2C8ZRE/P	8
IO84	Christopher Richmond	G0TOO/P	3
IO85	David Dodds	GM4WLL/P	2
IO90	Peter Thompson	G8DDY/P	2
IO91	Tony Crake	G0OVA/P	3
IO92	Midland Satellite Net	M1ASE/P	4
IO93	Oldham Radio Club	G1ORC/P	8
IO94	The JDP and JGE Jazz Men	G1JDP/P	2
JO01	Crowborough & District ARS	G0CRW/P	6
JO02	Roy Smith	G0RRC	3
JO10	Dirk Everaet	ON1AEE	1

Leading Stations Using A Single Antenna

Pos	Name	Callsign	Antenna
4	Dave Hewitt	2C8ZRE/P	7-ele ZL-special
6	Rochdale & District ARS	G0ROC/P	14-ele Parabeam
7	Tony Crake	G0OVA/P	Tonna 17-ele yagi
8	Peter Lowrie	GI7JYK/P	Tonna 13-ele yagi
9	Colin, Alan & Jo	G6FQZ/P	19-ele yagi
10	Bromsgrove & District ARC	G3VGG/P	8-ele quad
11	Charlie & Sue Jordan	GW0PZO/P	5-ele quad
12	David Dodds	GM4WLL/P	Jaybeam 8/8 slot-fed yagi
14	North-East ex-Pats	G0HDV/P	12-ele ZL-special
15	Macclesfield & District RS	GX4MWS/P	Jaybeam 10-ele yagi

Leading Multi-Operator Stations

Pos	Name	Call	Score	QSO	Squ	Loc	Ant	a.s.l.(m)	TX/RX
1	Bristol Contest Group	MW1BCG/P	12169	283	43	IO81	4x5Y	800	IC275
2	North Wales Wafflers CG	GW0NWR/P	5539	191	29	IO82	2x17Y	560	FT736R
3	Oldham Radio Club	G1ORC/P	3738	178	21	IO93	2x9Y	660	FT290R
6	Rochdale & District ARS	G0ROC/P	2750	125	22	IO83	14Y	410	FT290R
9	Colin, Alan & Jo	G6FQZ/P	1827	87	21	IO91	19Y	290	FT736R
10	Bromsgrove & District ARC	G3VGG/P	1598	94	17	IO82	8Q	195	FT746
11	Charlie & Sue Jordan	GW0PZO/P	1568	112	14	IO83	5Q	295	FT290R
14	North-East ex-Pats	G0HDV/P	1235	95	13	IO93	12Z	300	FT847
15	Macclesfield & District RS	GX4MWS/P	1184	74	16	IO83	10Y	410	FT290R
17	The JDP and JGE Jazz Men	G1JDP/P	990	66	15	IO94	17Y	190	TR9130

Leading Single Operator Stations

Pos	Name	Call	Score	QSO	Squ	Loc	Ant	a.s.l.(m)	TX/RX
4	Dave Hewitt	2C8ZRE/P	3220	161	20	IO83	7Z	275	TR751E
5	Mike Baguley	2C7LQD/P	2860	143	20	IO82	2x9Y	360	IC275E
7	Tony Crake	G0OVA/P	2016	96	21	IO91	17Y	295	TR751E
8	Peter Lowrie	GI7JYK/P	1840	92	20	IO74	13Y	300	FT290R
12	David Dodds	GM4WLL/P	1440	80	18	IO85	8/8Y	365	TR9130
13	Christopher Richmond	G0TOO/P	1280	80	16	IO84	2x7Z	130	IC706II
16	Peter Thompson	G8DDY/P	994	71	14	IO90	10Y	240	FT221R
21	West Kent ARS	G1WKS/P	798	57	14	JO01	13Y	130	FT290R
24	J.D. Rushton	G0WZL/P	735	49	15	IO83	4Y	300	FT290R
27	John Dudderidge	G4NVM/P	700	50	14	JO01	13Y	110	FTV707

Leading Stations

Overall Winners	**Bristol Contest Group**	**MW1BCG/P**
Runners Up	**North Wales Wafflers**	**GW0NWR/P**
Leading Single Operator	**Dave Hewitt**	**2C8ZRE/P**
Runner-up Single Op.	**Mike Baguley**	**2C7LQD/P**
Leading Fixed Station	**Paul Baxter**	**G4ZVN**
Leading English Station	**Oldham Radio Club**	**G1ORC/P**
Leading Welsh Station	**Bristol Contest Group**	**MW1BCG/P**
Leading Scottish Station	**David Dodds**	**GM4WLL/P**
Leading N. Ireland Station	**Peter Lowrie**	**GI7JYK/P**
Leading Eire Station	**Pat Molloy & Gareth Martin**	**EI5IF/P**

Just a reminder that the 18th *PW* 144MHz QRP Contest will take place on **Sunday 18th June 2000.**

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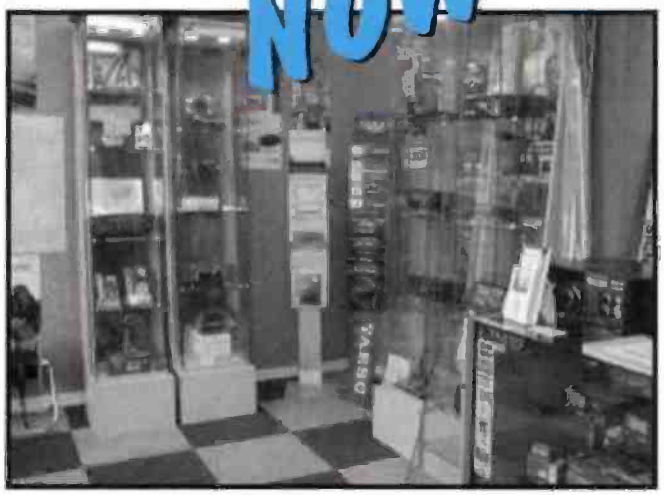

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The Ups And Downs Of Mountain Scenery...

Lakes & Low Power

Phil Davies M0AYB describes how he took part in the 1997 and 1998 *PW* 144MHz QRP Contest in the Lake District. He describes equipment and antennas used as well as a list of safety points which you might like to consider if you would like to take part in QRP in the lakes - or wherever!

It's wonderful living at the edge of the Lake District - all this mountain scenery which other people pay to come here and see. One problem with mountain scenery, however, is that it tends to block v.h.f. signals.

Looking at a map, the mountain range is (very) roughly circular. It represents the core of a geological 'dome' structure about 60km across, lying south of the Scottish Southern Uplands across the Solway, between the Pennines in the east and the Irish Sea in the west.

While you can easily transmit 'outwards' from around the edge of the mountain range, it's another matter to communicate across the ridges and peaks in the middle!

Phil Davies M0AYB joins in many contests, operating from mountain tops!

First Effort

My first effort at the ***PW* 144MHz QRP contest** was in 1997, using an Icom IC-706 rig on open ground near Egremont, just to the west of the mountains overlooking the Irish Sea. To gain the last few metres of height, the rig was set up on the top of a small hillock, with a trailing power lead connected to my car in the field nearby.

The site, at an elevation of over 100m, had the benefit of a clear take-off south (to North Wales), west (to the Isle of Man and Ireland) and north (to the south western part of Scotland).

On the other side of the coin, the mountains rising behind made it difficult to make contacts with any station in the eastern half of the compass. Using a newly acquired Tonna 9 element portable Yagi (see **Fig. 1**), I made 495 points (49th position), a reasonable first effort at a contest.

Encouraged, I bought a second hand Yaesu FT-290 MkII (See **Fig. 2**), apparently known in some circles as the Electric Handbag (sorry, Yaesu). This is a popular 2.5W portable rig, having the benefit of an internal power pack holding rechargeable NiCad cells.

The next effort at a contest was a disaster. In summer 1997, I carried the Yaesu and the Yagi to the top of Black Combe for one of the series of RSGB 'Backpackers' contests. Located at the south western corner of the Lake District, and at 600m, Black Combe is a promising take off point for the south and west.

Unfortunately, because of a problem with the charger, the new batteries, despite showing working voltage, hadn't been fully charged. They died within a few minutes of pre-contest listening and I had to pack up and trudge back down the mountain without making a single QSO.

Lesson number one, was learned the hard way! I've now learned to charge and gain confidence in new NiCad batteries in general use before recharging them and relying on them in a remote spot.

Another high Lake District peak, with a proven track record in v.h.f. contests and good take off towards the south, is Coniston Old Man, at 801m. This is generally occupied by other stations and, after the Black Combe debacle, for my 1998 contesting I sought another high location.

After much study of Ordnance Survey maps and some field trials with a hand-held transceiver, I decided to try Skiddaw, locator IO84KP. From the top of Skiddaw (see **Fig. 3**), at 931m, there would still be mountains between my station and almost all the others in the contest, but it has the advantage of being the highest point in the northern part of the range.

Morning Of The Contest

On the morning of the contest, it was dry, but the cloudbase sat at around 500m, half way up the mountain. I had an early start, allowing two hours to walk from the car park (at 290m) up the main walker's route to the peak about 5km away. I made it to the top at the contest start time, but encountered increasingly violent weather en route: fine spray within the clouds, and strong wind whipping across the peak, making it quite difficult to walk.

I had a choice - locate myself on the highest point, where take off would be slightly impeded by a rocky ridge to the south, or on the south edge of the ridge, with better take off south, but less elevation and impeded to the north. I chose the highest point.

Having got to the top, I ducked for cover behind a small drystone windbreak wall and contemplated the next move. Even in the lee of the wall it was chilly - lesson number two (fortunately well known by me) is to have plenty of warm and weatherproof clothing for such trips.

Fig. 1: The Tonna F9FT 9-element portable antenna which Phil uses for 144MHz

Fig. 2: Phil M0AYB uses a Yaesu FT-290 MkII 2.5W portable transceiver for his portable contesting.

Rather than try to put up the Yagi in the strong wind, I switched on the rig using the 'rubber duck' antenna and made an opening contact with G8ZTT/P, who was also being buffeted on top of Coniston Old Man at the southern edge of the range. The 'rubber duck' would not be much use for the contest, so I decided to try the Yagi, using only two of the three boom sections to cut down wind resistance.

The mast (a telescopic clothes line prop) was erected and guyed to heaps of boulders (using pieces of clothes line, to continue the laundry theme!). The truncated antenna was clamped onto the mast, but only raised to about two metres above the ground to reduce the risk of the whole arrangement being expensively blown away.

Back behind the stone windbreak, I started to make contest contacts. Although the directional character of the antenna was impaired by the lack of three elements, I seemed to be getting out reasonably well, and within a short time made contacts with England, Ireland, Scotland and Wales.

Cloud Clear

Although the cloud cleared away, the wind continued to be a problem all day, and, at times, it was shrieking past the antenna. The main operating problem was to keep the antenna pointing in the desired direction.

One station reported that I'd dropped down in QSB, but I had enough of a signal to be able to report that the problem was due to the beam swinging around in the gusts!

Eventually, I tied a length of washing line (of course) to the tip of the boom, and from the shelter of my windbreak, used this to stabilise the antenna and pull it round to positions within a limited arc. It was rather like adjusting the set of a sail.

During the morning, the fell walkers started arriving, some apparently dismayed that I'd laid claim to the least draughty spot on the summit. As a windswept ambassador for the hobby, several times I endured the ribaldry "... it's a rather extreme approach to picking up the World Cup score, isn't it on the telly"?

One eight year old came up to enquire if my antenna was indeed a Yagi! His father, who had put him up to it, turned out to be an ex-army radio operator, so we had a chat about the demise of Morse, h.f. operating, wire antennas and so on, filling in a flat spot in the contest. I told them it was two thirds of a Yagi.

Another hiker took pity and plied me with hot coffee. Together with being hauled out to take record photographs of people on the summit using their own cameras and generally socialising, it was quite an eventful day, if not exactly competitive contesting.

The wind dropped slightly during the afternoon, enabling me to add the third section of the antenna and raise it to its maximum height, which is only about 2.5m (I need a more ambitious mast, I think).

The majority of contacts had been made within the first three hours of the contest, and by later in the day, things were getting quiet. I heard a weak Belgian station at one point, but couldn't make the contact. I was, however, pleased to make my single f.m. contest contact of the day on Channel 22 with enterprising GW0PZO/P. I had assumed that all the action would be on s.s.b. around 144.300MHz and was only scanning the f.m. channels around 145.500MHz to see what else was happening in the world.

I'm already studying the OS maps again, looking for the site that could put me into the big time next year. My 1998 contest result, was an improvement on 1997. I got as far as JO01 (G1WKS/P, in Kent?) this time, diagonally in the opposite corner of England, so maybe I'll get across the Channel in 1999? Alright, I didn't make the highest score in 1998, but perhaps I had the highest station!

Out & About

If you are not familiar with being out and about on high mountains, consider the potential hazards before you embark on a remote portable operation. Here are some suggestions for controlling risk and having a safe and enjoyable day out:

1: Don't bite off more than you can chew. The radio and other equipment you will need will probably add up to a fairly heavy rucksack load. Experience transporting the equipment and portable operating at a near-civilisation or low-level location before committing yourself to a high altitude or remote contest site.

Fig. 3: The trial /P site near Keswick. Skiddaw is in the background.

2: Be accompanied if possible. If you must operate alone, you will be safer at a location which is frequented by others, such as a popular walker's destination.

3: Recognise that, if mist descends, you will be disorientated. You need to be aware of your locations and options for 'escape routes' at all times. A proper map and compass should be carried on all but the smaller hills and you should know how to use them. A satellite navigator could be useful as well, although I haven't yet tried one.

4: Let someone responsible 'back at base' know where you are. They should have an agreed action plan to implement if you are late returning. You may have encountered a problem and be in need of assistance.

5: A mobile phone will work from many locations. If you've got one, take it for emergency backup.

6: You may be out in the weather for many hours (for example, 11 hours in the case of my Skiddaw event). The mountain tops are often much colder, windier and wetter than lowland or valley locations and you should have warm and weatherproof clothing with you, even in mid-summer. Good sun protection is advisable too, including a hat.

7: Use proper mountain footwear to avoid slipping and to protect your ankles from twisting.

8: Leave plenty of time for the whole event. Unless you plan to camp out, this includes walking off the mountain with daylight to spare.

9: Take plenty of food and drink.

10: Be prepared to quit early or turn back if the weather turns unfavourable. Get the antenna down and get yourself off the top at any sign of lightening.

With all that in mind, I hope that you decide to have a go at mountain top contesting - it has it's advantages! PW

Part Two Of Our Introduction To Microwaves Series...

Get Going On Microwaves!

In the second of his three part series on microwaves, David Butler G4ASR takes a look at some microwave activity and equipment including the klystron transceiver and the Gunn diode ... plus much more besides!

Last month, in the first part of my series on Microwaves, I took a look at the ten Amateur Radio microwave allocations between 1.3 and 250GHz. I mentioned that the most popular of these in the UK are the 1.3GHz and 10GHz bands. These are often used for s.s.b. and f.m. telephony, c.w. telegraphy, wide band data and Amateur TV (ATV) communications.

The 2.3GHz band is also gaining in popularity primarily for receiving mode-S amateur satellite down-links. Development is also being carried out on the 24GHz and 47GHz bands by a small, yet growing, group of enthusiasts.

The middle bands of 3.4GHz and 5.7GHz, however, have been largely ignored by many microwave operators and the upper bands of 75GHz, 142GHz and 248GHz are virtually unattainable to most, if not all, Radio Amateurs.

Also in Part One, I took a look at the difference between portable and fixed station operation and explained how different propagation modes provided the mechanism to contact other operators many hundreds of kilometres away. The increasing use of amateur satellite and moonbounce communications has also given the super high frequency (s.h.f.) enthusiast the opportunity to make world-wide contacts.

This time around I want to take a look at the development of Amateur Radio microwave equipment in the UK. I'm doing this so that you will have a clear idea of the two basic types of microwave constructional techniques.

Microwave Activity

Amateur Radio microwave activity in the UK started nearly 50 years ago in January 1950 when the first recorded two-way contact on the 10GHz band took place. The contact between G3LZ and G3BAK (now VK5ZO) across the Manchester Ship Canal was over a path of less than 3km. The equipment used consisted of a low power klystron (a microwave valve) transmitter/receiver arrangement, feeding a small parabolic reflector.

The 10GHz band was virtually the only microwave band that experimenters could use at that time. The release of government surplus radar equipment, which operated at 3cm wavelengths, provided an abundant source of waveguide components.

Waveguide consists of a hollow pipe (often rectangular but it can be round) usually made of brass or copper. It's used to carry s.h.f. signals from one part of a system to another just like you do with coaxial cable. However, unless coaxial cable is very specialised and specifically designed for microwave frequencies, it will be very, very lossy.

On the other hand, waveguide is relatively low loss, usually one or two orders of magnitude lower than coaxial cable when used at the same frequency. Waveguide differs from cable in that the cross-section of the guide is related to the frequency in use. Therefore, the size of waveguide must be selected for the particular band in use. Because of this, waveguide is impractical for use on lower frequencies such as the 1.3GHz and 2.3GHz bands.

Another aspect of using waveguide is that, due to its physical size, components can be built inside it or around it. These components include frequency sources, mixers, filters, directional couplers, screw tuners, attenuators, wavemeters, in fact everything you would find in a transmitter/receiver system. Individual waveguide components containing these items are then bolted together to form a complete r.f. system.

The Klystron Transceiver

For 25 years or so, the klystron transceiver was the only practical method of getting onto the microwave bands. The most popular klystron during this period was the 723A/B which was configured as an oscillator producing an output of around 30mW.

The reflex klystrons, such as the 723A/B were designed to work between 8.5 to 9.6GHz but enterprising amateurs found a way of adjusting the device to enable it to work around 10.1GHz. The 723A/B, similar in appearance to a small metal octal valve (i.e. metal covered having an 8-pin base), was often used as the frequency source for both the

Dave Hall G8VZT operating 'portable' on the 10GHz band.

transmitter and the local oscillator (l.o.) for the receiver.

On receive, a simple diode (such as a 1N23E) was configured as a mixer picking up the receive signal with no pre-amplification. Full duplex (that is simultaneous transmit and receive) contacts using frequency modulation (f.m.) in occupied bandwidths of 200kHz were the order of the day.

A similar arrangement using a 726A klystron could also be used on the 3.4GHz band. Unfortunately, this type of equipment consisted of a large amount of microwave 'plumbing' which was rather bulky. You needed a waterproof and windproof enclosure for the klystron and a whole bundle of other waveguide based components such as a directional coupler, mixer mount, wavemeter and changeover relay.

The klystron valve also required a power supply unit (p.s.u.) with outputs of 6V, +400V and -150V. All this to produce a low-power, wide band f.m. transceiver that was generally unstable and definitely very insensitive. Little wonder that it tended to deter many operators from trying microwaves. But those that did had great fun in proving that they could work some reasonable distances with equipment that could almost be likened to microwave crystal sets!

The Gunn Diode

In the mid-1970s a solid-state device called the Gunn diode appeared on the surplus market which effectively brought to a halt the use of cumbersome reflex klystron transceivers. Although the output power levels are comparable to the 723A/B klystron, the Gunn device only requires a simple p.s.u. of around 10V at 150mA.

The frequency drift from switch-on with a Gunn diode is relatively small (but only suitable for wide band operation) and it can be tuned up to 500MHz by a single knob control. Like the klystron predecessor, the Gunn diode is easily modulated to produce wide band f.m. of a very acceptable quality.

The Gunn source is both a transmitter and a receiver at the same time just like the old klystron duplex system. The Gunn diode is placed inside a piece of suitably-dimensioned waveguide operating as a free-running cavity oscillator. It transmits the microwave energy out of the waveguide into a small (horn) antenna.

The system also receives at the same time by using the same Gunn source as a local oscillator and mixing it with the incoming receive signal from the other station. This is used to produce an intermediate frequency (i.f.) determined by how far apart each Gunn frequency is separated from the other Gunn frequency. For example, if one station operates on 10.100GHz and the other station operates on 10.200GHz then the i.f. frequency for both stations is the difference which, in this case, is 100MHz.

The receiver is still insensitive because it uses nothing more than a mixer diode mounted inside the waveguide. However, some advances have been made to low-noise i.f. pre-amplification and a standard f.m. portable radio (or scanner) operating at 100MHz is often used as a simple tunable i.f. stage, detector and audio amplifier.

Using small parabolic antennas (such as the 460mm *PW* dish), many operators would go out portable from the hill tops to make wide band f.m. contacts up and down the UK. In August 1976 a new world record was created when G4BRS/P (The Barry Radio Society) operating from Cornwall contacted GM3OXX/P in south-west Scotland over a path of

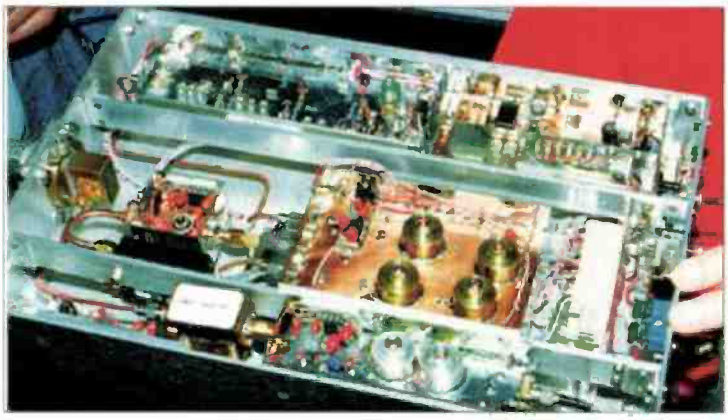


Fig. 1: The G3WDG/G4DDK 10GHz transverter kit.

521km. They were using simple 10mW Gunn transceivers to small dishes 600mm and 750mm in diameter. The signals were exchanged directly on the 10GHz band and were some 45dB above the noise 'floor' - very strong indeed.

For over 25 years all microwave contacts were conducted using wide band f.m. systems. However in the late 1970s a small group of UK amateurs started developing more complex narrow band systems for use on the 10GHz band. Narrow band in this context means modulation modes with bandwidths of 3kHz or less, nowadays taken to mean s.s.b. or c.w.

There are a number of reasons why the group went to all the effort of doing this. Primarily this was becuase the use of a very stable transmitter and receiver allows the receiver bandwidth to be reduced considerably improving the carrier/noise ratio. For example, by going from a 200kHz bandwidth to 200Hz you get (10log200/0.2) a 30dB increase.

In practice, a narrow band system will give much better receiver performance and you can run much less transmit power than the equivalent wide band system. Of course, nowadays, more power and more sensitive 10GHz receivers give even greater system performance.

Narrow Band Systems

The original narrow band systems consisted of a crystal-controlled v.h.f. oscillator running a few watts output driving a chain of varactor diode multipliers. This provided a stable c.w. or n.b.f.m. transmitter with an output power of a few milliwatts. The receivers still used simple diode mixers as there were no transistor devices available at that time that would work as pre-amplifiers or mixers on the 10GHz band.

One microwave enthusiast **Mike Walters G3JVL** went one better and developed a waveguide based transverter system that translated a 144MHz c.w. or s.s.b. signal up to 10.368MHz, the narrow band section of the 10GHz band. However, the unit still lacked any form of receive amplification and the output power was often less than 1mW.

It was in the early 1980s that a step jump was made in the development of Amateur Radio microwave equipment. One of the reasons for this was the availability of transistors and other components designed to work at frequencies up to 12GHz. This was a spin-off from new technologies such as satellite television and terrestrial microwave communications.

Microwave Sub-Systems

Two amateurs, **Sam Jewell G4DDK** and **Charlie Suckling G3WDG** were instrumental in the late 1980s for the development of state-of-the-art microwave sub-systems. Sam had designed various high stability oscillator sources for use at frequencies up to 2.5GHz and Charlie used these as an integral

"If you want the ultimate in system performance to work terrestrial or satellite DX, then you will need to consider building (or buying) a narrow band coaxial-based system".

part of a solid-state narrow band transverter he had designed for the 10GHz band.

The photograph, **Fig. 1**, shows a typical G3WDG/G4DDK kit system. Transmit power levels of 100mW and receiver noise figures of 2dB were now being achieved. The point to note here, is that these modern designs use no waveguide whatsoever. Everything is constructed on a printed circuit board of a suitable dielectric material and uses small coaxial SMA connectors with 0.141 inch semi-rigid cable for module interconnectivity as shown in the photograph, **Fig. 2**.

The only place you may find anything resembling waveguide is associated with the antenna. Narrow band techniques really are plug-n-play. Once it's working you don't need to touch it again, just apply 12V and away you go!

However, the downside to all this was that, virtually overnight, everyone stopped using their easily constructed wide band f.m. systems and committed themselves to the new but complicated technology.

Tremendous Growth

During the 1990s the tremendous growth in commercial satellite and microwave systems enabled Radio Amateurs to reap the benefits of new devices and surplus equipment. Satellite TV technology in particular has opened up another method of receiving signals on the 1.3GHz and 10GHz bands.

A low-noise block down-converter (l.n.b.) consisting of a feed horn, local oscillator source (a dielectric resonator called a d.r.o.), mixer and associated r.f. components can be easily modified to cover the 10GHz band. It's also possible to use the d.r.o. as a reasonably stable, low power transmitter in its own right.

The indoor set-top satellite receiver usually covers the 750-1900MHz band, providing a ready-made receiver for television, data or f.m. telephony modes on the 1.3GHz band. (I will provide more detail about this next month).

It's now also possible to buy 'off-the-shelf' systems, either ready made or in kit form, for all amateur bands from 1.3GHz through to 75GHz. The availability of low noise amplifiers, transverters, high power amplifiers, antennas and specialist feeder cables has revolutionised microwave construction.

Many stations now have a system capability which allows operation from home instead of going out portable on the hill tops. Noise figures of 1dB and solid-state powers of around 5W on the 10GHz band are now easily attainable.

Surplus travelling wave tube (t.w.t.) amplifiers have been available for a number of years enabling stations to run many tens of watts on this popular microwave band. Even moonbounce contacts have been made on the 10GHz band by a few UK stations and it doesn't stop there.

The 24GHz band has also seen a dramatic change from wide band to narrow band modes with the introduction of surplus equipment and commercial kits. The 47GHz band has seen a shift to narrow band operation although wide band systems still predominate.

On lower frequencies, surplus C-band satellite and terrestrial communication equipment is being pressed into service on the 3.4GHz and 5.7GHz bands. A number of stations have solid-state f.e.t. amplifiers on the latter band running 10W output and a few operators have been lucky enough to procure 100W units!

At the bottom end of the microwave spectrum, 1.3GHz and 2.3GHz, even more power is readily obtained nowadays from solid-state devices provided you have the money to pay for them. If you can't afford

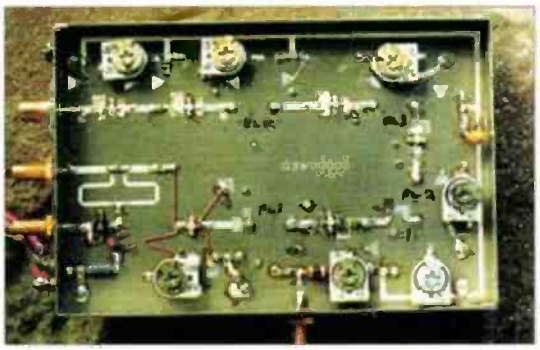


Fig. 2: Microwave equipment can be built on a printed circuit board (p.c.b.).

solid-state power amplifiers then TV transmitting valves such as the YL1050 or YL1052 are available on the surplus market. These are coaxial tetrodes and various designs have been published for amplifiers running up to 1200W output on the 1.3GHz band.

As an aside, I will mention that the break-up of the former Soviet Union has provided opportunities for the ambitious builder of real high power amplifiers. Valves costing as little as £40, such as the GS35b triode, can produce 1.5kW output on frequencies up to 1GHz and the GS23b tetrode can deliver 2kW output on the 430MHz band!

If you want to get started on microwaves you need to decide which constructional technique, waveguide or coaxial, is best suited to what you want to achieve.

For simplicity, a wide band waveguide-based system using a Gunn source has much to commend itself. It's inexpensive, easy to get going and will provide you with much hill top fun. You can also use it for data, telephony or TV links on a point-to-point basis.

The same wide band modes can also be achieved by modifying surplus satellite TV equipment, although this does restrict operation to either the 10GHz or 1.3GHz bands.

If you want the ultimate in system performance to work terrestrial or satellite DX, then you will need to consider building (or buying) a narrow band coaxial-based system. They're much more expensive and complicated but the performance is infinitely better than anything else available today.

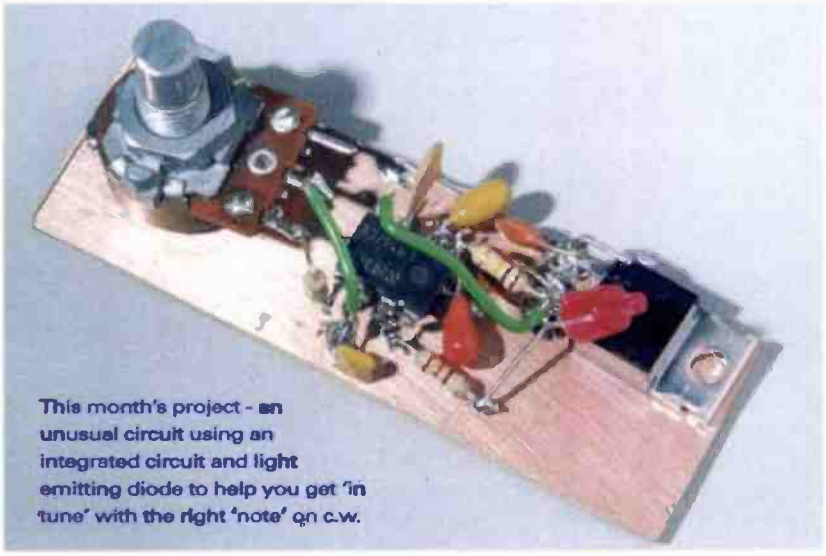
Next Month

Next month I'll take a look at each microwave band in turn and explain the various options you have for the different transmission modes. I'll also be giving you details of where to obtain specialist components, what kits are available and where to find that elusive surplus equipment.

In the meantime, if you have any questions relating to microwave construction please feel free to contact me. My details are shown in the 'VHF Report' column towards the back end of this magazine.

73 From
David G4ASR

Carrying on the Practical Way



This month's project - an unusual circuit using an integrated circuit and light emitting diode to help you get 'in tune' with the right 'note' on c.w.

"I heard a thousand blended notes while in a grove I sate reclined"

William Wordsworth,

(Lines written in *Early Spring*)

This month's project has led the Rev. George Dobbs G3RJV to change frequency from r.f. to a.f. as he describes an interesting 'tone detector' idea. Ideal to help you get on frequency during that c.w. QSO, after (of course!) the usual appropriate quotation!

There's no doubt that the human ear favours the pitch of certain notes. If you go to a concert hall, before the concert begins you'll notice that the musicians of the orchestra adjust their instruments to a note played usually by the Principal Oboe.

The musicians are tuning their instruments to 440Hz, which is referred to as 'standard pitch'. This frequency was accepted by most of the Western nations at an international conference in 1939.

The earliest music written in notation was 'plain chant' and Gregorian Chant has become popular again with those who like relaxing music. In this music the cantor's starting note is usually standard pitch A (440Hz) or the C above (512Hz). There's certainly something that seems to please the human ear in the 400-500Hz range.

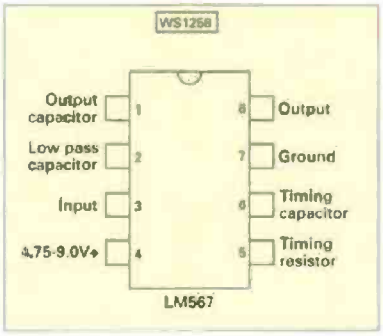


Fig. 1: The pin-out diagram of the LM567 l.c. used in this month's project (see text).

Unfortunate Product?

It's has perhaps been an unfortunate product of convenience that's led to 800Hz becoming the usual 'accepted' pitch for c.w. Morse reception. However, things can change!

Some time ago, that stalwart of the G-QRP Club **Gus Taylor G8PG**, did some research on using a lower pitch for receiving c.w. Not surprisingly he found that a pitch in the order of 400 to 500Hz appeared to be more comfortable for most experienced c.w. operators. An added bonus discovered by Gus was that the lower pitch allowed better discrimination between adjacent signals on the band.

In the days when I operated a separate transmitter and receiver and my receiver had a beat frequency oscillator (b.f.o.) pitch control, I often used quite a low pitch to listen to c.w. signals. However, it would seem that the commercial world has bequeathed us a tone of 800Hz for c.w. listening.

Modern transceivers have a fixed off-set for c.w. reception and to 'zero beat' the transmission with the other station, the operator has to adjust the pitch of that station to 800Hz. This technique should place the transmission on the same frequency as the desired station **but relies on the operator being able to judge that pitch**, although in many cases the sidetone of the transceiver does give an 800Hz note on transmission which can be used as a guide.

So, if the station being received sounds at about the same pitch as the internal sidetone (on transmit) all is well. Even so, the whole process is rather subjective!

Visual Indication

Some years ago I recall seeing a circuit which gave a visual indication of a specific audio pitch. The circuit used an LM567 tone decoder chip and I remember this device very well.

In the days when our sister publication *Short Wave Magazine* was primarily an Amateur Radio title, they published a circuit of mine, which used the 567 to provide a c.w. filter. It was an odd circuit where the 567 filtered the receiver audio output and any signal at 800kHz triggered an audio oscillator.

So, with that approach in reality the listener **heard the audio oscillator rather than the actual signal**. The circuit described below is very similar except that it triggers a light emitting diode

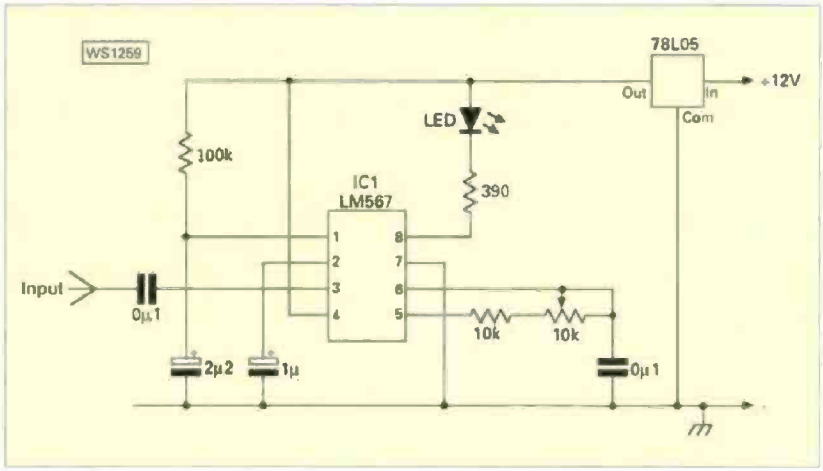


Fig. 2: Circuit of the audio frequency 'Tone Detector' project (see text).

"The circuit described below ... triggers a light emitting diode (l.e.d.), which illuminates when the signal is at 800Hz. This shows that the received station is at the required pitch to zero beat with the transmitter".

(l.e.d.), which illuminates when the signal is at 800Hz. This shows that the received station is at the required pitch to zero beat with the transmitter.

Phase Locked Loop

The LM567 chip contains a phase-locked loop and the pin designations are shown in **Fig. 1.** When the input frequency matches the chip's internal chosen frequency, Pin 8 goes low. (The internal frequency of the chip is set by the timing resistor and timing capacitor at pins 5 and 6).

The 567 is capable of detecting any chosen frequency between 0.01Hz and 500kHz. The bandwidth of the tone detection is set by the low pass capacitor at pin 2.

A practical circuit for tone detection is shown in **Fig. 2.** This closely follows the manufacturer's application notes for the device. In this circuit the potentiometer and the 0.01µF capacitor at pin 6 set the internal frequency. This allows for adjustment either side of the desired 800Hz frequency. I guess that a pre-set potentiometer would be the ideal choice for this application. My prototype used a small shaft driven potentiometer for ease of testing the circuit.

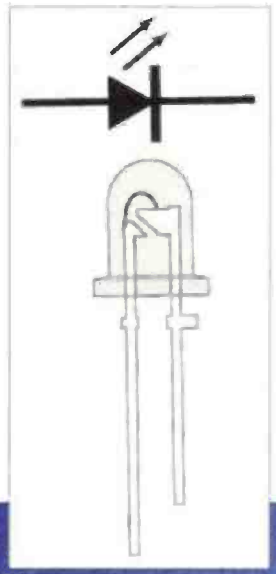
The circuit in Fig. 2, shows a 1µF capacitor used at pin 2 to determine the bandwidth of the circuit. This value gives a bandwidth of about 100Hz, which suited the application well. Increasing the value to 2.2µF would reduce the bandwidth to around 70Hz. (The individual constructor might like to experiment with this value).

The detected tone drives the l.e.d. which illuminates when pin 8 goes low. An LM567 chip works with a voltage in the range 4.75 to 9V.

As I imagine most applications of the circuit will be used with a transceiver that has a 12V power supply, I added a three pin integrated circuit voltage regulator.

As I've a lot of 7805 voltage regulators that give an output of 5V and can handle up to 1A of current. The voltage is ideal but the current capability is rather over-kill. A more sensible regulator chip would be the 78L05 that can handle a current of 100mA.

However, you can use whatever regulator you have to hand. Any other regulated voltage, within the allowable range of the chip, would require a different series resistor for driving the l.e.d.



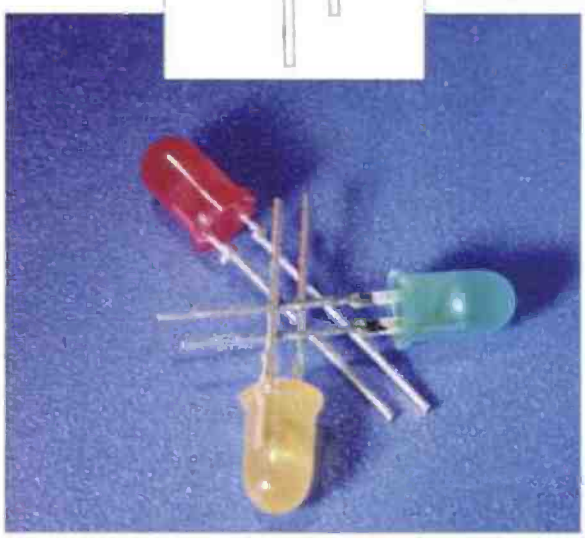


Fig. 3: You can use a colour of your own choice for the l.e.d. in the circuit ... but remember that the longer lead goes to the positive (+) supply).

Driven From The Top

The circuit works well being driven from the top of the audio gain control in most transceivers. Again, this is open to experimentation and other places in the audio chain of the transceiver could be tried.

The 0.1µF capacitor on the input isolates the circuit from the transceiver audio stage d.c. supplies. Set up the frequency of the chip by 'ear' using a received tone on the transceiver or use an audio signal generator if one is available.

A refinement might be to build two of the circuits and set the internal frequencies a few tens of Hertz apart. The two l.e.d.s lighting would then mark the required pitch. This may be easier to use than hitting the exact frequency to light up the l.e.d. on a single circuit.

So, here's another 'illuminating' little circuit to try - have fun! *PW*

Top Class Performance - Budget Prices!

The ADI AR-147 144MHz FM Transceiver

Rob Mannion G3XFD reports on two interesting 144MHz transceivers the latest of which, the AR-147, incorporates 'Air Band' receive. He thinks they provide "Top class performance at budget prices".

Early on this year, just before my holiday in Ireland, I was able to borrow a budget-priced transceiver - the Taiwanese manufactured ADI AR-146 to take with me as I was expecting to have a great number of QSOs during my visit using my new callsign EI5IW. I wasn't to be disappointed, either by the number of QSOs with friends, or the performance of the transceiver!

To go with the original transceiver I'd also borrowed a replacement for my own antenna - which had been stolen from the roof of my car when (would you believe it) I'd been attending my local hospital as an out-patient! The replacement antenna was the beautifully made and extremely robust **Comet SB15** Triband and it too performed beautifully, which was kindly provided by **Nevada** in Portsmouth.

I'm writing this report on the earlier AR-146 transceiver model and the new one (the ADI AR-147), which comes fitted with 'Air Band' receive because I know that there will still be many of the earlier rigs available.

The new ADI AR-147 transceiver (top) and older AR-146 (bottom). The AR-147 covers 144MHz and provides 'receive only' on the 'Air Band'.

Hidden Under A Bushel

The ADI range of equipment really does seem to be 'hidden under a bushel' when it comes to publicity and availability. As you'll realise from my report, although we don't know a lot about the manufacturers (the ADI Communications Corporation) the performance is in the 'Top Class' range and they really do provide excellent performance at budget-prices ..., despite the two problems which I discovered on the transceivers.

The receive side of both the earlier AR-146 and the newer AR-147, are based around dual conversion superhets with the standard intermediate frequencies of 10.7MHz and 455kHz. The audio output is quoted as being 2W into an 8Ω load.

Transmitter output on both 144MHz transceivers is a maximum 50W on n.b.f.m. It's capable of being switched down from the 50W to approximately 25 and thence to 7W.

Cooling for the transceiver is provided by natural convection from the extensive heat-sinking fins on the rear. They do their work very well too!

What's On Offer?

So, what's on offer with the transceiver? What does it feel like to use? Well, in presentation it's very small and compact and measures 140 × 40 × 166mm, with almost half of the physical dimensions being taken up by the heat-sinking. The internally mounted loudspeaker is located under the top side of the casing.

Designed around a small, neat and 'non fussy' control panel (with main controls incorporating illumination) the transceivers are dominated by the back-lit, pale yellow coloured liquid crystal display (l.c.d.). screen. This, although it works well, can prove difficult to read in bright sunlight and some of the annunciators can be difficult to read.

The front panel controls are all neatly placed, easy to use and, even with my larger fingers, caused no problems during the long periods I had both transceivers on test. The fist-held microphones are also relatively easy to use. However, the microphones are also the source of the second of the only two problems I discovered with the transceivers (see comments under the heading '**My Opinion**').

As you'll be able to see from the photograph, **Fig. 1.**, the microphone has a host of controls - including the 'tone burst' for repeater working. It requires some dexterity in use!

Fig. 1: Close-up photographs of the ADR microphones, clearly illustrating the complex functions provided (see text for comments on repeater working). The newer AR-147 microphone (left) is provided with a ferrite sleeve.

Manual & Controls

The supplied manual is well written and readable, although some of the diagrams (referred to in the manual's text) are not as clear as they could be. However, the 46-page booklet is very comprehensive. Incidentally, the manufacturers mention that the same manual covers the 430MHz version, the AR-447. So, apart from a higher frequency coverage and lower transmitter output you can assume it's basically the same transceiver.

I'll list the main controls and most important functions and facilities because to list everything that's available will take up too much space! To start, it's important to realise that the newer AR-147 comes 'ready to go' with CTCSS functions, especially useful as more repeaters in the British Isles are being so equipped.

Front panel controls include: **PWR** (power) switch,

Tuning control (this is used - to select transmit/receiver frequency, MHz step, memory channel, frequency step - available in 5, 10, 12.5, 15, 20, 25 and 50kHz steps, scan direction, tone frequency And other facilities).

Next come the **VOL**ume control, **SQ**uelch, **LOW/DIM** control (LOW is used for setting power output levels, DIM is for l.c.d. illumination setting). The **VFO/M** key is used for the v.f.o. and memory selection, **MHz/LOCK** control, is for tuning rate and DTMF setting (if installed). The **CALL** key is for 'call channel' function and multi purpose us. The **SHIFT/REV** button is for selecting offset features, while the REV function reverses transmit/receive frequencies during repeater operations along with other facilities.

Pressing the **TONE/DUAL** key is used for selecting sub-audible tone signalling modes and the required frequencies of the tones. The DUAL function allows you to 'watch' two different frequencies. This includes: Listening on the dial frequency under M1, listening on the dial frequency and one memory, listening on the dial frequency and a memory frequency under scanning.

There are also 81 memories available. The data that can be stored includes: Receive frequency, transmit offset frequency, transmit offset direction (high or low), repeater access tone, CTCSS tone frequency, DCS code/polarity, continuous squelch code, CTCSS/DCS status, pager/con. squelch status, auto-repeater mode stays, DTMF transmit speed, DTMF transmit delay time. (Although not all apply here in Europe as yet).

On The Air

In reality most of us want to know "just how did it work when on the air" when it comes to making a decision to buy a particular transceiver. Well, in answer to that often asked question I've got to say that both the AR-146 and later 147 worked impeccably for many hours over months of use.

Additionally, the transceivers were also reported to have very good audio reports on transmit - even though I'd initially found that I'd been talking (with my well known loud voice) too closely into the AR-146's microphone. On receive I must say that the AR-146 and '147 also proved remarkably sensitive and selective, coping extremely well with other transmissions close by both in frequency and physical terms when I was 'on air' from my car at the Longleat rally in July where I had much competition on adjacent channels!

As I tend to talk too much and brevity is not my style on air - the generous heat-sinking was put to the test in some QSOs! With the transceivers (not at the same time!) mounted in the front passenger's foot well in my car I was able to judge just how hot the aluminium fins on the heat-sink got. However, they proved their worth and very quickly dissipated the heat when I operated the rig at maximum r.f. output.

The sensitivity of the transceivers was really 'tried and tested' with some extreme range mobile-to-fixed QSOs I had with **Liam EI7FE** and other friends in Ireland. In particular I remember working Liam (through hilly terrain) at close on 120km under difficult conditions.

If you're keen on 'Air Band' listening the AR-147 is available with this option. All that has to be done to access the 118 to 135.995MHz band is to turn to **VFO** mode, press the **MHz** key for one second and it will display 'A' on the l.c.d. screen. Pressing the MHz key for longer than one second returns the receiver back to the amateur band.

Audio output is more than adequate for mobile use and the speaker - despite being a smaller unit copes very well. Audio distortion - often caused by poor mounting is not a problem on this rig due to the innovative 'three-legged' suspension collar (see **Fig. 2**). Very nifty!

Fig. 2: Top view of the inside of the ADI AR-147 transceiver. The extensive (and efficient) heat-sinking is clearly shown, along with the innovative 'three legged' loudspeaker mounting assembly which considerably reduces case vibration at higher audio output levels (see text).

My Opinion?

In summing up, my opinion it's important for me **to stress just how good** these 'budget priced' transceivers are on air. Don't be put off by the lower prices - in this case, it really doesn't mean you're not going to get good equipment. On the contrary, **they are** good and **very reliable**.

The only complaints I have about both the older AR-146 and the newer AR-147 is that the main l.c.d. screen cannot cope with bright sunlight and the awkwardly placed repeater tone button on the microphone on both the AR-146 and 147. The former only requires the rig to be placed (as far as possible) out of direct sunlight so the screen can be easily read. The latter can be overcome by using a properly installed switching unit combined with a boom microphone for (legal) 'hands free' operation.

I think we may hear more from ADI in the future and I'll look out for anything they offer for h.f. as it could be very interesting indeed!

My thanks go to Waters & Stanton PLC of Spa House, 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835, FAX (01702) 205843 for the loan of the review transceivers. The older AR-146 is no longer available (except second-hand) but W&S can supply the AR-147 for £199.95 plus £6 P&P. *PW*

Manufacturer's Specifications

General:

Frequency range Transmit/receive	144-146MHz	
Receive only (Air band a.m.)	118 to 135.995MHz	
Mode	F3E (f.m.)	
Operating temperature	-20°C to 60°C (-4°F-140°F)	
Power requirements	13.8Vd.c. ±15% (11.7 to 15.8V)	
Ground	Negative	
Current drain	Transmit mode	Less than 12A
	Receive mode	Less than 600mA
Receiver		
Circuitry	Dual conversion superheterodyne	
Intermediate		
Frequency 1st/2nd	10.7MHz/455kHz	
Sensitivity (12dB SINAD)	Less than 0.18µV	
Selectivity	70dB	
Squelch Sensitivity	Less than 0.1µV	
Transmitter:		
Output power	HI	Approx 50W
	Mid	Approx 25W
	Low	Approx 7W
Modulation	Reactance	
Spurious radiation	< -60dB	
Maximum frequency deviation	±5kHz	
Audio distortion		
(at 60% modulation)	<3% (300-3000Hz)	
Microphone impedance	500Ω	
Antenna impedance	50Ω	
Frequency stability	<±10ppm	
Dimensions (w x h x d)		
projections included	140 x 40 x166mm	
Weight		
Audio output (10% distortion)	More than 2W (8Ω load)	
External Speaker Impedance	8Ω	

Rob's Review Score: 8 out of 10

VALVE & VINTAGE

It's Ben Nock G4BXD's turn 'on duty' in the shop again this month. And you may wonder ... is he wearing a Second World War Royal Navy uniform because there's a slight nautical flavour this month?

Hello once again and I hope you all enjoyed the various rallies and shows during the summer! Did you experience the odd effects to radio propagation during the eclipse? I know I did.

Do you not find that fate conspires against you sometimes? At a rally a few weeks ago I noticed a Royal Navy transmitter for sale. I looked over the set and pondered if I should buy it but as I had never seen its matching receiver offered at any rally (though I have seen one in a museum) I decided against it.

Guess what I saw at a rally a few weeks later? Yes, you're right ... it was the matching receiver. Of course I had to have it and now live in the hope of finding the transmitter being re-offered at another show somewhere!

Fig. 1: The Murphy h.f. receiver. Because the control knob lettering is white, it doesn't show up too well in the photograph against the light blue paint work.

Made By Murphy

The receiver, **Fig. 1**, was made by Murphy in the early 1960s and is very nice indeed. The example I have is in excellent condition and, after a full tune up, is performing very well although the home-brewed power supply unit (p.s.u.) that came with the set did need a bit of attention.

In use, the set needs a 150V regulated high tension (h.t.) supply for the oscillators. The home-brewed p.s.u. had a stabiliser incorporated but, with the incorrect value of dropper resistor fitted, the regulator was in fact not firing and thus not holding the h.t. line stable. A quick application of the soldering iron and a new resistor soon sorted the problem.

The set is designated CAS or AP100335. The matching transmitter is (apparently) a Type 618, the set has 13 valves and is a single conversion superhet.

With a tuning coverage of 60 to 550kHz and 1.5 to 30MHz the receiver covers the wide range this in a total of five ranges. The set has switched i.f. bandwidths offering 8, 3 and 1kHz and 200Hz settings. The beat frequency oscillator (b.f.o.) can be switched to provide a crystal calibrator function and the normally tunable local oscillator can also be crystal controlled for accurate 'spot frequency' operation.

I found that the receiver operated on the bands very nicely, although the tuning is a little 'tight' on the higher bands (but that's typical of this type of set). Stability after an initial warm up is good and the only problem experienced was with the gain difference using the automatic gain control (a.g.c.) **On** and **Off** setting, but this might have been a fault rather than a feature.

Czech Set

Another receiver I have been playing with for a few days is a Czech set marked R4-1, **Fig. 2**. This very nice receiver covers 1.5 to 12.5MHz in five bands, has a built-in S-meter, which also doubles as various other options like allowing the different valve voltages to be measured. It even comes with a variable i.f. filter control which, at its widest, is suitable for amplitude modulation (a.m.) reception and, at its narrowest, ideal for c.w. reception.

High and low impedance antenna connections are provided together with high and low impedance audio outputs. Switched a.g.c., volume and r.f. gain controls and an antenna trimmer control all add to this receiver's features.

The power supply unit can run from 12V and uses a rotary generator for this purpose. When operating from the 'mains' the receiver employs a standard transformer type circuit.

The set has a crystal calibrator for accurate setting of the dial, the centre pointer of which is adjusted by a small screw slot to align it with 'zero beat'. Two pre-set positions can be locked into the dial on two spot frequencies.

In use, the set is very good. The ability to vary the i.f. bandwidth is ideal on the crowded bands and is very easy to use. The tuning, via the lower left knob (see picture, Fig. 2), is very positive with no backlash whatsoever.

Two Drakes

Now, how about the two receivers in **Fig. 3**, both from Drake in the USA? Both cover the Amateur Radio bands.

Although they're from the same well known 'stable', the two sets are separated by a few years. The receiver on the right is the older Drake 2-B, made around 1961 to 1965 and is a triple

Fig. 2: The R4-1 receiver, main tuning lower left, with headphone sockets bottom left and S-meter/voltmeter top right. (The p.s.u. plugs in at the rear).

conversion 10 valve superhet.

The set on the left is the Drake R-4C, made from around 1973 to 1979, again a triple conversion design, but this time incorporating six valves plus 15 transistors.

The 2-B receiver covers 500kHz segments from 3.5 through to 28MHz as standard with a spare five positions on the wavechange switch that could be used to install any 500kHz segment from 3 to 30 MHz.

A small modification allows 1.8MHz 'Top Band' to be fitted, as on my example. The main tuning dial has 1kHz divisions marked around the edge and tuning is quite good, but as it uses a cord drive, it's prone to slipping.

The intermediate frequency (i.f.) passbands of 3.6 or 2.1kHz and 500Hz are selectable as are diode or product detector demodulation, fast and slow a.g.c. and a noise limiter. A crystal calibrator could also be fitted as an option.

The R-4C receiver again covers the 3.5 to 28MHz bands as standard. However, it also has provision for a further 15 separate 500kHz segments to be fitted between 1.5 and 30MHz.

Usually, the R-4C usually came with only the s.s.b. filter fitted, the optional filters are mounted on the rear wall of the case so can easily be checked for their existence if purchasing a set. (The practice of making other filters an 'option' still seems prevalent today, even if you're spending thousands on a rig!).

The receiver has i.f. passband tuning, a variable notch filter and swichable a.g.c. speeds. Tuning is direct and very smooth, the R-4C as a whole is an exceptional set and a joy to play with.

Test Set

Although not often mentioned here when I write this column, I throw in the test set item, shown in **Fig. 4,** by way of a small change. The set in question, a BC-906D, is a Second World War vintage cavity wavemeter with a single valve amplifier.

The BC-906D was more or less the standard frequency meter used to tune up the United States Air Corps. IFF (Identification Friend or Foe) sets (Mk III). The BC-906D was used in various test set combinations (my database says IE-13, 46, 48, 50 & 56) and (at least some cases) these test sets also included the BC-1066 Signal Generator.

Some information about BC-906D from the *Surplus Schematics Handbook* from *CQ* magazine of the 1960s says that: "The BC-906D is a frequency meter of the absorption type. Frequency range is 150 to 225MHz. The required voltages are 1.5V for valve heater, a type 1S5 and 45V for the anode supply". (These were provided by batteries housed inside the case).

I fitted batteries and tried out this example and did notice a blip on the meter from my 144MHz transmitter but, in reality, I think the unit is now more of a display item than a shack tool. My thanks go to **William Donzelli** and **Bruno SM7HKM**, for information on this test set

So that's all for now. I know it's over two months away but a happy Christmas and have a very good new year. As always, I can be contacted at: **62 Cobden St, Kidderminster, Worcestershire DY11 6RP**, or E-mailed on **G4BXD@compuserve.com** Visit my Web pages at **http://ourworld.compuserve.com/homepages/G4BXD/** *PW*

Fig. 4: The BC-906D Wavemeter with calibration chart housed in the lid. A small extendible whip antenna plugged into a socket on top of the meter's case.

Fig. 3: The Drake 4C and 2B receivers, note the classic styling of the 4 series, something that many other sets lack.

Counting Up From The Millennium!

Most of us are somewhat tired of the various 'count downs' to the coming 'Millennium'. However, for the remaining part of 1999 Rob Mannion G3XFD is doing something quite different by 'counting up' from the Millennium! Rob is letting his imagination run wild with 'cuttings' of imaginary Amateur Radio 'news' item which (might) appear in the magazine in future years. They're intended to be thought provoking, sometimes controversial and interesting but above all ... totally imaginary!

A Mixed Bag Of History

From The Editor's virtual desk, March 2108: Before I leave to join the Interplanetary Amateur Radio Union's conference at the Intergalactic Communications Centre on Mars I've found just enough time to share with readers a remarkable discovery which furthers the knowledge reported in the Wessex Archaeology Report of January 2108, and published within a recent *PW* magazine-disk. Additionally, we have great pleasure in announcing that there's a definite link to *PW* dating back to the late 1990s!

However, I'll now pass the narrative over to **Professor Norman G. Swann**, who has the Chair of Electronic Industrial Archaeology in the University of Wessex, who has a quite remarkable story to tell.

Professor Swann tells us that: "It all began when I was called in by the Wessex Archaeological consultants to the remains of what was known as a 'house', near to the present community dome complex where I now live. In fact, I was called in because there's a long lost family connection in the area as my Great-Grandparents were believed to have lived in what was known as a 'Street' or 'road' in the days of the inefficient individual living modules referred to as 'homes' before everyone learned to live in energy-efficient Community Energy Limited Living Systems (CELLS).

"I was particularly interested following the find of what turned out to be very ancient electronic components, as reported in your own magazine-disk. My own hobby-interests are in the history of electron microscopy, particularly engineering at sub-visual levels and mainly medical microscopic capillary pumps, etc. This interest was inherited I think from my late Great-Grandfather, one **Norman George Swann** who although originating from what was Northern England, eventually settled in the South.

"The other interesting thing - as far as your own magazine-disk is concerned, is that my Great-Grandfather had some connection with your subject in the days when it was published on paper. He (we think) worked as a photographer in the latter days when chemicals and 'film' were used and as some form of Editor - in fact he may have been Editor at one time, although we have little information on this aspect - using a very ancient form of electronic writing which was carried out on a device called an 'Apple' I believe.

"Although we could not condone such waste now - reading a magazine on paper must have been so inconvenient and tiring. All I've got to do now is to plug my neural-transfer band to my forehead, insert the news-disk into the interpreter unit and lie back and enjoy the 'direct image neural transfer' transferred from your disk. That's the way to read - with your eyes closed and while you're relaxing" said Professor Swann.

Mystery surrounds the bag of what is thought to be a well-preserved selection of electronic components, found just above the tide line near (the now submerged) town of Poole, in East Wessex (formerly Dorset).

Mixed Bag

Questioned on the interesting industrial archaeology discovery, Professor Swann told *PW* that: "The bag of mixed components was discovered in a large concrete box-like structure which - so we've learned - was built to protect a 'house' during one of the many wars that took place between 1914 and 2020. We're not sure quite when the building was erected - but it's still strong now, even though there's no sign of the original 'house' it was associated with.

"Double-wrapped in what was known as 'plastic' and sealed in a waterproof sealed box, it is thought that the components were actually placed deliberately as a form of 'time capsule'. A message - containing the strange acronym G1TEX (still being decoded) was found written on paper (yes ... paper!) which, although it had survived, was badly stained from absorbing condensation, brought about by the close proximity of the sea". (Here, Professor Swann pointed out that, although the site was originally 80 metric units above the European Channel (formerly English Channel), it was now only just above the tide-line.

Investigations continue on the contents but great mystery surrounds some of them! Just what (for example) is a CB Converter and what's an 'AM' radio? Also in the package were devices labelled 'relays' and 'compact cassettes'.

Intriguingly, there's one rectangular object - with a semi-opaque viscous jelly-like substance (very well preserved) which appears to be made up from a material similar to the vege-protein now used instead of the (now illegal due to health regulations) old fashioned Hen's Egg, once so popular in the (now outlawed as politically inappropriate) 'English Breakfast'. Marked as a 'Numerical Liquid Crystal Display' unit - this particular item is proving very interesting indeed.

No doubt, we'll hear more about it as the Industrial Archaeologists dig into the long history of electronics! There's much more to electronics than vege-genetic programming and we must not forget the days when 'radio' was carried out with the help of metal wires and lead-tin-alloy metals. Let's not forget our history!

Please direct any correspondence or comments to the *PW* office in the correct year – remembering to add the relevant space-time-warp code.

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CAN YOU AFFORD TO MISS IT? - DECEMBER ISSUE ON SALE 11 NOVEMBER - PLACE YOUR ORDER TODAY!

Antenna Workshop

An Experimental Fractal Dipole For 28MHz

John Heys G3BDQ designs and tests the latest in antennas - a fractal. Puzzled? You won't be after you've read the article!

Fractals are shapes, now often computer generated, that have ever increasing 'layers' of patterns that are diminished copies of an original outline. They are a branch of the mathematical discipline of topology. Until **Professor Nathan Cohen N1IR**, of Boston University experimented with antennas based upon fractal patterns In 1998, these figures did not appear to have any practical or useful function.

Always ready to try out something new in antenna design, I set about making a fractal antenna for the 10m (28MHz) band. I could not discover any constructional data anywhere so had to set about the task empirically without instructions or guidelines.

I've shown a typical fractal in **Fig. 1** which has three iterations (repetitions) each being made up with squares having a missing side. A fractal, when outlined with a wire, can accommodate a great wire length within a small area. In the example shown, a wire 77 units long can be arranged within an area just 19 by 13 units. Bending a wire along a fractal pattern doesn't appear to prevent radiation taking place when the wire is then employed as an antenna.

A fractal designed for use at v.h.f. or u.h.f. presents fewer constructional problems for the conductor of tubing or thick wire can hold itself in position with little support. This simplicity ends when fractal antennas for the h.f. bands are considered, so I had to work out a radically different method of construction.

Out Of The Blue

It is uncanny how an answer to a pressing problem can suddenly appear 'out of the blue'. I was in my garden one afternoon and chanced to notice some unused plastic mesh netting lying by my compost heap. This material is sold to make fencing or to lie as protection for seedlings and vulnerable plants. A former use for it had been to prevent a heron invading my fishpond but it had been replaced by a less visible substitute.

The mesh is quite sturdy and is made with 50mm (2 inch) squares. My piece was about three metres long and almost half a metre wide. It was white but I also had some lengths that were coloured brown. It dawned on me that an antenna wire could follow a fractal pattern by being wound through and around the mesh squares and held in position by using a few nylon cable ties at strategic points.

Knowing that a bent wire always has a resonant frequency higher than a straight one, I followed the fractal pattern until I had used up a temporary 3.6m (12ft) length of thin insulated tinned copper wire. A true quarter wave wire for 28.5MHz is 2.5 (8ft 3in) long, so I had used considerably more wire than usual.

The mesh, with its fractal wiring on board, was then hung vertically from my loft trap door which is above the landing outside my shack. Some 50Ω coaxial was connected, the inner going to the fractal wire and a straight quarter wave 'radial' joined to the coaxial braid and laid along the floor of the landing. My Autek Antenna Analyser revealed resonance was somewhat below 28MHz. Some judicious pruning of the fractal wire to a total length of 3.47m (11ft 5in) resonated it on 28.32MHz.

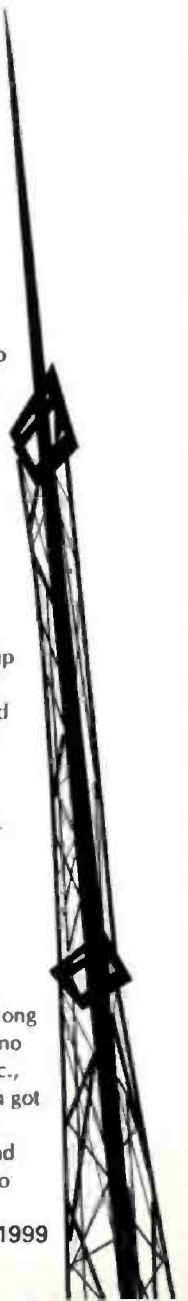
I now had a quarter wave vertical antenna which was a simplified version of the fractal design shown in Fig. 1, but with only two iterations. The pattern enabled the wire length to fit on a section of mesh only 1.06m (3.5ft) long. A 'normal' quarter wave wire for the 10m (28MHz) band is 2.5m (8ft 3In) in length. My half wave fractal design antenna, as actually used, is shown in **Fig. 2**.

Initial Testing

When the half finished fractal antenna was connected to my transceiver, I was surprised to hear how lively the band seemed. A few c.w. signals were as strong on the fractal as they were on my outdoor antennas. The s.w.r. was about 1.3:1 at the c.w. end of the band and when using just 50W of power, I was amazed to work and receive good reports from Oman, Turkmanistan and **5R8GC** in Madagascar. (I actually 'cracked' a pile-up to work that station!).

Spurred on by the results so far, I soon wired up the other half of the dipole. The total length of mesh netting was now 2.132m (7ft) which held the complete half wave 10m dipole. As usual when feeding a balanced antenna with an unbalanced feeder (50Ω coaxial), I used a current balun just below the connection point. This can be made with a couple of clamp-on ferrites, a few turns on a ferrite ring or rod or some ferrite beads slipped over the (5mm diameter) coaxial cable.

The completed dipole was first set up horizontally, tied to the wooden bannisters along the landing and I found that in that position, no doubt because of nearby electrical wiring, etc., some additional trimming was needed. I soon got it resonant on 28.2MHz where the s.w.r. was right down to unity. On 28.01 it was 1.3:1 and above its resonant frequency, the s.w.r. rose to



1.4:1 on 28.6MHz and 2:1 at 28.8MHz.

Then I replaced all the thin antenna wire with a thicker insulated multi-strand wire which had little affect upon the resonant length. With my fractal pattern the wire length for a half wave dipole is 38% greater than 'normal'. This would not apply were a different pattern to be used. In this case some experiment would be needed.

Genuine Reports

The finished fractal dipole was used to work c.w. and s.s.b. DX and I received some genuine S9 reports. All continents were worked including W, UA0, LU, VK6 and 8Q7. Checks against my good outdoor antennas usually indicated that they were from 1 to 2 S points better than the indoor fractal. By positioning the dipole over the landing as a sloper at 45° the fractal became quite directional and was poor towards its high end. When using 100W to the fractal dipole a neon lamp could be struck along most of its wire length. **The r.f. voltages at its ends must be considerable and care must be taken to avoid them being touched.**

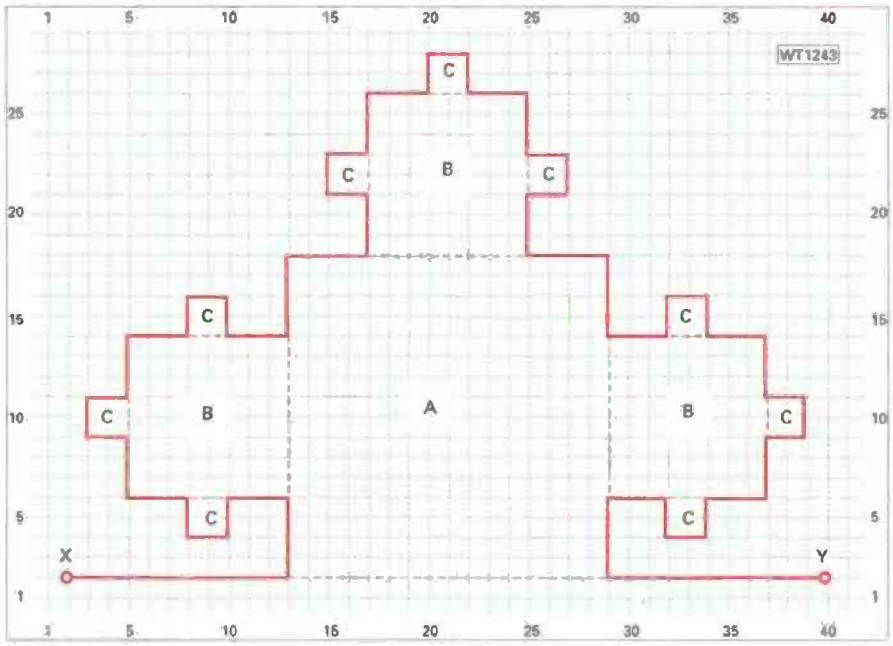


Fig. 1: A fractal design based upon squares. It has three orders of iteration which are marked A, B and C. Points X and Y would be the wire ends if this fractal was used as part of an antenna. The distance from X to Y is about four times the fractal shape length.

A most surprising coincidence was to hear and contact the 'father' of fractal antennas, N1IR himself. Nathan 'Chip' Cohen and I had much to talk about. At the time he was using an outdoor fractal quad loop antenna, which he said was some 3 to 4dB better than a standard quad loop antennas.

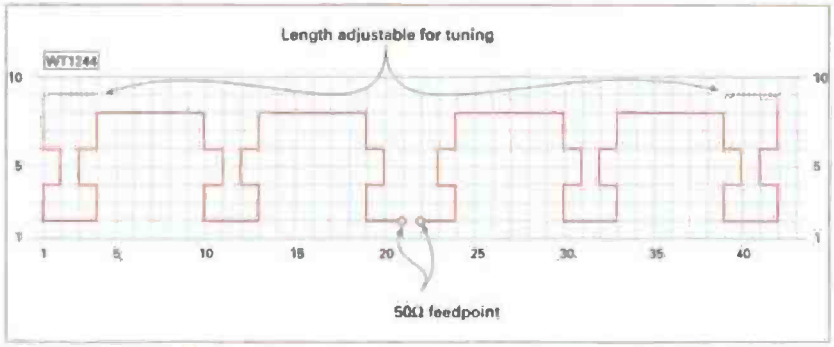


Fig. 2: The wire arrangement on a length of plastic netting (with 50mm - or two inch 'holes') used to make the 28MHz fractal dipole. At the dipole ends enough wire is left to trim the antenna to resonance. The complete fractal dipole can be built on a length of netting which is a considerable length reduction over a normal half wave antenna for the band.

If you discover and develop a new and perhaps unusual type of antenna it often invites ridicule and ribaldry. In our conversation, 'Chip' said that the apparent lack of 'open-mindedness' had been a disappointment and even now he finds some sections of the amateur community seem to find it difficult to take him seriously. Just why folk think that a Boston University Professor should try to fool us is difficult to understand but when a few more folk make and try out fractal antennas perhaps reactions will improve.

The first 'airing' of 'Chip' N1IR and his work with fractal antennas in the UK appeared in April this year (a similar article called "Aerial magic", was published in the *New Scientist* magazine dated the 31 January 1998). But here in the UK, the first mention was in the technical topics section of *RadCom* and many readers thought that it was **Pat Hawker G3VA**'s April Fool joke!

But rest assured, **the fractal antenna is not an April fool's joke!** The antenna works well, although we do not yet know why fractal antennas work so well. Even the discoverer, N1IR himself, does not yet really know why they work despite their diminutive size, but work they certainly do. I intend making a fractal quad loop antenna for the 50MHz band soon and this should be an interesting project.

Still Indoors

My dipole has not yet been used out of doors but I see no reason why fractal antennas with their inherent small physical size should not be put up as fence sections in gardens. They could be mounted above existing hedges, walls or wooden fencing. If the wire used was the same colour as the plastic mesh they would become almost invisible.

A fractal dipole can easily be rolled up if it is to be transported and would then make a convenient parcel. A quarter wave antenna for the 1.8MHz band (about 40m long) could be replaced by a fractal end fed by using repeats of the pattern given in Fig. 1. It would only take up a 10m length of garden, so who will be the first to use a fractal on the l.f. bands?

antennas in action

welcome to AiA!

Hello and welcome to Tex Topics for November 1999. This is rather a strange month as I have no news, or books for your bookshelf this month. But let me first say that by the time you read this there should be Volume 6 of the *Antenna Compendium* series of books available.

G7TEX

I shall try to review the new Volume 6 of the *Antenna Compendium* in the next 'Tex-Topics' column but, in the meantime, a short news release from the ARRL's book service, mentions that there will be 43 new previously unpublished antenna articles in the new volume. There will also be a CDROM containing data and executable programs for IBM PCs or compatible computers with the book. For further details contact our book sales department for the price and availability of the new *Antenna Compendium Volume 6*.

Voltage-Probe Antenna.

My project for this issue is an unusual receiving antenna from **Peter Buchan G3INR** called the 'Voltage Probe Antenna' (v.p.a.) shown in **Fig. 1.** But instead of waffling on about the antenna, I'll let Peter describe it:

"Browsing through old radio magazines is a fascinating and sometimes rewarding pastime. Recently, whilst looking at a few copies of *Ham Radio* (USA), all nearly 30 years old, I came across the interesting title 'Voltage-Probe Antennas' (v.p.a.). This article described some research on a very small active antenna which claimed to out-perform the common 'on-set' whip antenna and an external ground mounted five metre vertical antenna. The active circuit made use of discrete components (including an f.e.t.) but no detailed information was given.

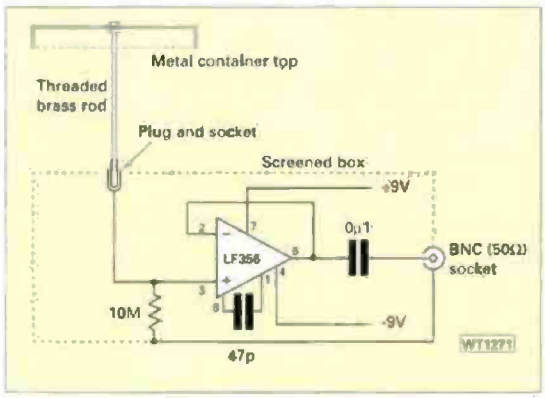
" I was not familiar with the v.p.a. but had had considerable experience making and using Voltage-Probes (v.p.), instruments used to search out electric fields and interference when conducting research on the nervous systems of insects. Glass electrode impedances greater than 1,000MΩ were common and Faraday cages were required. A different instrument was used to sort out magnetic fields.

"Early v.p.s used discrete components but later ones made use of the then innovative Op-Amp, and a little later of course the f.e.t. input Op-Amp. Bearing in mind the 1MHz Band-Width, it took but 30 minutes or so to knock up a v.p. using the ubiquitous 741 Op-Amp. The basic circuit I adopted is shown in the diagram of **Fig. 2.**

Fig. 1: Peter Buchan's Voltage Probe Antenna (v.p.a.) can outperform a wire antenna at low frequencies, see text for more details.

"Instead of the normal search probe a very small antenna was constructed as per the photograph in the original article. *(The photograph of **Fig. 3** shows the small piece of Vero-Board that Peter used to build the small amplifier circuit.* Ed.*)* Connecting the battery supply and the probe output, through a coaxial cable to a Ten-Tec 585 antenna socket, a search of the lower frequencies commenced. The results were quite extraordinary. The v.p.a. was also tested using an ICOM 745 with similar results. The v.p.a. out-performed a 20m end fed antenna from 100kHz up to 1MHz, increasing the strength of signals at the lower end by as much as 40dB.

Fig. 2: The circuit of the v.p.a. could hardly be simpler!



Active Antenna

" Here was evidence that a very useful active antenna could be constructed from just a few components. Further work showed that the v.p. must be contained in a

Continued on page 50...

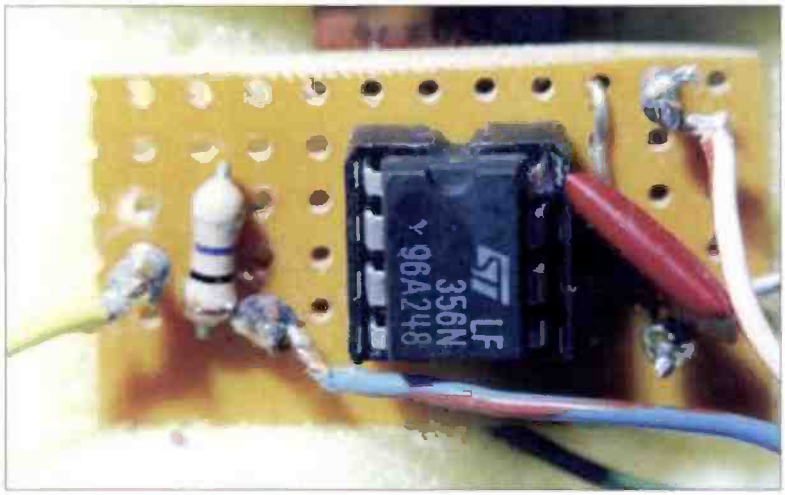


Fig. 3: A small piece of board and a few components to mount the parts on ...

...continued from page 48

screened enclosure, and positioned at least two metres from any type of metal work. This includes the receiver itself and such devices as filing cabinets water piping, and electrical conduit or wiring. To avoid overloading, the v.p. should be used remotely from a large antenna. An improvement in performance is realised by changing the 741 Op-Amp for a SGS LF356, nevertheless the 741 does work very well .

"The impedance characteristics of a very short antenna, one that is very much less than a quarter wave show the antenna to be overwhelmingly reactive. The resistance is of the order of milliΩ in series with a capacitive reactance of about 1MΩ. Connecting this across the 50Ω input of a communication receiver leaves only a minute percentage of the signal voltage for amplification, the remainder being reflected (See Appendix).

"The v.p. however, with the Op-Amp connected as a Voltage Follower presents a very high input impedance, especially so the LF356 with its input resistance claimed as being 1TΩ (10^{12}Ω). The Op-Amp is not acting exactly as a matching device but nevertheless allows the signal to be presented to the receiver at an impedance of about 50Ω. The output impedance of both the 741 and LF356 Amps is about 50Ω .

Construction Straightforward

"Construction of the v.p.a. is quite straightforward, being made up into a small Eddystone die-cast box, shown in **Fig. 4**, with the addition of an on/off switch, a BNC coaxial socket, a 4mm plug and socket (banana plug) plus an 8 pin DIL socket a small piece of Vero-Board and of course a 741 or LF356 'op-amp' i.c. The antenna was constructed by soldering 50mm of 6BA threaded rod into the 4mm plug, on top of the rod was fixed a discarded tin lid 60mm diameter, first drilling a 6BA clearance hole into the centre of the lid, then securing the lid with a 6BA nut on both sides and then soldering the nuts to the lid. A coat of paint was added later.

"Further tests were carried out using an AKD HF3 receiver, which tunes from 30kHz, using the same 20m antenna. The AKD out-performed the Ten-Tec and other receivers, below 1MHz by a fair margin but with the addition of the v.p.a. the low frequency performance was considerably enhanced, especially below 100kHz".

I have to thank Peter for the project, and having tried Peter's prototype I can verify the superb signal quality that comes from the antenna. I think it would make a useful basis for a 136kHz receiving station.

Comparative Query

Now to some of your other letters. I've had a comparative query letter from a reader who bought a Scanmaster LP1300 log-

MFJ-269 Reviewed

I've just had the opportunity to try out the new 'third-generation' antenna analyser, the MFJ-269 from MFJ. I've looked at two earlier versions of the antenna analyser, and this short review complements them. (MFJ-259 mentioned in 'Goodall's Goodies' August 1995 and the MFJ-259B on page 40 of October 1998's *PW*). So, what were my thoughts about the new MFJ-269?

Looking very like its predecessor the MFJ-259B, the new MFJ-269 measuring from h.f. to u.h.f., is altogether a rather more capable unit.

At first sight you might think that the MFJ-269, is the same as its predecessor, the MFJ-259B, But then on looking closer you will see that the top panel has been rearranged, with an N-type socket instead of the SO239 of its forebears. You would also notice another small push-on, push-off switch labelled 'UHF' and a slight rearrangement of the power on switch.

One initial, slight disappointment was that the battery pack (ten rechargeable or AA cells) is now hidden inside again, requiring eight countersunk headed screws to be removed before you can put in new batteries. In the MFJ-259B variant, a single screw allowed access to the battery compartment. The new MFJ-269 has definitely been designed to have ten NiCad cells fitted. And let's face it, primary cells are now expensive by comparison.

The new unit still covers the original frequency range of (1.7 -170+)MHz in six ranges, but now has the option of covering a range of 415-470MHz when the 'UHF' switch is pressed and the unit is tuned between 138 and 156MHz on the topmost range. If the oscillator is outside these figures then a message to 'Increase' or 'Decrease' frequency appears on the display.

Ground Loops

To counteract possible problems with 'ground-loops' at u.h.f. within the chassis, the N-type socket is grounded directly to the bridge sensing board (which I can offer little information about, as none was provided). The case of the unit is now only indirectly

The MFJ-269, on the left side-by-side with the MFJ-259B. Although the limit on s.w.r. readings at u.h.f. is only a maximum of 5:1, it is extremely useful nonetheless.

antennas in action

Fig. 4: ... and a diecast box to put the amplifier and batteries in. Then you have your v.p.a.

periodic antenna of the type that I reviewed back in 'Tex-Topics' in the September 1998 issue of *PW*. He was having some problems comparing the results of my s.w.r. tests and those for his antenna. The reader also commented on what appeared to be very low signal strengths between himself and two fellow amateurs.

In my explanation I mentioned that, I used the Log-periodic antenna in the horizontal mode, in which it is easiest to attach to a normal vertical mast and mis-polarisation could account for the differences of signal level experienced with the two local stations. Not knowing what frequency the tests were carried out, or how long the coaxial cable was feeding the antenna I had to make my answer in very general terms.

The log-periodic antenna also exhibits a 'pointing' effect, consider this like a reflector placed behind a light bulb 'forcing' the light to one side of the bulb. The unit will receive better to the front, than to the rear, and poorly to the side. And like the reflector of a torch makes the light look brighter, the directional antenna seems to pick up (and transmit) more signal than a simple dipole antenna. So, in real terms the signal to the sides and back of the antenna is much lower (less 'bright') than to the front.

Opposite Polarisation

The situation is much worse, if the two antennas are of 'opposite polarisation' (i.e. one antenna vertically and one horizontally polarised), then there will be an even larger drop in signal between the two systems (I've seen figures as high as 36dB above the side-on loss, quoted). The degree of gain (losses) is very dependent on the antennas and surroundings in each case.

I also explained that when I carried out my original v. s. w. r. tests on the Scanmaster LP1300 antenna I a very short low-loss coaxial cable, with the antenna mounted above head-height pointing vertically upwards into the sky. The tests I carried out were using an MFJ-259B antenna analyser from 100-170MHz, then with confirmatory tests using an FT-736 in the 144, 430 and 1200MHz bands.

The tests that I carried out to check the s.w.r. are, at best, merely an indication of the matching of the antenna, not of its effectiveness or gain. Although I carried out no comparative

The MFJ-269 on the left with the MFJ-259B to its right shows that the modifications are more noticeable on the top panel. Note that the output socket is now an N-type rather than the SO-239 of its forerunners.

attached to the shell of the output socket.

The new MFJ-269 has all the capabilities of the MFJ-259B plus u.h.f. measurements of s.w.r., Impedance in both series and parallel effective values and also by phase angle display, bandwidth of filters, line length, velocity factor of a section of line, effective inductance or capacitance, return loss, resonance. There are many other tests that could just develop into a straight list, were I to give them!

The first, of the notable differences, is that the effective bridge resistive value (from 5Ω to over 1kΩ) may now be set, although accuracy will suffer somewhat when set other than in the 50-75Ω range. A second difference is that instead of the MFJ-259B's single group of advanced settings, the number of new tests that the unit can perform now requires three groups of advanced settings.

The documentation that comes with the MFJ-269 is in the form of a 40-page A4-sized manual printed on heavy-weight paper. The information presented is good, and covers every aspect of the unit, though a little 'spartan' at times. My main 'quibble' is that as the paper is rather stiff, it doesn't look too good after it has been folded to fit in the rather small, though adequate box, that the unit is supplied in.

There are eight countersink-headed screws to remove to gain access to the battery holder (similar to the MFJ-259). So, rechargeable NiCad or NiMH batteries are now the order of the day.

An Anomaly

One anomaly I noted about the new unit concerns the display of the battery voltage on switch-on. When the UHF switch is in the 'Off' position the supply voltage is reported correctly (usually between 9 and 15V). But if the UHF switch is in the 'On' position, then the battery voltage is reported as around 27V. Strange!

But what are my conclusions about the new antenna analyser? Would I buy one to replace my MFJ-259B? The answer is yes! On balance I think it's a good step forward for anyone interested in antenna and filter measurements and optimisation of all stages of getting a signal out into 'the æther'. The range of tests that may be carried out is extensive (although they need careful analysis) and useful. And to help you make up your mind, let me state three various scenarios for your consideration.

1) If you have an MFJ-259B and use it only occasionally, then perhaps you should stick with the unit you have.
2) If you have an original MFJ-259 and an interest in antennas, my advice would be to upgrade soon.
3) If you do not have any similar test equipment, then this unit is ideal and is 'a must have now'!

My thanks go to Jeff Stanton of Waters & Stanton (W&S) for the loan of the MFJ-269 Antenna Analyser which costs £299.95 - free delivery on this item for all *PW* readers. W&S can be contacted on Tel: (01702) 206835, FAX: (01702) 205843, Spa House, 22 Main Rd, Hockley, Essex SS5 4QS.

antennas in action

'side-by-side' tests with other antennas at the time. The antenna gave every indication of working as well as I would expect when I took it to the top of my favourite hill somewhat later to try out.

Vertical Antennas

An E-mail from **Peter Talbot M1DGQ** took me and the column to task, when he started out "Let me get the winging out of the way first, having read your great magazine for over a year I am some what disappointed with the antenna section of the magazine, as it seems to lack any construction of vertical or small antenna of any description for the v.h.f. and u.h.f. bands. I apologise now if I have missed any articles on this subject but it seems that you are all obsessed with big h.f. antennas and forget we are not all 'A' licensees but many of us are proud to hold a 'B' licence".

Peter then went on to say "I have got to the point of giving up trying to build my own as all the relevant literature always seems to be written for people with a good knowledge of this subject. I live on a ground floor flat with no garden, I have very understanding neighbours who let me put up a 25 foot (8m) pole with a home made quarter wave groundplane and four-element beam in the communal washing line area.

"The ground plane antenna is the one which I would like to improve as I live in the bottom of a valley and receive very little activity on 144MHz, this not without trying for some time. Unless I use the repeaters, I only seem to make contacts when mobile outside of the valley. I have tried constructing a pole with little success".

Peter asked about some advice on improving his situation. Considering Peter's location in a valley it's not an ideal position, more so for vhf/uhf operation where distance worked tends to rely more on 'line-of-sight' conditions. On h.f. of course there are semi-reflecting layers (D, E and F layers) in the sky to push the signal back down towards other amateurs.

I described a simple end-fed 144MHz antenna, the 'Pigtail', published back in the April 1992 issue of *PW* as a very effective antenna for use in restricted locations or mounted at the top of a simple pole or mast. The bandwidth of my original was adequate to cover the whole of the f.m. section (145-146MHz) easily (and could be retuned to cover the datamode section as well as the lower part of the f.m. simplex channels).

About the point, of Peter considering colllnear antennas. Well, they do do give a higher gain and a lower angle radiation pattern (this helps to improve the coverage for v.h.f./u.h.f. signals) over a simpler λ/4 or 5λ/8 vertical antennas. But they do so, at the expense of reduced bandwidth in general. And I doubt that things will change much!

Peter also asked why advertisers didn't put pictures of the antennas they sell in their adverts, which I couldn't answer - perhaps one of our advertisers would supply an answer to this question. But I cannot recommend buying an antenna just from a picture alone It's a recipe for disappointment!

In answer to the request for v.h.f. and u.h.f. antenna projects, I hope to bring you a variety of vertical antennas for several v.h.f./u.h.f. bands in the next year or so. So, keep an eye on the Antennas-in-Action column. But if readers have their own ideas and projects, then please write in and get your 'name in lights' here in A-I-A.

Crazy Dipole

In the last A-I-A there was an idea for an asymmetric dipole from **Bill G3XZF** and, in response I've had a letter from **Tony F5VBY/G3TZH** who courteously included **Ann F5VBX/G0SYH** at the end of the letter when he said: "I noticed an article from my dear friend G3XZF this month where Bill was describing what he calls "The Crazy Dipole". It is great to see some of the older style antennas being considered and I can only think that the reason for demise of most of them is the space required.

"This particular antenna is in fact the "Coaxial-fed Fullwave" and was first used by myself in 1967 for DXing on 3.5MHz. Its origins were never determined by myself, but with the references at the time to the **VS1AA Windom** makes me think that it was a monoband derivation. In effect, I am not surprised that Bill had success with the antenna described on 7MHz, because its dimensions are a full wave fed at the λ/4 point.

"If dimensions are true, then the feed impedance is nearer 90 and it was normally fed with 75 ohm coax in practice with the braid to the short end. It can be seen as two halfwaves out of phase and as such works the same as a fullwave with a similar four-lobed radiation pattern. At 20m high on 7MHz it will very low angles of radiation and hence the DX worked by Bill.

"A similar antenna was used at this QTH in 1997 for a few months on 3.5MHz where the first trial yielded an XE on s.s.b. In the afternoon just before we washed up after our excursions into the trees! A note that may be of interest, my antenna exhibited a marked change in feed impedance when the l/4 wave end was dropped in the fashion of an inverted "V" which resulted in a far easier method of making the 50Ω coaxial cable match better than the usual cut 'n try - any comments?

"I have since noted that **John Heys G3BDQ** has also made reference to this type of antenna and gives some useful information on tuning and extending it to include additional λ/2 wave lengths".

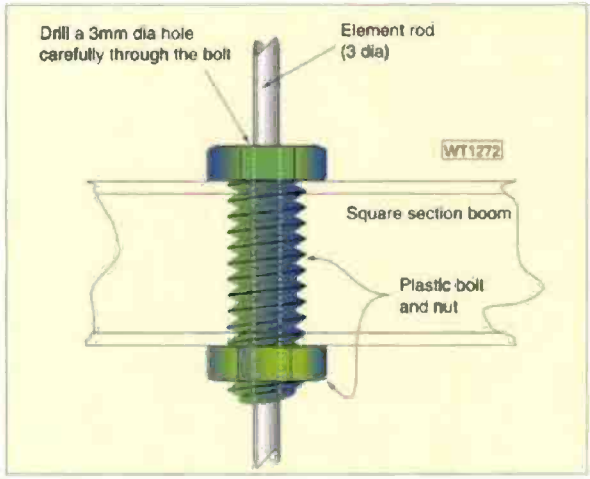


Fig. 5: Wilko Melenhorst uses a simple, but effective fastener for the elements on his long Yagi antenna, making it quick to assemble and strip apart.

I'm happy to add your additional information Tony (and Ann) I have always said that I'm just here passing on many of the comments you, the readers make. Please keep your comments and projects coming In, even if you think sometimes that it's 'nothing much'. Sometimes a number of 'not muches' add up to a great deal when they are all put together.

Men's Toys

It's often said that separating the men from the boys is only the cost of their toys. Well on a recent trip to my local high-point I met up with **Wilko Melenhorst PA1WM** (and his XYL and two young sons) who managed to combine both ages of man by using the method shown in **Fig. 5** to hold elements on the boom of his Yagi antenna. I was very impressed, a multi-element antenna stripped and packed away in a few minutes, due mainly to the simple and cheap fasteners.

The screw is a 'Mechano'-like bolt made totally of plastic and very easy to drill. The resilient plastic material of the bolt shrinks back slightly after being drilled to grip the element pushed into it very tightly. A 'soak' in hot water before fitting would help in difficult cases I think. A hole the same size as the outside diameter of the bolt is drilled through opposite sides of the square section boom and the bolt fitted through.

Well as usual, I've run out of space again this month so, keep those letters and E-mails rolling in. That way we can share the information about antennas, gradually improving all our stations. See you next time.

G1TEX

Matching the practice with the theory...

Dissecting The Dipole

Tony Harwood G4HHZ

describes his experiment whereby he set about building and measuring a dipole and then seeing how the impedance of the theoretical and practical dipole compared in practice. Does the theory match up to the reality? Read on and find out.

I'm one of those people who have been lucky enough to have had a career which included doing a lot of things I thoroughly enjoyed. In my case, this was whilst working as an engineer in broadcasting and it included building antennas and working on radio wave propagation, combined with technical writing.

Now, having retired and been blessed with a large garden - thoughtfully provided by nature - with tall trees at the front and back, I can now pursue these interests simply out of sheer curiosity. This article is one of the results of this curiosity. Why not, I thought, put up a dipole, measure it and see how the results fit in with the theory?

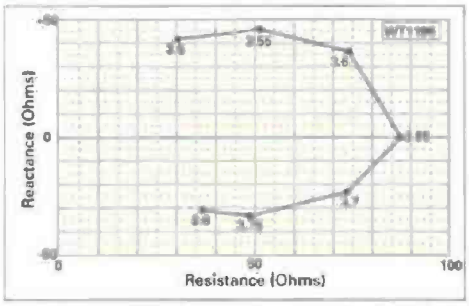


Fig. 2: Measured input impedance of the 3.5MHz dipole after adjusting for resonance on 3.65MHz.

Analysis Of The Dipole

The analysis of the dipole is quite a mathematical feat. One of the first successful attempts was made by **Erik Hallen** at the university of Upsala in the 1930s.

Hallen showed that the dipole impedance at the centre point of a length of wire split into two halves, depends on the ratio of the length to diameter of the wire and on the frequency. He showed that, for a dipole in free space - and this is a very important point - the impedance at low frequencies is equivalent to a small resistance in series with a high capacitive reactance.

As the frequency is increased and the length of the antenna in wavelengths becomes greater, the resistance increases and the reactance decreases. This continues until a point is found where the impedance is purely resistive, the antenna is resonant and also has a value of about 73Ω. At this point, the overall length of the dipole is slightly less than one half wavelength, about 0.47 wavelengths for a thin antenna and somewhat less for a fatter antenna.

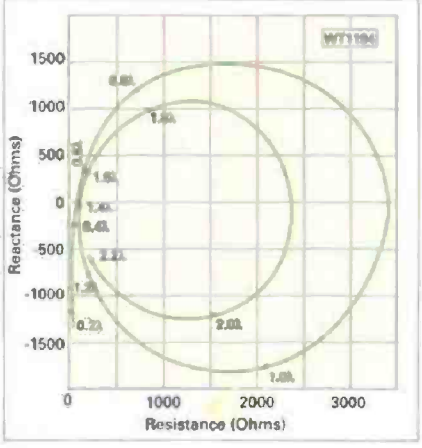
Increasing the frequency still further thus results in an increase in resistance in series with an inductive reactance. This then initially rises but reaches a maximum before falling to zero at a second resonant point where the resistance is very high - about 4000Ω for a very thin antenna. Here again, the length is somewhat less than a full wavelength, at about 0.95 wavelengths.

From here on, increasing the frequency results in decreasing resistance and a capacitive reactance until a third resonance occurs, the resistive value being somewhat greater than 73Ω, 80 to 110 being a typical range at length of about 1.45 wavelengths.

Increasing the frequency still further repeats the pattern with the high resistance values getting progressively smaller. For a 'fat' dipole the pattern is similar, but with a much reduced spread in range of resistance and reactance. For instance, with a diameter to length ratio of 60, the resistance at first resonance is about 72Ω, but at the second is about 950Ω.

The graph of the impedance is usually plotted with the reactance as the vertical scale and resistance horizontal, the result being a spiral as shown in **Fig. 1**. This then is the problem I set out to investigate and, to begin with, I had to construct the dipole.

Fig. 1: The Hallen spiral showing the theoretical variation of impedance with length in wavelengths of a thin centre fed dipole.



Dipole For 3.5MHz

I decided to go the whole hog and construct a dipole for 3.5MHz using materials to hand, adjust it for resonance at 3.65MHz and then check its performance across the 3.5MHz band.

The main 'legs' were constructed from some old three cored twisted wire mains cable with the insulation removed (to reduce the weight), the overall diameter of the three wires was about 2mm. As the overall length comes to some 38m, giving a length to diameter ratio of 19000, it certainly qualifies as a thin dipole.

In order to be able to adjust the length easily, the outer ends were passed through an insulator and doubled back through the insert from a chocolate block connector used to grip the wire, thus allowing for adjustment, (see 'Antennas-in-Action', page 63, November 1997 *PW*).

To start with, I made the overall length 39m and used a 13.5m length of 75Ω balanced twin feeder with a velocity factor of 0.66, giving an equivalent feeder length of 20.45m (a quarter wave at 3.65MHz). I arranged this to come in via the shack window so that all measurements were made in relative comfort. When erected, the dipole centre point was about 17m, approximately 0.2 wavelengths, above ground.

I make my measurements using a Wayne Kerr B801 admittance bridge (something I acquired for sentimental reasons, as it was the bridge I cut my teeth on as a young BBC engineer), which actually measures the parallel components of the admittance. It's capable of measuring both balanced and unbalanced systems and, for these tests, all measurements are in the balanced mode.

The signal source is an old AVO signal generator and the receiver a Lowe HF-225, which enables quick and accurate determination of frequency by means of the

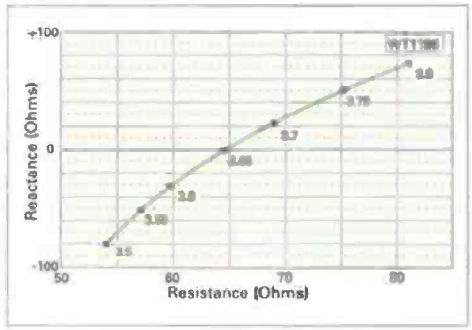


Fig. 3: Impedance of the dipole at the centre point, the classic dipole impedance curve.

keypad. To analyse and process the results I use a computer spreadsheet which also draws the graphs and, for convenience, I've turned the measurements into series form.

The method I use is to enter measurements as I go along, with the computer plotting the graph 'before my very eyes' as I proceed, since 'deliberate mistakes' are then easy to spot. (This is a far cry from the slide rule and Smith Chart I used in the middle of an antenna farm in the 1960s, but the old method is just as effective!). I use either *Lotus 1-2-3* or the shareware spreadsheet *Aseasy-As*, both of which are very well suited to this sort of task.

So, on to the measurements ...

'Nitty Gritty'

Down to the 'nitty gritty' now and here is not the place for a discussion of the theory of transmission lines and the method of calculating the impedance at the dipole from measurements at the input - perhaps that will do for a later article.

A measurement is made in the shack, converted to the input impedance and plotted (**Fig. 2**), the impedance at the dipole is then calculated and plotted. The first attempt at measurement gave some very curious answers which proved to be due to a 30m long receiving antenna some 10m from the dipole. Lowering this gave measurements much closer to expectations, the first lesson had been learnt!

My initial dipole length, as expected, proved too long. The resonance being at about 3.85MHz with capacitive reactance across the 3.5MHz band. A process of shortening, repeating the measurements and shortening again eventually resulted in a classic dipole plot as shown in **Fig. 3** - with a resonance at 3.65MHz, capacitive reactance below and inductive above.

The standing wave ratio (s.w.r.) across the band is also shown in **Fig. 4**. This plot shows a number of things worthy of comment. Firstly, the mid band resonant impedance is 64.5Ω, somewhat less than the Hallen figure, but well in line with the theoretical figure for a dipole at about 0.2 wave lengths above ground, one of the effects of not being in free space.

Similarly, the resonant length turned out to be 37m, corresponding to 0.45 wave lengths rather than the 0.475 figure usually suggested as a starting point. This, again, is probably due to the proximity of the dipole to the ground.

So, the first stage in the experiment was complete, I'd made a perfectly good 80m dipole which behaved as expected. I even connected it via a 1:1 balun and used it on air without an a.t.u. with the s.w.r. meter readings on the 50Ω coaxial being close to the values calculated from my measurements.

Now on to measure the other frequencies ...

At First Sight

At first sight it would seem that, to complete the task, all that was needed was a lot more measurements, but a little consideration given to Hallen's spiral showed that this was not as simple as it looked. So far, I had only made measurements on a 75Ω feeder in a region where the s.w.r. was less than 4:1, not too difficult a task.

From now on I needed to cater for values of resistance and reactance in the region of a few thousand ohms and s.w.r.s on 75Ω feeder of over 40:1, a far more difficult task. However, there was a way to do it!

For any feeder, the range of impedance encountered lies between the maximum resistance R_{max}, in this case about 4000Ω and Z_0^2/R_{max}. For a 75Ω feeder I needed to be able to measure a range from 4000 down to 1.4Ω. The answer was to use a feeder with a high Z_0 for the measurements. I therefore constructed a twin wire feeder and measured its characteristic impedance (again, a subject for another article) which turned out to be 480Ω. This gave an expected measurement range of 4000 to 57Ω with the maximum s.w.r. at about 7.5:1 (much easier to handle).

Measurements proceeded from 3 to 23MHz, again plotting the results 'hot off the press'. These are shown in **Fig. 5a** and **5b**, the ranges being separated for the sake of clarity and are quite like the Hallen spiral. I have also included a plot of resistance and reactance against dipole length in wavelengths as **Fig. 6**, which shows where **Fig. 5** on page 62 of November 1997's 'Antennas-in-Action' comes from.

Once again there are lessons to be learned. The first is that the resonant points are not precisely harmonically related to the lowest 3.5MHz band resonance. In fact, the 7MHz and 14MHz resonances are a long way from the high impedance resonances which occur at about 10.5MHz, not too far from the amateur band.

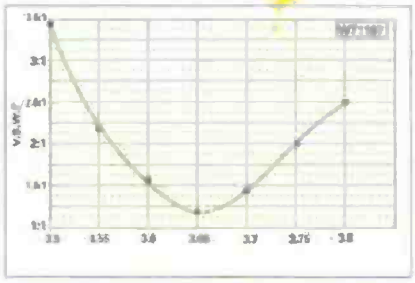


Fig. 4: SWR of the 3.5MHz dipole across the band referred to 75Ω

The second point to note is that the s.w.r., with respect to 75Ω, is high at all but the design frequency. This does not mean that the antenna can't be used on the other bands, it requires the use of a good a.t.u. and I managed to load up my Icom IC-737 easily with an external a.t.u. (VCI VC300DLP) on all bands using the 75Ω feeder.

It was considerably easier to load up using the high impedance twin wire feeder connected to the balanced input and with this I could even get an acceptable performance with only the IC-737's internal a.t.u. in circuit, the antenna being connected via a 1:1 balun.

At this point, the weather took charge and the post Christmas gales made short work of some of the temporary erection methods used to enable speedy raising and lowering for adjustment, thus bringing an end to experimental work for the time being.

So far I've only considered the impedance of the dipole, nothing has been said about its directional properties. These should be the standard text book patterns with a circular pattern about the axis and the pattern at right angles changing with frequency. When the dipole is below one wavelength, as at 3.5MHz and 7MHz, the pattern will have one lobe which will be slightly narrower on 7MHz than on 3.5MHz. Above this, the pattern splits into lobes, the number depending on the length in wavelengths.

The overall pattern is modified by the height of the dipole above ground but, in general, the dipole should give good all round general coverage on all bands. However, with a better performance in some directions than others, the worst directivity being at low angles along the length.

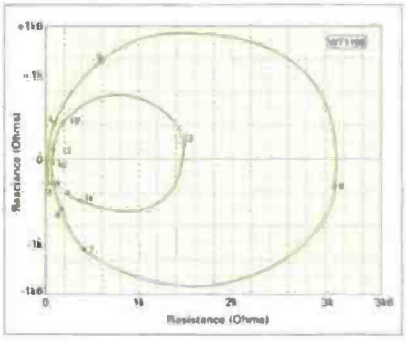


Fig. 5a: Impedance at the centre point of the dipole on frequencies of (a) (above) 3-15MHz (b) (below) 12- 23MHz

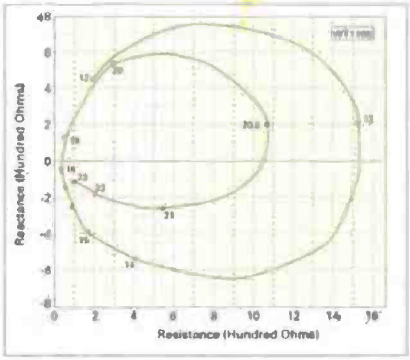


Fig. 5b

For The Future

Having achieved my original aim of finding how the impedance of the theoretical and practical dipole compared in practice, the time had come to consider projects for the future. Ideas that come to mind are an analysis of the G5RV and my trap dipole. I'm particularly interested in how the trap dipole's impedance varies as the trap frequency is approached.

Also of interest is the possibility of making an artificially 'fat' dipole by using a fan of wires rather than a single wire element and I'm contemplating the possibility of such a dipole working on two adjacent amateur bands such as 14 and 21MHz without the use of an a.t.u. As they say, 'watch this space'. PW

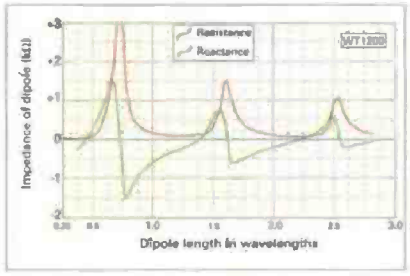


Fig. 6: Impedance at centre point shown as series resistance and reactance against dipole length in wavelengths.

Trader's Table

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Collecting Old QSL Cards

Fig. 6: A card from Tibet where Reg Fox operated from the British Mission in Lhasa. Not long afterwards, Reg was captured and imprisoned by the Chinese.

We all know what QSL cards are and you probably have your very own collection but, do we realise just how far back QSL cards go and do we realise the immense variety of cards that exist. Well, John Heys G3BDQ shares his thoughts on 'Collecting Old QSL Cards' with you and shows you nine rare cards from his very own collection.

I love collecting QSL cards, not just those acquired from stations I have contacted, but older and even 'antique' cards, that were once treasured by their recipients. During the last twenty five years I've examined more than 100 000 cards, the earliest dating back to 1922 - about the time when QSLing began.

Early cards are scarce and difficult to find, but there are still many cards about that were used after 1945. As the amateur movement has grown, the number of cards has proliferated. Amateurs often express their interests and personalities through the design of their QSL cards and these cards are a long way from the once universal depiction of callsigns in bold lettering.

Fig. 1: An historical card confirming the very first ZL/G contact on Top band. Incidentally ZL1AH was also my first contact on 1.8MHz.

These days, those OMs with deep pockets and the YLs with deep handbags can splash out and have really beautiful artwork on their cards. If you contacted some of the recent giant DXpeditions you could have been rewarded with some super productions in full colour to grace the shack wall.

The Spice Of Life?

Variety is said to be the spice of life and the QSL card collector can find variety in abundance. My collection has many sub-sections and includes historic DX 'firsts'. I have a card from **ZL1AH to G6GM** (see **Fig. 1**) confirming the **very first G/ZL QSO on 1.8MHz on October 17th 1953.**

Subject cards abound. I have sections on the topics of ships, glamour, humour, religion, Marconi, military, space, VIPs, advertising, scouting, field days, politics, etc. Many of the finest designs originate from overseas. For some reason (economics?) many UK amateurs are very conservative in their design choices and just pick a design from the limited range presented by the card printers.

Unusual Materials

Cards can be made from unusual materials. I have a **slate card from GW3KJW**, several printed on **wood** and **cork**, and some printed on **mint obsolete bank notes**. One card has its design made entirely from **coloured feathers**.

A warning though, if you must decorate your shack walls with QSLs, please **avoid drawing pins** or the **putty-like blue stuff** which, after a time, makes nasty marks which percolate through to the front of the card.

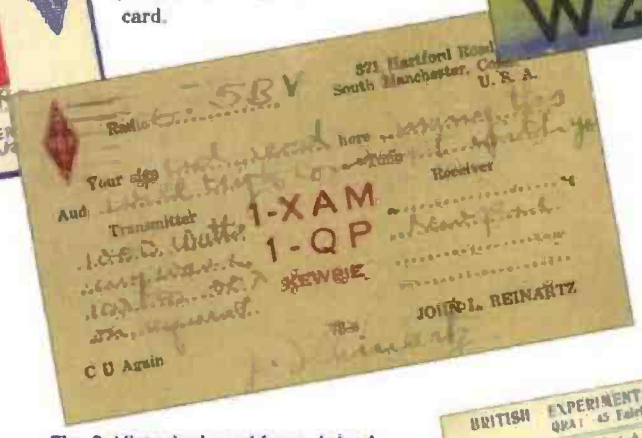

Fig. 2: Historical card from John L. Reinartz. He was one of the 'big names' in Amateur Radio through the 1920s.

Choice Specimens

I was asked to choose several cards to illustrate this article, but I have so many choice specimens that this proved to be difficult. I've done my best and here are a few descriptions of just a handful of my own cards from my own collection.

John L. Reinartz, who held the calls **1-XAM** and **1-QP** (Kewpie) (see **Fig. 2**), was involved in making the **first amateur Trans-Atlantic QSOs**. He also designed an effective regenerative receiver circuit which was copied and used universally between 1923 and the Second World War. Many pre-war cards state 'Receiver-Reinartz' O-V-O or O-V-1. My Reinartz card was sent to G5BV in 1924 to confirm hearing his signals from over the 'Pond' on 100 metres.

Mr. P. D. Walters G5CV was an early experimenter on the 5 metre band and was the first to receive USA television over here in 1930. On May 21 1933 he used a simple super-regenerative receiver on the five metre band when in a light aircraft over the North Sea. He clearly heard **'Dud' Charman G6CJ** and other stations when 97km from London. This demonstration helped to

convince the BBC that transmissions on 7 metres could provide TV signals right across the home counties and G5CV's QSL card is rarer than a Penny Black postage stamp! (See **Fig. 3**).

The late **Rev. Marshall D. Moran 9N1MN** gave many of us a treasured QSO from Nepal. His card (see **Fig. 4**) has almost everything.

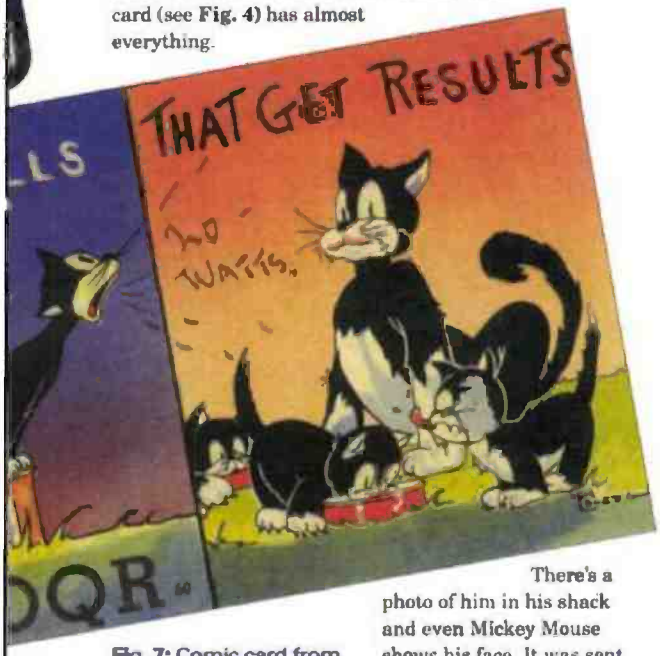

Fig. 7: Comic card from the USA.

There's a photo of him in his shack and even Mickey Mouse shows his face. It was sent to the late **GM3PGO**, whose cards I acquired recently.

Being a little long in the tooth myself, I well remember the dramatic sinking of the *S. S. Flying Enterprise* more than forty years ago. The ship's **Captain, Kurt Carlsen**, held the call **W2ZXM/MM** and his graphic QSL (see **Fig. 5**) was sent to the late top DXer **G3BID**.

When I was first licensed, the rarest station on the air

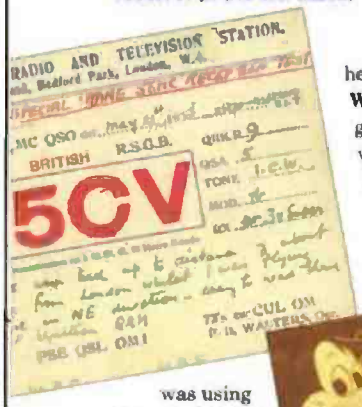

Fig. 3: Rare card from G5CV confirming reception of G6CJ whilst flying over the North Sea using a simple receiver in the 5m band.

was using the call **AC4YN** in Tibet. In 1946, its operator was **Reg Fox** at the British Mission in Lhasa and my card was sent to **VU2BC**. (See **Fig. 6**). At that time there were very few active stations in Zone 23, so a contact with Reg gave a new Zone and a new country.

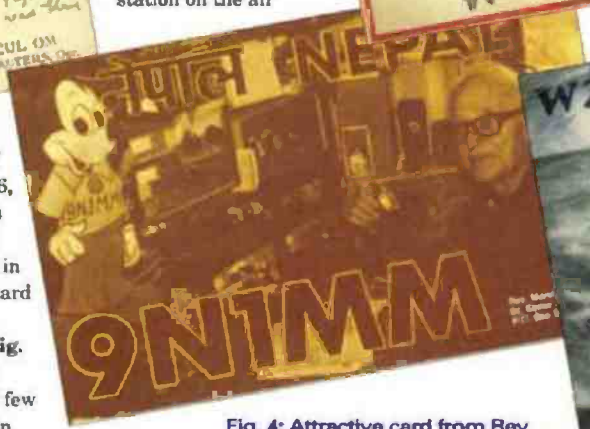

Fig. 4: Attractive card from Rev. Marshall D. Moran in Nepal for a QSO with his station in 1983.

Older Cards

Most of my older cards were obtained from personal contacts with the remaining old timers who had been active before the Second World War, some being involved in the Trans-Atlantic tests of the early 1920s. Their widows were sometimes persuaded to let me have the accumulations of old cards rather than disposing of them on the bonfire or for salvage.

Over the years, many thousands of interesting cards have been lost forever. It is not too late to get hold of many fascinating cards, for many of the G3s are still with us and they have been active from the 1940s and up to the present day.

Advertising in the amateur press is one way to find cards, asking around at club meetings or rallies can also be useful. There are still many wonderful QSLs to be found and prized.

What about this 'listener report' sent to 2CX (later G2CX) in 1928? "Dear Sir, would it be possible for you to broadcast something more interesting than 'Hello-Hello-Hello-2WR' on Sunday mornings, as you interfere with the musical programme from Hilversum? Yrs truly...".

QSL cards are more than just a verification of contacts made, they are a snippet of history and I hope that more Radio Amateurs take care of the ones sent to them and perhaps consider the design of their own QSL cards more thoroughly - you never know who will be examining it 40 years from now!

PW

Fig. 8: Rolf Kluge, a former radio Officer on the Graf Zeppelin, was still an active Radio Amateur in 1984. He was certainly a survivor, living through the Nazi regime and the Second World War.

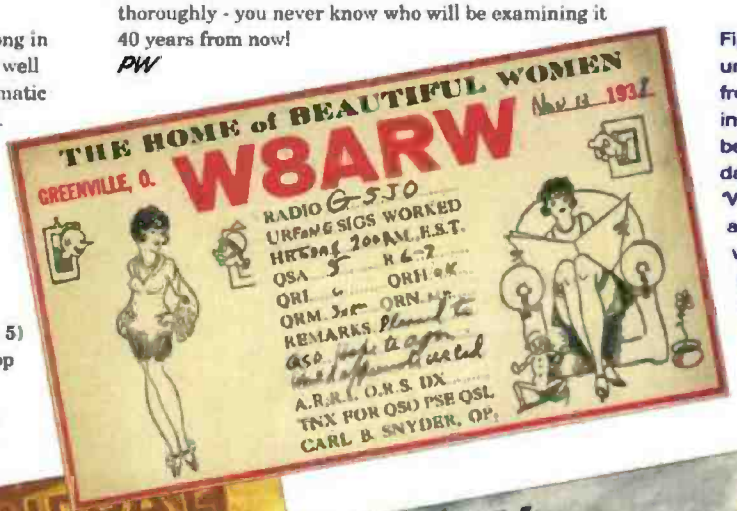

Fig. 9: An unusual card from W8ARW in 1938. It was before the days of 'Women's Lib' and today would be regarded as rather sexist.

Fig. 5: Colourful and dramatic card illustrating the final minutes of the *S. S. Flying Enterprise* in 1952.

THE PW PERSONAL ORDER FORM

This month Roger Hall G4TNT – PW's Advertising Manager – describes how we're launching the PW Personal Order Form service to help readers buy with extra confidence from advertisements in this magazine.

Many readers will have noticed how the battle for their custom has become more intense as the popularity of the hobby has declined. Fewer amateurs buying less equipment means there are now some great deals to be had but it also means that some dealers may try to cut corners when it comes to honouring their commitments. Also, as the real cost of Amateur Radio equipment has fallen and the competition for your custom has increased, some of the smaller shops have either gone out of business or been swallowed up by the bigger companies. In some areas, it's almost impossible to find a local shop and now the trend is towards mail order purchasing.

This, in itself, is not a bad thing but it does mean you'll probably be buying from a shop you've never visited and from a salesperson you've never met. So, how do you know who to trust with your money? You could go on air and ask about the dealer you're thinking about buying from, but the risk is that there may be one or two vociferous individuals who will be happy to tell the world about their grievances while the majority of satisfied customers just keep quiet. The same is true of the Internet. The various radio related newsgroups are a good place to ask but, again, you may not get a representative (or honest) selection of answers.

The truth is, there is no real way of telling beforehand how your transaction will be handled, how well the equipment will perform or whether it will go wrong. All you can do is to take reasonable precautions before you buy and know what to do if the worst happens. This is where we aim to help. First of all, take a look at the Top Ten Tips in the Buyer's Guide box. If you follow those guidelines before you buy, you'll have minimised the chance of something unforeseen cropping up and you'll be prepared should the worst happen and you have to return the goods.

Secondly, whenever you order goods from an advertisement in *PW*, make sure you use the Personal Order Form that will be printed in every issue from now on. Call around your list of potential suppliers first and then post or FAX them this form when you place the order. It has been carefully laid out to help you make sure you've not forgotten anything and it will act as written confirmation of the deal. If you post it, don't forget to keep a copy! If you have placed the order over the telephone, still send them the form with ORDER CONFIRMATION written across it.

The vast majority of transactions are trouble free but, if you are one of the unlucky ones who does have a problem, here's what you should do. Write to the supplier enclosing a copy of the order form and the advertisement (you did keep them, didn't you?) and outline your complaint. The letter should be accurate and brief but should also contain the details of any telephone conversations you've had with the company. It's always a good idea to make a note of the date, time and the name of the person you're speaking to whenever you call a company.

If the supplier fails to resolve the matter to your satisfaction, contact us and we will be happy to take up the case on your behalf. Just write (no 'phone calls please) to **Roger Hall, Advertisement Complaints Dept., PW Publishing Ltd., Arrowsmith Court, Station Approach, Dorset BH18 8PW** enclosing copies of all relevant paperwork and we'll take it up with the supplier. We have helped many readers in the past and almost always succeeded in putting matters right but this has been on an *ad hoc* informal basis. Now that we have formalised this process, we can only accept complaints **if the original order was placed on the *PW* Personal Order Form** to show you bought from an advertisement in *PW* and not from one in another magazine. Also, the order must have been for goods that were advertised in this magazine **(but not in Classified or Bargain Basement advertisements)** and not for goods that did not appear in the advertisement. Not only will we help you to pursue your claim, we will also publish in the magazine a selection of the complaints we receive and the responses from the advertisers. This will help other readers when it comes to deciding where to buy from and who they prefer to deal with.

We also intend to publish rulings from the Advertising Standards Authority. When we get complaints about the content of advertisements, some of which come from readers and some from other dealers, we refer them to the ASA whose job it is to decide whether the advertisement is legal, honest, decent and truthful. They then make an impartial ruling in favour of either the complainant or the advertiser. Up until now, we've just asked those concerned to comply with the ruling but now we're going publish those rulings in the magazine so that readers can see for themselves how advertisements are judged.

We hope our Personal Order Form, along with our offer to take up complaints on your behalf and the publishing of complaints and ASA rulings will make it easier for you to make an informed choice when it comes to parting with your money. You should also look out for buying advice in future issues of *PW* where we will be bringing you features on your rights when buying and returning goods, the pros and cons of buying 'grey' imports and many other topics that will allow you to buy with extra confidence from advertisements in *PW*.

Buyers Guide

Top 10 Tips

1: Telephone first to confirm the price and details are as in the advertisement. Dealers often have to send in copy up to 8 weeks before the magazine is published and prices and availability can change in that time.

2: Ask if it's a parallel/grey import or if it came from the authorised UK importer.

3: Ask if it is the full UK specification and if it has CE approval.

4: Ask about extra charges (delivery, VAT etc.) and find out the final, all-inclusive price.

5: Ask about their return/refund/repair policy for faulty goods and if they have a restocking fee for the return of non-faulty items.

6: Ask for a written quotation if it's a large order.

7: Make a note of all calls and who you spoke to and keep copies of all paperwork.

8: Pay by personal credit card whenever possible as the card company has insurance to cover all transactions above £100 and you will almost certainly get your money back from them should something go wrong.

9: Check everything as soon as it arrives. Open all the boxes and check that you have been sent everything exactly as ordered. If there is a problem, contact the supplier immediately.

10: If a problem develops later, write the supplier a concise and accurate letter outlining the problem and asking them how they intend to rectify it. If that fails, write to us with copies of all relevant paperwork and we'll take it from there.

THE PW PERSONAL ORDER FORM

Use this form when ordering by mail, FAX or for telephone order confirmation

TO THE ADVERTISER

Company

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Address

Postcode

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Order reference number (if quoted)

Despatch reference number

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Daytime telephone number

FAX number

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Delivery address

Postcode

Agreed delivery date

Terms of warranty/money back/returns policy

PAYMENT DETAILS

- Tick method of payment
- ☐ Credit card
- ☐ Cheque
- ☐ Debit card
- ☐ Postal Order

CREDIT CARD DETAILS

Credit card company

Card number

Start date

Expiry date

Signed

Date

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PW

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ISSUE NO.	PAGE NO.

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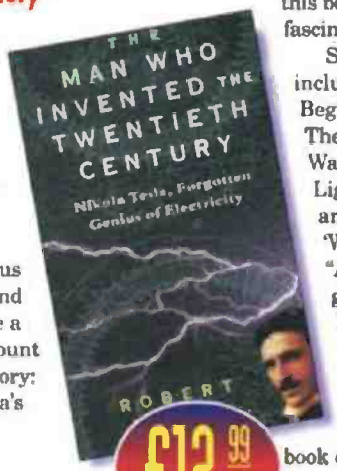
Up until the Year 2000, we will be focusing on the last century of Amateur Radio and events which have shaped its course. Last month we took a look at such books as *Tesla - The True Wireless, 100 Radio Hookups, Watchers Of The Waves, World At Their Fingertips, Crystal Radio: History, Fundamentals And Design and Wireless For The Warrior - Volume One.* Continuing the historical theme this month, the 'Book Profiles' on these pages, compiled by the Editorial team, focus mainly on elements of Amateur Radio such as Tesla, twinplex regenerative receivers, neutrodyne receivers and valve receivers. We hope that you enjoy reading about them and that you'll consider expanding your historical Amateur Radio knowledge with one or two of these books.

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 82

Book PROFILES

The Man Who Invented The Twentieth Century

Robert Lomas



£12.99

The author of the book, **Robert Lomas**, has given this book the sub-title: 'Nikola Tesla, Forgotten Genius of Electricity' and goes on to write a fascinating account of Tesla's life story:

"Using Tesla's own writings, contemporary records, court transcripts and recently released FBI files, *The Man Who Invented The Twentieth Century* pieces together for the first time the true extent of Tesla's scientific genius and tells the amazing tale of how his name came to be so widely forgotten".

Intrigued? Then this book could be for you. It takes on a narrative style and is very easy to follow. It is all too easy to get caught up in the narrative - you begin by reading the first page and the next thing you know, you've read five chapters - I know, it happened to me! (Rob). And us! (Jo, Tex, John).

If you are a Radio Amateur who would like to know more about Nikola Tesla, even if it is just out of a general interest for all things radio then this book will make a fascinating read.

Some chapters include: 'Promising Beginnings'; 'A Little Theory Goes A Long Way'; 'Let There Be Light'; 'Resonance and Radio'; 'Wireless Power - "A new and glorious age for humanity!"'; 'The Turbine, the Nobel Prize and the Edison Medal'. This book comes **Highly Recommended**.

How To Build The Twinplex Regenerative Receiver

T. J. Lindsay

£5.75

The front cover of this book claims: "Build Three Different Hot Performing Shortwave Regenerative Receivers: The 1934 Doerle Twinplex; The 6SL7 Twinplex; The Solid-State Twinplex".

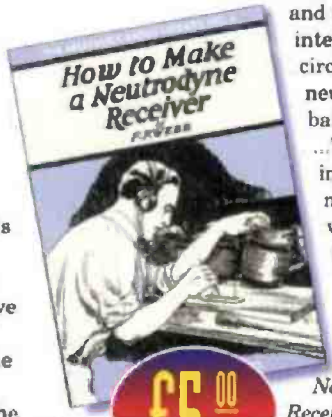
T. J. Lindsay, the author of this book, says that in this book he will "show you the details you need to bring the original 19 Twinplex to life, as well as a couple of variations". So, if you've ever wanted to build yourself the twinplex regenerative receiver then this could be a good place to start.

How To Build The Twinplex Regenerative Receiver is only 63 pages long but it contains such chapters as: 'The "19 Twinplex"'; 'Building the Twinplex'; 'Firing Up the Twinplex'; 'The 6SL7 Twinplex'; and 'A Solid State Twinplex'.

The text is very easy to follow and there is also a lot of very good, clear circuit drawings and photographs to help you along your way. This book comes **Recommended**.

How To Make A Neutrodyne Receiver

F. F. Webb



£5.00

"The Neutrodyne circuit is the result of nearly three years of research and accomplishes perfectly the results that have been sought so long. By means of special, extremely low capacity condensers, known as 'neutrodons', the natural coupling capacities of the radio frequency tubes and the intermediate circuits are neutralised or balanced out ...". Interested in knowing more? Then why not give this a book a try.

How To Make A Neutrodyne Receiver, reprinted by **Lindsay Publications Inc**, will be of interest to those Radio Amateurs who would like to know how to build a neutrodyne receiver. *How To Make A Neutrodyne Receiver* is small enough to keep on your shack desk and not be in the way.

This book contains some interesting drawings as well as easy-to-follow text and

instructions. Some of its chapters include: 'Advantages of the Neutrodyne'; 'Description of the set'; 'The Vacuum Tubes'; 'Building the Neutroformers'; 'The Neutralising Condensers'; 'Assembling and Mounting the Parts' and much, much more. **Recommended.**

Wireless For The Warrior Volume Two Louis Meulstree

If you saw last month's 'Book Profiles' on page 91, then you would have seen the profile on Volume One of *Wireless For The Warrior* which concentrates on Wireless Sets No.1 to No.88.

In this month's 'Book Profiles' we are taking a look at *Wireless For The Warrior* Volume Two: 'Standard Sets Of World War Two'. Once again, this is a book dedicated to looking at "A technical history of Radio Communication equipment in the British Army" only this time, as the front of the book tells you, it concentrates on the sets used by the British Army in the Second World War.

In the Introduction to the book, the author, **Louis Meulstree** explains: "The books are merely written to serve as a reference for anyone interested in the technical history and development of British Army radio equipment".

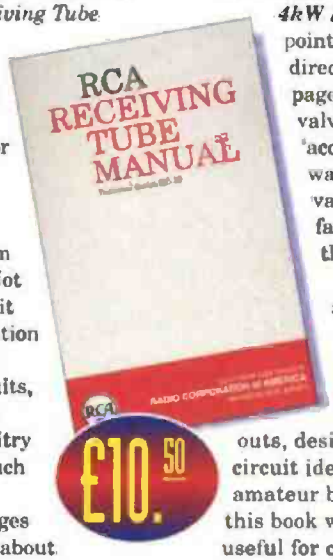
Louis goes on to say that the majority of this book is taken up with "descriptions and illustrations of fitting sets into a variety of vehicles. This has been done explicitly as it shows the sets in actual use and also gives illustrations of the many station ancillaries".

Wireless For The Warrior, Volume Two is an extremely detailed book with some very good illustrations - a must for Second World War British Army communications enthusiasts and, although not cheap, it is a very big book with a lot of information on Wireless Sets such as the No.10, 19, 22, 38, 46, 53, 68 and many more besides. **Highly recommended.**

RCA Receiving Tube Manual Reprinted by the Antique Electronic Supply

This popular re-print, put together by the **Radio Corporation of America (RCA)**, comes in a well-presented paperback format and is essentially a designer's handbook. Prepared, it claims, in order to assist "... those who work or experiment with electron tubes and circuits. It will be found valuable by engineers, service technicians, experimenters, students, Radio Amateurs and all others technically interested in tubes".

Not only a valve listing, the *RCA Receiving Tube Manual* comes complete with 'thumbnail' design data for the RCA's receiving 'tubes' (the American term for 'valves'). Not only this, but it covers application notes, theory, practical circuits, base pin-outs, internal circuitry and much, much more.



Its 384 pages explains a lot about valve theory and their applications and some of the chapters include: 'Electrons; Electrodes and Electron Tubes'; 'Electron Tube Characteristics'; 'Electron Tube Applications' and 'Electron Tube Installation'. **Very Highly Recommended.**

Again, such chapters include: 'Power-Tube Fundamentals'; 'Construction and Materials'; 'Power-Tube Applications'; 'Power-Tube Installation' and much, much more. **Highly Recommended.**

RCA Transmitting Tubes - To 4kW Plate Input Reprinted by Antique Electronics Supply

Are you trying to build a valved linear? The ***RCA Transmitting Tubes - To 4kW Plate Input*** will point you in the right direction. It is a 316 page book covering valves from the 955 'acorn' type (yes, it was a transmitting valve!) to well known favourites such as the 833 and 5763.

Apart from anything else, this book is an interesting read. Packed with information, pin-outs, design data and circuit ideas (including amateur band transmitters) this book will prove very useful for collectors and constructors alike.

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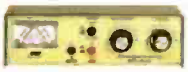

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Ageism clearout?? Marconi CR100, £40. R1155, £40. National special 80, £50. Pye Cambridge International Model PE8, £80. Nordmende Mesa 7000, £75. BC-348-G, £20. Many radio magazines manuals for above. Tel: Wisbech (01945) 585857.

Alinco DJ-X10E for quick sale, scanner complete with battery charger, in excellent condition, used twice, £180 o.n.o. Realistic DX-394 l.s.b./u.s.b./a.m./f.m. receiver, excellent condition, offers invited. Tel: Coventry (01203) 738241 or (07803) 725579.

Alinco DX-70T, immaculate, boxed, with manuals, never used mobile, never used on transceive on h.f., rarely used on transceive on 6m (50MHz), £425 o.n.o. Realistic DX200 receiver, very good condition, £65 o.n.o. Tel: Mike G1HED (01926) 513073, evenings or weekends.

Alinco DX-70T, £375. Only 18 months old, SGC smart tuner, £175, good pair, EP9 p.s.u., £50, very little used, plus carriage boxed. Tel: G3MEY (01249) 701715 (not QTHR).

Amplifier Henry 2002A v.h.f., mint, £1000. Elevation rotator, £100. An a.t.u. AT-230, £110, open to offers. Tel: Mike on Epsom (01372) 810612.

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BC221 with book, £25. 31 set working no antenna, £20. 1155 plus p.s.u., working, bit tatty, £35. Telequipment "scopes, model S51B working, £20, buyer collects. Tel: Maurice G7HRN (QTHR) on Warrington (01925) 504245.

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Codar 70A receiver instruction manual, circuit diagram, damage to glass dial. Codar PR30 a.t.u., both working order, £50 o.n.o. plus carriage. Tel/FAX: G3SVD (01234) 720591.

DEBEG?? 7204 marine receiver, £300; AOR 5000, £700. Lowe HF-250, £360, exchange for PRO receiver. Tel: Essex (01279) 815020.

Diamond SX-600 p.w.r. 1.8-160MHz, 140-525MHz, as new, £60. Navico AMR-1000S 2m (144MHz) f.m. with s.w.r. tuner, mint condition, bargain at £120, no offers. Tel: Alan on Royston, Herts (01763) 262443.

Digital multimeter portable bench type Escort EDM2347, voltages, current and resistance ranges frequency e.t.c. £10. Tel: (01623) 882893.

Drake a.t.u. MW2700 in good condition best offer secures, with handbook. E-mail: pjt41@aol.com

Dual channel oscilloscopes, Philips PM3209 40MHz, as new, £200. Philips PM3267U, 100MHz, g.w.o., £180. Telequipment D75 50MHz with spares, £140 or exchange h.f./v.h.f. equipment. Tel: Cirencester (01285) 621571.

Eddystone EA12 very good condition, spare valves, £150. DX-394 Realistic, new, used about 30 hours working, unwanted gift, £85. Tel: (01535) 630361.

FL-110 linear SW in, 100W out, £100. JPS-DSP filter NRF7, £50. Discone antenna will transmit & 2m, 70cm (50,144, 430MHz), £30. 9-way coaxial switch for Icom rigs, £40. Tel: G3PTN QTHR on Leeds 0113-265 4644.

For sale: (neighbours object) four section (5/14m, 2in diameter) aluminium antenna heavy duty, mast height 20ft, never used, £20 only, bargain. Tel/FAX: Mike on Ripon (01765) 601527.

For sale: ERA microreader in unused condition with operating manual, associated literature and 12V supply, bargain, must clear hence only, £95. Tel/FAX: Mike on Ripon (01765) 601527.

For sale: unique working vintage ex-govt portable receiver covering 28-1000MHz in three bands original documents include designers typed manual and hand-drawn circuit diagrams, absolutely unique offers over £400. Tel/FAX: Mike on Ripon (01765) 601527.

FREE to genuine school or scouts electronics/radio club. Components transformers, relays loads odds/sods, need space. Tel: Tony G3ICB (QTHR) (01635) 864345 FAX: (01635) 872782.

Frequency counter Mx 50MHz (small), £50. 10MHz with adapter up to 500MHz, £65. MI 10MHz frequency and timer, £55. MI v.h.f. signal generator a.m./f.m.-modulation 1.5MHz-220MHz, £55. Venner 10MHz frequency, £35. Tel: (01234) 354767.

FT-102, £325. FT-101ZD WARC, f.m., £295. KW1000 linear, £200. Wanted: HRO 60m (3.5MHz) BS coil, HRO IFTs. Tel: Tibbert (01332) 880035, 66 Horsley Rd, Kilburn, Derby DE56 0NE.

FT-736R including 6m (50MHz), £750. FT-2200 2m (144MHz) mobile, £160. Alinco DR430E 70cm (430MHz) mobile, £180. Icom IC-2340H dual-band mobile, £250. Four tiny TNCs, £90 each. Blackstar 0-1300MHz counter, £90. All boxed and immaculate. Tel: (01474) 852009 or (07803) 752971 or E-mail martin.abbott@cablenet.co.uk

Full h.f. station: Icom IC-735 plus PS55 supply, £595 o.n.o. Manuals, KW100 amplifier, £220 manual Triband beam TA33 Classic G400 plus controller, £270 o.n.o. g.w.o., excellent condition. Tel: (01407) 832197, anytime.

Hallicraft S120, £45. Lafayette v.h.f. receiver f.m. 152-174MHz, £40. Spring wartime recorder, outside broadcast, £25. Solartron 7040 digital test meter, £25. Lowe v.h.f. monitor receiver, 12 channel, 144MHz, (little six channels, £15 each. Tel: J Bird (01827) 65641, 24 Manor Rd, Bolehall, Tamworth, Staffs.

Heatherlite 2m (144MHz) Explorer amplifier, 300W+ out, immaculate condition, just serviced by Linear Amp. £350. Icom IC-706 MkII, boxed, £500. Yaesu FT-480R, 2m multi-mode, £175. Yaesu FT-707, £225. Tel: Paignton (01803) 695772.

Heathkit HW5400 synthesised transceiver with matching power supply, 80-10m (3.5-28MHz) and WARC bands, all manuals and instructions, £250 o.n.o. Tel: Paul on Swansea (01792) 884895.

Howes CU-917 antenna tuner, instructions, receipt, mint, radio shack 5W B&S speaker, never used, mint, ERA BP 34 filter with PP, Zetagi V2 two way antenna switch, £40 the lot. Tel: 0191-526 7902.

Icom IC-706 MkII h.f. and 2m (144MHz), £425. Trio TS120V h.f. transceiver, £195. Both new condition with manuals and original boxes. Aztec 24cm (1270MHz) ATV transmitter, £55 prefer buyer to collect. Tel: G6NB on Bicester, Oxon. (01869) 241088.

Icom IC-706/2 as new, boxed, little used, £550. IC-735 h.f. mobile, good condition, recently serviced including new battery, £400. Kenwood TS-830, good condition, £350. Tel: David MACAY/MX3DGN 0117-931 5020 or (01454) 228020 (home).

Icom IC-740 hasn't been used much, good condition, £350. Tel: Dave on Herts (01582) 766416.

Icom IC-746 v.h.f./f.m., excellent condition with UT-102 voice unit, SP-21 speaker, manual, boxed. Tel: Martin MOBUZ on North Lincs (01427) 753006.

Icom IC-756 h.f. 6m (50MHz) all s.s.b. filters, used three times, mint condition, still under warranty, £1200. Tel: Telford (01952) 415207.

Icom IC-PCR1000 two months old with p.s.u., RRP £299.99, will sell at £200 o.n.o. or exchange for anything radio. Tel: Martin (01504) 763738 or (0403) 567494.

Icom IC-T8E 3 band f.m. hand-held transceiver, boxed and brand new, unwanted gift, £230 including postage. Tel: Jim on Herts (01462) 631370.

Icom ICR-7100 wide-band receiver, 25-2000MHz all mode coverage with JRM pre-amplifier, 5A p.s.u. and Icom AH-7000 base discone antenna and manuals, all mint condition, complete listening station for £750 o.n.o. Tel: Simon (01768) 885100, E-mail: standvw@tesco.net

Icom ICR-71E first class condition, first class radio, f.m. board fitted, £400. Trio R2000 plus v.h.f., like new, 3250. JRC NRD-525, excellent radio, excellent performance, £450 or swap radios. Tel: West London 0181-813-9193.

Juki 6100 daisy wheel printer - Centronics Parallel Input, complete with six assorted daisy wheels and handbook, £50 o.n.o. Roland DXY880A plotter - HPGL compatible - Centronics parallel/serial inputs with a selection of plotter pens and handbook, £75 o.n.o. Tel: (01202) 393880 or FAX: (01202) 300213.

Kenwood R5000 VC20 voice, 12V, mint, boxed, £520. Datong FL3 as new, £60. ICS FAX-1 excellent, £80. Tel: Dave MM1CHQ (01383) 824634.

Kenwood SP-23 speaker 123mm (w), 96mm (h), 235mm (d), half price, £30. 0-1 mA meter for HRO SNR, etc. Marion elec, £5. Headphone adapter high to low impedance, quarter inch plug, £5. Taylor model 127A, manual. Tel: Edwards on Bury St. Edmunds (01284) 827379.

Kenwood TM-9707 dual-bander, 2m, 70cm (144, 430MHz) with extras, £250. Standard C5800E 2m, £95. Two collinear antennas, 2m, 70cm/50MHz, £35 + 40 all in good condition. Tel: SW London 0181-785 7314.

Kenwood TM441E 70cm (430MHz) f.m. mobile complete with mount, etc., £200 o.n.o. Unused matched pair Raytheon 6L86 valves, £20 o.n.o. Marante audio CD player model CD273, £150 o.n.o. Tel: Peter G3UXH (01634) 250562.

Kenwood TM733 dual-band mobile rig, v.h.f./u.h.f. detachable front panel, mount kit, extended receive, excellent condition, in box with manuals, £200. Tel: Bristol (01275) 794076.

Kenwood TMG-707 2m plus 70cm (144 plus 430MHz) mobile radio. VS-3 voice DFK-4C front panel unit, £275 o.n.o. Alinco DJ-V5 hand-held with dry cell case, big NiCad, 9.6V only one month old, £200 o.n.o. Wanted: 2m multi-mode. Tel: Mick 2E1FCG on Barnsley (01226) 742871 after 6pm.

Kenwood TR-751E 2m (144MHz) multi-mode, v.g.c., manual, £325. Daiwa LA2065R 2m amplifier, £85, v.g.c. Yaesu FT-230R 2m f.m., box, manual, v.g.c., £140. Credit cards welcome?? post extra. Tel: (01206) 396946, daytime (01255) 880858, evenings.

Kenwood TS-430S f.m. and all filters and PS-30m 30A p.s.u. and s.w.r. meter as new and boxed, £500 the lot. Tel: (01246) 236496.

Kenwood TS-530S, mint condition with manual, also KW ezee?? match a.t.u., v.g.c., £285, buyer collects or pays carriage. Tel: Don G4PLE (01453) 756311.

Kenwood TS-530SP transceiver and s.w.r. meter 1.8-150MHz and manual spare (2)?? 6146B 12BY7A, all excellent and as new condition, £300 o.n.o. Tel: (01246) 236496.

Kenwood TS-790E 144/430MHz, good condition, £950 o.n.o. Tel: Tony G0CZV on South Cave, East Yorkshire (01430) 422657.

M2 2M12 Yagi for 144MHz new in box, too big for QTH, 12 elements and superb quality, £110, including shipping or pick it up for £100. Tel: Paul G7GUC Lincoln (01522) 723440.

Marconi 2370 Spectrum Analyser covering from 30-110MHz, complete with manual and leads, excellent condition, £375 o.n.o. Tel: Gordon (01258) 817474.

MFJ-407D keyer brand new never used with paddle, £50. Lake Electronics OTR7/5 40m (7MHz) QRP transceiver, factory built, as new, £75. Postage, £3. Tel: G2BGC 0151-427 1903.

MFJ-418 Morse Tutor, as new, boxed, £32. Tel: (01487) 823879.

Microwave modules 144-100s, 100W 144MHz linear, 10W input, built-in switchable pre-amplifier, good clean condition with operating manual, £90 plus postage. Tel: John (01383) 721523.

Mint condition Icom IC-746 s.w. and s.s.b. filters fitted plus SM20 base microphone, SP7 speaker and GSRV, £1300. Tel: Dave Patrick G8EGM (01697) 478314.

Mirage D3010N 70cm (430MHz), 100W linear, never used, £200. Wanted: tower sections, 10ft long, 15in sides, triangular bolt together. Tel: Roger G3LDI (01508) 570278.

R1155 with p.s.u. g.w.o., £100. Tel: 0161-427 5257.

Racal 1792 late model (1987), backlit, 1Hz readout, 0.3, 1.0, 2.7 (s.s.b./t.s.b.), 3.0, 6, 16kHz crystal filters, c.w., a.m., u.s.b./l.s.s.b., f.m. modes, pristine condition with operator/workshop manual, £900 o.v.n.o. Tel: Martin on Glos (01242) 519281.

Racal RA-17L receiver, £95. Inverted solid state twin beam 'scope, v.g.c., £60. Tektronix 100MHz twin beam 'scope, probe, large original manual, excellent condition, £120. Tel: (01203) 672438.

Racal RA1772, £400. RA1792 with cabinet, service manual, £650. Tuning aid MA2232, £200. New front circuit board with displays for RA1792, back lit, £250. Tel: Peter 0161-743 9544 or 0161-876 4153.

Racal Receiver RA117 in cabinet works well, £100 o.n.o. Tel: David Paterson (01132) 711279, 115 Windsor Rd, Birstall.

RC oscillator type TG200DM level sine-square wave, 13 ranges output level indicator, 3Hz-1MHz, £50. Tel: (01623) 882893.

Realistic DX302 receiver digital lots of features good condition with workshop manual and handbook, £50. Codar RQ10 Q Multiplier, good, £15. Also AT5 changeover switch, £5. Tel: Suffolk (01359) 244349.

Realistic DX394 receiver, boxed, as new, £80 o.n.o. Uniden Sportcat hand-held scanner, 29-950MHz, charger, manual, £80 o.n.o. Yupiteru VT225 airband scanner, new charger, manual, £70 o.n.o. MBA Reader reads Morse baudot, £30 o.n.o. Tel: (01924) 896604.

Redifon S5in receiver g.c., £150, handbook, Racal 1772 receiver, g.c., £350, handbook. Racal 1217 receiver, g.c., £200, handbook. Receiver 210, g.c., handbook, £80. Tel: (01244) 815681.

Refinement sort-out hand-held - mobile all go-cordless, many extras. Icom IC-02E, 2m (144MHz), £80. Icom IC-04E, 70cm (430MHz), £80. Standard C828M 2m compact mobile, 12 channels, crystal control with mounting bracket, £90. Tel: John G3UPE on Richmond Upon Thames 0181-891 2349.

RF signal generator Trio SG-402 100kHz-30MHz, six ranges, £50. Tel: (01623) 882893.

Roberts R861 portable, as new, boxed, RDS, m.w./l.w./f.m./s.w./u.s.b./l.s.b. superb on 60m (3.5MHz) etc., clock, scan timer, dot matrix working input a.f. gain, a.t.u., cost £200 accept, £100. Tel: (01608) 662488.

Short Wave Magazine (1971-5) *Radio Communications* (1970-80), various *Practical Electronics*, *Practical Wireless* (1970s period) offers. Tel: (01628) 776216.

Silent key Sale G4PIY, 35ft tiltover Tennamast (will need new ground post) CDR rotator control unit, h.f. 3-element Weston antenna DX33

coaxial, rotator cable. Buyer dismantled. £450 o.n.o. Tel: Surrey (01483) 472251.

Storage oscilloscope Tektronix T912 10MHz dual channel and manual. £150. Tel: (01623) 882893.

Strumech versatower 60, 18m heavy duty tower model SP60, dismantled, base unit had to be cut, therefore some welding for new one required. Cost new, £2400, price £350, no offers. Tel: Peter G3UCA on Preston, Lancs (01772) 494474.

Telegraph tape perforator model 1553C-7SFRH with full spool of new tape, v.g.c., photo if required, £25, plus carriage. Army Morse key ZA28656 with cover, unused, £25. Tel: Peter (01771) 623654.

Telescopic three section wind-up lattice tower, 39ft extended c.w. rotator housing v.g.c., £350 o.n.o., buyer collects. Tel: Jimmy on Northolt 0181-864 1468.

Trio JR310 amateur bands receiver, 3.5-29.7MHz, £75. Yaesu FT-DX401, 500W output, h.f. transceiver, mint, £350. Hallicrafters h.f. linear amplifier, HT41 rare, £160. Second World War Bendix radio compass, MN-26C with remote control unit, £170. Eddystone 740 receiver, 550kHz-28MHz, £130. Tel: Yorkshire (01482) 887939.

TS-450S good condition, £475. TS-130V linear tuner, external synth manuals for sale, £250.

ACC77, boxed, will post. Tel: Ted on Bedford (01234) 357087.

TS-830S, AT-230, SP31, new condition, boxed. Whiterose transceiver 10W, working order, 3.5-28MHz, £70. Tel: Grimsby (01472) 822067.

TS430, SP430, PS430 h.f. transceiver, £450. Icom PCR-1000 with DSP, £220. Yaesu FP12-p.s.u., £30. All boxed, all excellent condition with manuals, all o.n.o. Tel: Gosport 0239-252 7388.

Two rarely offered receivers: JRC NRD-505 plus the Heathkit Mohican, both recently serviced and realigned, open to sensible offers, buyer to inspect/collect 'phone, write or E-mail. Tel: Mike 0181-505 6303, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR. E-mail tibms4ozone@compuserve.com

Ultra 1950s valve receiver, Roberts 1960s portable receiver, three band, Hacker Herald receiver, offers on £30 each. Tel/FAX: Devon (01647) 281631.

Universal M8000 decoder manuals, etc., £450. Or exchange for an h.f. transceiver. Tel: Isle of Wight (01983) 882643.

Valves, seventy in total, assorted types, used, £30 o.n.o. Tel: (01322) 342649 for details.

Vortexion 8inch reel-to-reel valved professional Tape recorder, three motor version, complete unit, major overhaul/rebuild required. £40. Tel: (01269) 870076.

Wireless magazines offers - *Wireless & TV Review* 1924/26/34, *Wireless & TV Review* Special Radiolympia '35, *Popular Wireless* '35, *Modern Wireless* '28, *Bestway Constructor Guides*, '20, *Wireless Magazine* '29, blue-prints crystal sets to 5 valvers, *Amateur Wireless* supplements wireless made easy. Tel: Lancashire (01254) 382339.

Yaesu 1000SDX rotor, £270. Cowl Gill motor and Selsyn and shack indicator, £150. 5-element tri-band Yagi, £250. 2m (144MHz) 100W amp, £125, home-brew p.s.u. 30A, £28 Heath noise bridge, £35. Tel: (01974) 251420.

Yaesu equipment boxed, two months old?? FT-290 at all modes h.f. transceiver only used on receive, matching speaker (SP8) full coverage including 6m (50MHz), £950 o.n.o. FT-847 all mode full coverage, £1000. FP-8100, £200. Tel: Mark Cargill on Fife (01333) 352111.

Yaesu FL-101 transceiver matches FR-101 receiver, v.g.c. with box and manual, £150 o.n.o. Ten-Tec Century 22 transceiver/receiver, good QRP rig, £120. KPC3 plus, never used, £100. Tel: Pete on Bristol (01454) 882465.

Yaesu FRG-8800 receiver, boxed with manual, v.g.c. £290 for quick sale. Tel: (01670) 850402, mobile (07971) 339801.

Yaesu FT-101ZD Mkll mint condition, h.f. rig, £325. Trio 520S mint, QAV sem transmatch a.t.u., £195. Tel: Martyn (01422) 251520.

Yaesu FT-160 all amateur band 160-10m (1.9-28MHz) transceiver, 260W p.e.p. in mint condition with p.s.u. and original packing, £490. Lowe HF-225 receiver with battery pack, a.m., sync. board, key pad, as new, £300. Tel: John on Coventry (01203) 462581.

Yaesu FT-290R v.h.f. multi-mode with case, NiCads charger, mag mount antenna and manual, £150 o.n.o. Tel: Rob G6ULD on Hastings (01424) 798086 or (01424) 220812.

Yaesu FT-757 GX2 and Yaesu FP-707 p.s.u. with manual, will work QRP/P, £400 o.n.o. Tel: Edward G0WDT on Newcastle (01782) 717837.

Yaesu FT-757GX Mkll line up consisting of transceiver, FT-757 auto a.t.u., FT-757 HD p.s.u., all boxed, used very little, in excellent condition, for sale as full line up, £660. Tel: G0LW2 0161-427 1809.

Yaesu FT-757GX, £300. Yaesu FT-900, £600. Yaesu FRD-400 receiver, £60. Tel: (01563) 532901.

Yaesu FT-800R dual-band 2m/70cm (144/430MHz) mobile transceiver with wide-band receive coverage, g.w.o., never used mobile, c.w. all accessories and boxed, mint condition, £295. Tel: Jim on Leeds 0113-281 3718.

Yaesu FT-840 h.f. all mode 100W, MFJ-949E h.f. a.t.u., both mint, boxed. Zunich 30A p.s.u. Kamtronics Kam TNC all mode h.f. v.h.f., £475 the lot. Recal Syncal h.f. manpack, 2-8MHz, £100. Capco 300W a.t.u., offers, possible part exchange, swap. WHY? Tel: Mr Howlett, (01438) 750450 evenings, weekends. Days (0831) 660944.

Yaesu FT-902DM 12-240 with manuals, spare set 6146B valves, mint condition, £360. Alinco DX-70TH 100W h.f. with remote lead, as new, boxed, £475, buyer to collect. Tel: Ken (01509) 813175, evenings.

Yaesu FT-990AC h.f. all mode transceiver, auto a.t.u., keyer, DSP filter, 250Hz, 500Hz, 2.4kHz crystal filters, manual, boxed, as new, £795. Yaesu FT-736R 2m, 70cm (144, 430MHz) multi-mode base, 9k6 mod., manual, boxed, as new, £650. Tel: Taunton (01823) 288200.

NEW RULES!

Rules on how readers are to send their Bargain Basement forms is changing - for news of this, please see this month's 'Keylines' on pages 8 and 9.

Wanted

S1/1 Second World War spy transceiver, S2/1 receiver wanted. I am also interested in other spy/clandestine sets from any period or origin. Tel: 0181-505 6838, evenings.

All early wireless sets from 1920 through to 1940s wanted by serious collector. Looking for crystal sets, early valves, horn speakers, Morse keys, books, also want Dinky 4NB blanker for RAC. Tel: Jim G4ERU (01202) 510400.

Altai 'scope wanted Type OS75M, buy or swap for Telequip D61 twin trace in v.g.c. Tel: Doug (01359) 75838.

Any technical data on Heathkit model HW-7, three band transceiver, looking for at least a circuit diagram with component values and alignment instructions, can you help please. Tel: Andrew John Humphries (01926) 423120.

BNOS 144MHz linear amp, 10/180W output, must be in g.w.o., £100, also copy of *Buyers Guide To Amateur Radio* by Angus McKenzie. Tel: John (01383) 721521.

Eddystone 740 circuit plus manual. Lafayette HE30 circuit plus manual, working or not. Trio 9000/9130. Also information on Pye PF1 pocketphone. Crystals, batteries, diode. Reed battery Panasonic earphone 12V 2aH. Tel: Jack on Portsmouth area (01705) 233245.

Garrard pick-up cartridge holder for Garrard DA Mkll turntable circa 1960 with or without cartridge. Tel: Blaine (01670) 521088.

Hand mic speaker for old but working SB28 mobile rig. Tel: Basil G4BCD on Marlow, Bucks (01628) 472699.

Help need operating and any other information on Icom IC-240 2m (144MHz) f.m. rig. Tel: Rod G4RWF (07埋) (01509) 243541.

Help wanted: Tuning cord [illegible] for Crown CRC-656L stereo radio recorder. Tel: Jones (01267) 236941, 2 Bro Dawddwr, Pantiel, Carmarthen SA32 7AS.

Icom IC-275 or similar 2m (144MHz) multi-mode base transceiver. Tel: John G0UWV (01480) 750135.

Icom IC-765 in good condition with no modifications, please ring with details and price. Tel: Tony on Kent (01797) 361438.

International and American callbooks, can collect Midlands area - NOT computer disk! Tel: (01509) 814422.

Kenwood TS-830S service manual wanted. Also does anyone know the Web site for the American who makes digital boards for Kenwood 930s? Tel: Martyn (01422) 251520.

Mains transformer for Yaesu FT-902DM for a well used transceiver/receiver. Tel: Harry on Bedford (01525) 404165.

Meccano crystal set mods from November 1922 model RS1 or RSZ and/or Meccano parts to make one anyway or No. 10 set in cabinet red and green spares, collection possible. Tel: Peter Lepino on Surrey (01372) 454381 or (0374) 128170, anytime.

MFJ antenna tuner 949E h.f. 300W. Tel: Murray G3AAS 0113-266 5287, E-mail: g3aas@lineone.net

Old valve audio amplifier and pre-amplifier wanted, preferably Leak or Quad, but anything which is not transistor might be OK. Tel: Yorkshire (01482) 887939.

Operating and service manuals for Icom IC-240, Alinco service manual for Yaesu FT-757GX. Tel: Clive G3OQG (01305) 262006, 1 Arnhem Green, Dorchester, Dorset DT1 2PS.

Seek photocopies of all reference found on "Meccano Crystal Sets" from the Meccano magazine of the 1920s and any instruction sheets. Any help please. Tel: Andrew Humphries (01926) 423120.

Shinshu SS105S f.m. boards, wanted, would consider scrap SS105S with f.m. boards. Tel: Brian 0151-625 3612.

Still wanted: recent editions of RS Components and Farnell catalogues, will collect, 23cm (1296MHz) 8 wl router, 23cm quad loop antennas, etc. Tel: Duncan G7PNE (01436) 232482.

Teleprinting equipment of all kinds wanted for collection, especially old telegraph dating, but anything to do with teleprinting would be of interest. Tel: Yorkshire (01482) 887939.

Timestep geostationary weather satellite, complete set-up wanted. Tel: David (01902) 785180.

Valve 6AF4 or equivalent, ICs TMS 1121 LM443A. Tel: (01388) 607625.

Valve type 815 or QQV04-20 ex-equipment OK as long as working. Tel: Sam G3HVI (QTHR) on Stoke-on-Trent (01782) 393349, 46 Golborn Ave, Meir Heath, Stoke-on-Trent.

Wanted: CB transceiver converted to 10m (28MHz) must be good, will exchange grid dip meter Altai XDM6 with instructions, microwave modules LMA144V, 144MHz cf. switched preamplifier with instructions. Tel: (01254) 832350.

Wanted: circuit diagram for SBM Electronic tuner, small box type tune key speed head panel any costs refunded. Tel: Eric G4BIF on Blackpool area (01253) 726695.

Wanted: Service information on Pye Piccadilly 6000 receiver, made in the 1960s and any service information on Dynalnt (USA) of the same years. Tel: Surrey (01372) 467264.

Wanted: Wavecom W4100 or Universal 8000, must be mint, cash waiting. Tel: T P McClelland 01-4536452 (from UK dial 00-353-1-4536452), 17 Thomas-Davis St, Inchicore, Dublin, Ireland.

Woden mains transformer type SRS/152/T Secondary 670-0-670V at 180mA wanted to repair old power supply. Tel: Denis (G3UYI) 0151-652 7454, daytime, 0151-342 7980, evenings.

Exchange

144MHz linear amplifier 10W in, 100W out, pre-amplifier, mains powered, £85. Netsec PRO44 hand-held scanner, airband, etc., £80. Want 35mm SLR camera (not auto focus), 14MHz hand-held or mobile with CTCSS. Tel: Ian M0BZP on Cumbria (01229) 582867.

Exchange Hillomast, four sections, extends to 56ft, very robust and heavy for WHY? Tel: Hugh on Milton Keynes (01908) 366399.

Exchange or sell Kyosho High Wing Training Aircraft (model) complete with engine and remote controls (4 Channel) everything you need to fly. Will exchange for Heavy duty rotator or sell for £200. Call Dave on (01993) 212467, after 6pm.

IC-251E v.h.f. multi-mode base, IC-24ET v.h.f./u.h.f. hand-held with dual-band amplifier, all boxed as new, FC-757AT auto a.t.u. FC-700 a.t.u. Kenwood u.h.f. mobile, MC60 microphone, SP930 speaker, sell or exchange for v.h.f./u.h.f. mobile. Tel: Norfolk (01953) 884305, (01953) 884305.

Icom PRC 0-1300MHz computer scanner (Win98) excellent condition, box, manual, brought in error, swap for Yaesu FT-70 h.f. manpack, must be v.g.c. Tel: 0115-930 8098.

Icom PRC 100 PC scanner 0-1300MHz, as new, boxed, swap for FG-70 manpack with accessories if possible, v.g.c. please. Tel: Nottingham area 0115-930 8096.

Kenwood R1000 h.f. receiver with manual, very nice example swap for Alinco DJX-10 or MVT-9000 hand-held scanner, also want copy of: technical manual for TS-175W HET frequency meter. Tel: Alan (01207) 544342, after 6pm.

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DAVID BUTLER G4ASR DEVOTES THIS MONTH'S 'VHF REPORT' COLUMN TO THIS YEAR'S EXPECTED LEONIDS METEOR SHOWER.

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VHF REPORT

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THIS MONTH DAVID BUTLER G4ASR TAKES A LOOK AT THE LEONIDS METEOR SHOWER AND WONDERS IF THIS YEAR'S ACTIVITY WILL BE BETTER THAN LAST.

The general principle of scattering radio waves off meteor trails is easy to understand and I've illustrated it in the diagram, **Fig. 1**. The transmitting station is located at a large distance, about 500-2000km away from a receiving station. Because of this constraint, direct radio contact is generally impossible due to the curvature of the earth.

When a meteor enters the atmosphere, its trail may reflect the radio waves from the transmitter to the receiver. At the receiver, where the signal of the transmitter is not normally received, the transmissions can be received for a short period as long as the meteor trail is present. Such reflections, called 'bursts', last from a fraction of a second to several minutes. That is the general principle of meteor scatter, often called **m.s. propagation**.

TERMS MISLEADING

The term 'meteor scatter', though, is misleading. **It isn't the meteors themselves** which scatter signals beyond the horizon, **but the ionised trails which are left behind** as these high velocity fragments burn up. The meteors which create these trails are, for the most part, bits of metallic and non-metallic material in orbit around the Sun and are almost entirely of cometary origin.

When the particles strike the molecules of gas in the upper atmosphere the released kinetic energy raises the temperature of the gas molecules to a temperature at which they ionise. They then form a plasma of electrons and positive ions, not much different than that in the ionosphere, except that the trail is more in the form of a line charge. Variations in mass, composition and velocity result in trails between 20-65km long and about 1m in diameter.

The trail rapidly expands as the electrons diffuse into the surrounding space due to the repulsive nature of the electrons for each other. This dispersal effect may give rise to a small amount of doppler shift, particularly at the start of ionisation. The multipath distortion degrades the quality of the signal and becomes more severe at higher frequencies (144MHz and 430MHz) where the wavelengths are shorter.

Only a small number of meteors that produce an ionised trail will be suitable for a given path and, in order to be usable, they must meet three criteria: First they must produce an ionised trail with an acceptable reflection scattering loss, typically about 70 to 80dB. This requires a meteor with a typical mass of 0.001 grams and a diameter of 1mm, literally about the size of a grain of sand.

Larger meteors, termed **meteoroids**, are even more desirable but their abundance is inversely proportional (fortunately for us on Earth!) to their mass. Although they produce substantial ionisation they are of little concern because their rate of occurrence is extremely low.

Smaller meteors are termed **micrometeorites**, of which billions enter the Earth's atmosphere daily, are more plentiful but not as useful. These slowly settle through the atmosphere without being destroyed. Incidentally, the larger meteors that do make it through to the Earth's surface are called meteorites.

The second criteria that a meteor trail should possess is that it must lie within a common volume that is line of sight of both stations and at an altitude of between 80 to 120km.

Finally, the trail should be situated mid-way and at 90° to both stations. This last criteria can be relaxed somewhat for the more dense trails.

E-LAYER

Meteor trails ionise in the region known as the **E-layer** and this is where other propagation modes such as Sporadic-E (Sp-E) and aurora occur. On the 50MHz and 70MHz bands, the majority of reflections take place at a height of around 90 to 120km which corresponds to a maximum distance of between 2000 to 2250km. This will easily allow contacts to be made all over Europe on the 50MHz band.

However, because of the limited European access to the 70MHz band, contacts here will be more problematical, especially as the minimum distance for m.s. work is around 500km. This is the reason why reflections on the 70MHz band within the UK are generally poor.

The reflection height for the 144MHz/430MHz bands are theoretically lower as the trails need to be more dense to support m.s. communication at these frequencies. However, the distances worked on the 144MHz band are very similar with a peak occurring in the range 1500 to 1900km.

Reflections are generally longer and stronger on the lower v.h.f. frequencies such as the 50MHz and 70MHz bands. Theoretically bursts at 144MHz are weaker but increased antenna gains, higher transmit powers and a high level of European activity make this an ideal band for m.s. work. Contacts can also be made on the 430MHz band but this is approaching the limit for practical amateur communications.

TWO CATEGORIES

Meteors occur in two categories; sporadic meteors and those associated with meteor showers. Sporadic, or random, meteors arrive all the time and from all directions. Their rate of arrival varies with the time of day and season of the year.

Sporadic meteors are more plentiful at sunrise as the Earth sweeps them up as it orbits the Sun and less plentiful at sunset as the Earth rotates away from them. The average velocity of the morning sporadic meteors is higher than the evening meteors so they tend to ionise at a higher altitude and their trails dissipate more rapidly.

Random meteors are more prevalent in late summer around July-August and are at a minimum in February. If you want to make schedules for m.s. tests then the best times will be around 0500UTC during July. However, there's no guarantee that suitable random meteors will occur during your sked period! If you want almost guaranteed results then it's best to attempt m.s. contacts during a shower period as these are quite predictable.

Shower meteors appear at particular times of the year because they travel in fixed orbits around the Sun which the Earth intersects annually in its own orbit. (By the way, please don't think of showers as a night time phenomenon as many of them occur during daylight hours).

Meteor showers occur every month of the year with the exception of February and I've shown some of the more productive events in the chart, **Fig. 2**.

Each shower will possess its own unique characteristics such as when it is 'visible' above the horizon, the event duration and the speed of the meteors. Each shower has a different rise and set time and if you try to make an m.s. QSO when it is below the horizon you might as well be using a dummy load for the antenna!

MAXIMUM ACTIVITY

Although most showers last a few days, the peak of maximum activity usually lasts for so many hours on a particular day. Some, like the **Quadrantids** in January, exist for around 18 hours but have a sharp peak in activity lasting maybe one hour or so. Other showers such as the **Ursids** in December will have a broad period of activity but no specific peak.

The **Perseids** are above the horizon 24 hours a day and is termed a **circumpolar shower**. It's important to note that there's a considerable difference between the times quoted for visual sightings and that for radio propagation. All astronomical information (and that given on the TV, such as 'The Sky At Night') is for the visual observer. Therefore, to avoid any confusion, all my comments relate to radio propagation timings, unless otherwise stated.

That said, meteor showers are not uniform streams of debris and calculating the specific period of maximum activity can be rather difficult. However, this is made easier if you keep records of last year's peak and then add 365.25 days (one year, six hours). For leap years, you must also subtract one day for all shower dates after February 29 (including the Quadrantids in the following calendar year).

LEONIDS METEOR STREAM

In a few weeks time the Earth is going to pass through the Leonids meteor stream. This meteor shower occurs every year in the period November 15-19 with peak activity on, or around, November 17.

The shower rises above the horizon (in Europe) around 2300UTC and sets the next day around 1230UTC giving nearly 12 hours of activity. The shower meteors are very fast, entering the Earth's atmosphere at speeds of over 254 269 kmph (158 000 mph). Besides being fast, the stream usually contain a large number of very bright meteors that produce highly ionised trails.

The Leonids shower is usually nothing to write home about. It's

Fig. 1: Diagram illustrating one station transmitting towards the station being contacted via m.s. - forward scatter. (See text & 'VHF Report', March 1999 *PW*).

there, year after year creating some minor activity for the m.s. enthusiasts but in the last few years the activity has increased tremendously.

Recently it has been proved that there's a connection between annual meteor showers and comet orbits. Comets are composed of ice and dust and every time one approaches the Sun the ice melts and material is released.

Over the course of hundreds of years the dust spreads completely around a comet's orbit track. However, this spread is not even and much of the material stays close behind the comet.

In the case of the Leonids shower the parent comet is called Tempel-Tuttle and it makes an appearance in our skies every 33 years, the last time being in 1966. As Tempel-Tuttle passed closest to the Sun in February 1998 it was expected that activity during November 1998 would produce some very strong displays.

LAST YEAR

Many people described what occurred during last year's Leonids meteor shower as "brilliant", "awe-inspiring", "once in a lifetime" and even that doesn't convey the true excitement of what actually took place. Although there was a small amount of activity on the 50MHz band, it was up on the 144MHz band where the real DX contacts were being made.

Shortly after the shower radiant rose above the horizon from 2330UTC on November 16, the conditions really started hotting up with some very loud bursts of signals being heard from stations throughout Europe.

Over the next hour or so the m.s. conditions progressively got better as the radiant moved high in the sky. Now bursts of signals on the 144MHz band were turning into continuous transmissions, first a few minutes in length and then up to five or six minutes in duration.

It really was like a Sp-E opening but this event was much more special. Not only was the ionisation very intense but it was spread all over Europe at the same time. But better than that, you could also work stations via forward scatter, backscatter and sidescatter, in fact, in any direction you wanted.

As a consequence, it made very little difference in which direction you were beaming. Beam towards Finland (OH) and work into North Africa (EA9). Beam towards Hungary (HA) and work into Portugal (CT). It really was tremendous.

If you did beam in the right direction then signals were end stopping. So much so that operators stopped using traditional m.s. reporting techniques and operating practices and treated it as if it was a 'conventional' opening. Signal reports of 59 were being exchanged with stations up to 2000km away and in some cases even further.

This went on, hour after hour, right through the night until the shower disappeared below the horizon around 1200UTC on November 17. Although a great deal of activity was concentrated around 144.200MHz (the m.s. calling frequency) it was possible to hear stations all over the entire s.s.b. sub-band.

Unusually for meteor scatter operation, very little c.w. operation was heard as s.s.b. was very much more productive. The great thing was that you didn't need to run high power to work the DX. For example, **Roger Ward GW5NF** (IO81) running 20W into a 9-element Yagi contacted stations in Hungary, Poland and Slovenia.

A mobile station, **DL5MAE/M**, running 20W into a small vertical antenna even managed to make an m.s. QSO whilst driving to work. With a little bit more power the results were more impressive.

John Eaton GM4LBV, running 50W into an 8-element Yagi stuck on a 3m pole with no rotator contacted stations in Croatia, Estonia, Hungary, Lithuania, Italy, Poland, Switzerland and Yugoslavia. His best DX contacts on s.s.b. were Russian stations RX1AS (1980km) and RW1AW (1938km).

The more experienced m.s. operator worked even more DX with some well equipped stations making over 200 contacts during the night. On the 144MHz band the top three European distance contacts reported were G4ASR (IO81) to RW1AW (KP50) at 2231km, EA7GTF (IM87) to SP2FAX (JO83) at 2372km and F5OWN (JN25) to LA3FL (KP19) at 2871km.

A few m.s. contacts were also made in Europe on the 430MHz band although it is very difficult at these frequencies. Over in North America the stations of W7XU/0 (EN13) and N6RM) (DM14) made a contact over a 2036km path creating a new world record for the band via this mode.

Following the experience of last year, **Rytis LY2BIL** suggests you listen for periods when frequent two to three minute bursts are being heard on the 144MHz band. You should then switch immediately to 432.200MHz and attempt some very quick s.s.b. contacts.

A FEW WEEKS TIME

So what might happen during the Leonids shower in a few weeks time? Last year the Earth encountered the Leonid stream some 257 days behind Comet Tempel-Tuttle. On November 16/17 we will pass about 622 days behind the comet. You may be thinking that this is not ideal but some of the best (visual) showers have occurred in similar circumstances.

The large event in 1833 was 350 days behind and the more famous 1966 event (with 144 000 visual meteors an hour recorded at one site) was 561 days behind the comet. Indeed, spectacular storms during the Leonids shower are a distinct possibility for the next three to four years.

All looks set for yet another exciting night of amazing meteor scatter propagation. But now an important word of advise: **Please take no notice of the media hype** that will exist on television and radio channels. The so called 'experts' got the dates wrong last year and I have no confidence that they will get it right this time around.

I predicted the exact times last year in this column and I'm going to do exactly the same this year. Stay at home during the evening of Tuesday November 16. At 2300UTC go into the shack, turn on the transceiver and warm up the amplifier!

At 2330UTC start working some of the most amazing DX you've ever heard on the 144MHz band. Continue this until 1200UTC on Wednesday 17 November. It's as simple as that!

SCATTER PROCEDURES

Under normal circumstances, you need to follow the Region 1 meteor scatter procedures laid down by IARU. These can be found in various v.h.f. handbooks but, for really up to date details, it's best to point your Web browser to the **RSGB VHF Commitee's** Web site at: **http://www.scit.wlv.ac.uk/vhfc/iaru_r1.vhfm.4e/5B.html**

Another useful source of similar information aimed at the 50MHz operator can be found on the UK Six Metre Group site at **http://www.uksmg.org/deadband.htm** These Web pages give details of timing, reporting system, reporting procedures and confirmation procedures.

Although it's worthwhile noting the correct procedure, I'm hoping that the shower will be a repeat of last year's performance. In this case, you can dispense with convention and make quick s.s.b. exchanges using traditional signal reporting methods.

EQUIPMENT NEEDED?

So, what equipment is needed to join in the fun? As I mentioned earlier, nearly all of the contacts will be made on s.s.b. on the 50MHz or 144MHz bands. In my opinion, you should try to get equipment ready for the 144MHz band as openings of this type are more unusual at these frequencies.

Although you may be able to make contacts with low power it can be a bit frustrating. Medium power 50-100W will give good results, especially if coupled with a good antenna and low-loss feeder cable.

A horizontally mounted Yagi antenna of between 8 to 16-elements will be sufficient, but it will be useful to be able to rotate it towards selected activity areas throughout Europe. Don't go for huge multiple arrays as the reduced beamwidth will restrict the amount of meteor trails it can 'see'.

HINTS & TIPS

Based on experience of last year here are a few hints and tips that you may wish to adopt. Prepare all equipment and make sure it is working correctly. Pay particular attention to the antenna and feeder system, have a standby transceiver or amplifier ready just in case.

Prepare the shack, log books, plenty of spare paper, pens. Think about operating portable from a hill top and view the meteors at the same time. Make sure you get plenty of

Fig. 2: Meteor Showers usable for m.s. communications.

Shower	Limits	Maximum
Quadrantids	January 1-6	January 3
Lyrids	April 19-25	April 22
Eta Aquarids	May 1-8	May 5
Arietids	May 22-July 2	June 8
Nu Geminids	July 9-15	July 12
Perseids	July 25-Aug 18	August 12
Orionids	October 16-26	October 20
Leonids	November 15-19	November 17
Geminids	December 7-15	December 14

LEIGHTON SMART GW0LBI HAS TWO PAGES OF BAND REPORTS FOR YOU THIS MONTH

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sleep beforehand as you will be up all night.

Go into the shack around 2300UTC on November 16, point the antenna into mainland Europe and start listening on 144.200MHz. You probably won't hear anything at first, but after an hour or so you should start to hear some DX stations.

Listen to the operating practices of more experienced stations before you get going. Don't stay on 144.200MHz all the time. Spread out around the s.s.b. sub-band. When a burst occurs other stations will find you. Continue this until 1200UTC on Wednesday 17 November.

It's difficult to determine when the best times will be, but I reckon it may be between 0200-0900UTC on November 17. Use s.s.b. but be adventurous. Try f.m. (with a directional beam) on the simplex channels and see what happens.

Use clear unambiguous phonetics. Make rapid exchanges, call signs and reports are all you need. Try to keep individual exchanges to around five seconds and a complete QSO in less than 15 seconds. May the DX be with you!

DEADLINE TIME

That's it again for another month and it's 'Deadline Time'. Don't forget to be in the shack between 2300UTC on Tuesday November 16 and 1200UTC on Wednesday November 17. Please let me know what you heard or worked on any of the v.h.f. bands during this period.

Forward any details to the address and by the date given at the top of the column. Alternatively, you may find it more convenient to make a simple telephone call.

GOOD LUCK WITH THE DX DURING THE LEONIDS METEOR SHOWER. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR.

Web Watch

RSGB VHF Committee Web Site:
http://www.scit.wlv.ac.uk/vhfc/iaru.r1. vhfm.4e/5B.html
UK Six Metre Group Web Site:
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LEIGHTON SMART GW0LBI HAS TWO PAGES OF REPORTS FOR YOU THIS MONTH AND IN THOSE TWO PAGES HE DISCUSSES PROPAGATION CONDITIONS FROM THE LAST MONTH, THE ECLIPSE, NEWS FROM A NOVICE AND YOUR REPORTS.

Propagation conditions during August tended to be on the patchy side according to reports, but there were quite a few occasions when long-range signals were prevalent on the higher frequency bands. That's where most of our reporters spent their operating sessions this month and a bagful of DX was their reward!

A number of reporters have mentioned over the past few months that general conditions haven't lived up to their expectations, particularly regarding the present period of the sunspot cycle. I must admit to having to agree with their tentative opinions, things are not like they used to be! Still, we could be being overly pessimistic.

I don't mind admitting that the last sunspot peak was the first I had ever experienced as a licensed amateur and what a time I had! It was just after I had obtained my 'A' licence - and what a pleasure it was to work all over the place on 28MHz, even into the early hours of the morning. Maybe my memory is failing me, but I'm sure that conditions were better then!

THE ECLIPSE

The Eclipse in early August was quite exciting and a number of experiments were conducted by Radio Amateurs during the eclipse period and I've no doubt we'll read of some of them in the pages of *PW* at a later date.

For my part, I listened in to the 1.8MHz band to see what effect the eclipse would have on it and, lo and behold, nice strong (S9+) signals from Germany, Turkey, Poland, Italy, Russia, and Greece were heard here.

I didn't get any transmitting done though, all due to my very excited children calling me outdoors, but it certainly was something to remember, all those nice strong European and Asian signals on 'Top Band' still coming through at midday!

CHEERY NOTE!

On a cheery note, news came in this month of a 'first' in the Novice field. **Paul Godolphin 2E0AOK** of Bampton in Cumbria became the first British Novice to be awarded the **'CW DXCC' Award** (see **Fig. 1**). Bearing in mind the fact that, until recently, Novice operators were restricted to c.w. allocations outside the mainstream sub-bands, this is a massive achievement in itself!

Until the recently announced changes to the Novice licence, operators were forced to operate c.w. in a sort of 'no man's land' amongst the data, Packet and beacon sub bands, so achieving DXCC on 3W c.w. under these conditions must have been a **real** struggle!

Well done to Paul for being the first and I'm sure that *PW* readers would echo that sentiment! Now, how about some Novice reports for 'HF Far & Wide', Paul?

ALIVE & KICKING

A letter also came in this month from the **British Amateur Radio Teledata Group (BARTG)**, who insist that reports of their demise have been greatly exaggerated! Seriously, it seems that since the group held over its annual rally this year, many within the Amateur Radio fraternity have been under the impression that BARTG is no more.

Well, the good news is that it's still a going concern and membership details can be obtained from **Bill McGill G0DXB, 14 Farquhar Road, Maltby, Rotherham, South Yorks, S66 7PD**. Tel: **(01709) 814010** between 1900 and 2100.

PROPAGATION REPORT

Now for the Propagation Report and we start off down in Yeovil in Somerset with **Don McLean G3NOF**, who says: "Except for the 14MHz band, conditions on h.f. have been generally poor during the daytime. Once again 14MHz was the most reliable band and it never seemed to close. New Zealand and Australia were often quite strong between 0600 and 0900UTC on the long path, while a few short path openings to the same part of the world occurred after 2000UTC.

"On the 18MHz band there were a few openings over the North Pole into the Central Pacific area at around 0730 to 0830UTC and the short path to Asia was apparent from 1000 to 1600UTC with north Americans coming in at various times between the hours of 1100 and 2300 UTC.

"The short path to Asia was open on the 21MHz band between 0900 and 1800UTC, while a few Australian signals were heard around 2200UTC on the long path. North America came in between 1300 and 2300UTC, with south America in the late evenings. Some African stations were heard between 1600 and 1800UTC, with the band remaining open until the early hours".

"Both the 24 and 28MHz bands were very patchy this month, although there were some openings to north and south America at around 2200UTC on 24MHz and mostly south Americans were heard during the mornings and evenings on the 28MHz band".

YOUR REPORTS

Now on to your reports for the month starting with the 10MHz band, as our reporters have been DX hunting on the higher frequencies of late. First up comes **Carl Mason GW0VSW** of Skewen in West Glamorgan who has been using slightly higher power levels this month, at 50W into a half-size G5RV.

Carl's 10MHz list includes all c.w. contacts with J7/PA4EA (Dominica) at 0643UTC, V47WP (Federation of St. Kitts and Nevis Islands) at 0719UTC, JW/SM3CVM/P (Svalbard) at 1824UTC, as well as YR99E (Romania) at 1828UTC and TA2IJ (Turkey) at 2213UTC.

Between stints as the QRP Manager of the Milton Keynes ARS, **Sean Gilbert G4UCJ** has been about on the bands and reckons that conditions have ranged from "excellent to absolutely awful"! However, receiving the QSL card from ZL9CI cheered him up a bit, only to be disappointed again when he discovered that 10MHz contacts don't count for DXCC! Sean agrees with me that this is ridiculous. Why shouldn't contacts on the so called 'WARC' bands count towards awards such as DXCC? Does anyone know?

Nevertheless, back to Sean's report and we see that his 30W c.w. reached out this month to 4U1UN (United Nations, New York) at 0051UTC, YW7C (Venezuela) at 0129UTC, CY9CWI (St. Paul Island) at 0034UTC, FG5FR (Guadeloupe) at 2348UTC and, finally, a 3W QRP contact with UN7CN (Khazakhstan) at 2359UTC.

THE 14MHz BAND

On to the 14MHz band now and celebrating his very first QRP c.w. contact with Australia is **Eric Masters G0KRT** of Milton Keynes: "I've already worked VK with QRP" says Eric, "but this is my first with c.w.".

Eric was operating from the Wimbledon & District ARS Annual Summer Camp at Chessington and the only antenna used for the contact was a G5RV. Not bad Eric and I trust you

Fig. 1: Paul Godolphin 2E0AOK with just some of his awards.

and the lads (and lasses!) had a good time!

Eric's 14MHz report includes 5W c.w. contacts with RA3DAA (Russia) at 2135UTC, VK3DQS (Australia) at 0750UTC and UA9JMH (Asiatic Russia) at 2314UTC. His 100W s.s.b. contacts included LU1ALF (Argentina) at 2300UTC and VE1DFG/P (Canada) at 2310UTC.

Down in Yeovil, s.s.b. DXer **Don McLean G3NOF** has been busy around the bands. This month he spent more time on the higher bands but on 14MHz he lists contacts with CY9CWI (St. Paul Island), UE1TTT (Russia), VC6MP (Canada) and WP2Z (USA).

Meanwhile, using 3W c.w. into an indoor dipole, Sean G4UCJ listed contacts with DL1GKG/HI3 (Dominican Republic) at 2217UTC, VP5NB (Turks & Caicos Islands) at 2243UTC, CO2JD (Cuba) at 2247UTC and ZP5GPM (Paraguay) at 0016UTC. This was followed by an early morning contact with YV5DTJ (Venezuela) at 0800UTC and a 30W contact with VP9/N0ED (Bermuda) at 2056UTC.

THE 18MHz BAND

It seems that 18MHz was 'the place to be' this month, as most of our reporters have very long lists for this band. However, **Ted Trowell G2HKU** has been under the weather of late and, as such, was unable to get on the air as much as he'd like to. However, he tells me that he's now on the mend, which is good news. Glad to hear that you're feeling better Ted!

Ted's log includes all c.w. contacts with UA0AZ (Asiatic Russia) at 0800UTC, as well as 4Z5AD (Israel) at 1500UTC, while operating at 1800UTC brought in EX8F (Kyrghyzstan), plus JA2ODB and JL3TEM (Japan).

Don G3NOF certainly had a good crop on 18MHz judging by his impressive log for the band. It included all s.s.b. contacts with BV5BG (Taiwan), DS5RNW (Korea), KL7AC (Alaska), FW8WW (Wallis & Fotuna Island), R1ANZ (Antarctica), 9V1XE (Singapore), PJ7/K2GSJ (Saba Island), KH6/WE8P (Hawaii), 5W1SA (Western Samoa), and finally ZK1JD (Cook Islands).

Also on 18MHz, but this time 'bashing the key' was Carl GW0VSW, who used 50W and a G5RV antenna to hook up with TI2WGO (Costa Rica) at 0515UTC, CO8LY (Cuba) at 0530UTC, FP/W8MV (St. Pierre & Miquelon Islands) at 1232UTC and J45K (Greece) at 1400UTC.

Evening operation brought in FY5YE (French Guiana) at 1800UTC, as well as 9M6EE (Malaysia) at 1846UTC and a switch to s.s.b. brought in TA2BK (Turkey) at 1430UTC, CN2VA (Morocco) at 1441UTC and finally Z32FD (Republic of Macedonia) at 1506UTC.

THE 21MHz BAND

Also showing promise this month was the 21MHz allocation, which attracted the attention of Don G3NOF, whose 21MHz s.s.b. log includes contacts with the likes of AP2JZB (Pakistan), DU1LKY (Philippines), BY4BJA (China), FR5DX (Reunion Island), AC6AA (Arizona), 6Y5DA (Jamaica), V31HS (Belize), ZD7VC (St. Helena Island), 5H8TL (Tanzania), UA0FF (Asiatic Russia), XV7TH (Vietnam), as well as 9V1WW (Singapore), 8Q7AN (Maldives Islands) and V73CW (Marshall Islands).

"Fifteen metres" was also the place where Sean G4UCJ had a nice catch, which included 30W c.w. contacts with P49V (Aruba) Island) at 1030UTC, 8Q7TV (Maldives Islands) at 1330UTC, EP2MKO (Islamic Republic of Iran), JH3AIU (Japan) at 1437UTC, KH0HX (North Mariana Islands) at 1519UTC and LU6HUW (Argentina) at 2238UTC. The pick of his QRP crop was KC1XX (USA) at 1029UTC, CO8LY (Cuba) at 2143UTC, 4L1UN (Republic of Georgia) at 1821UTC and ZP5KO (Paraguay) at 2130UTC.

Ted G2HKU refused to lie down and take his medicine it seems, as he also includes reports of his activities on 21MHz as well, listing c.w. contacts with CN2BR (Morocco) QSL via F5IQG and E21EJC (Thailand) at 1700UTC, while operating at 1900UTC brought him 5A1A and Eric G0KRT lists a single contact for the band in the shape of 4S7AB (Sri Lanka) at 1751UTC.

THE 24 & 28MHz BANDS

Finally we come to the 24 and 28MHz bands, where it seems conditions have left a great deal to be desired! However, our intrepid reporters were not put out by this and despite the poor conditions managed to log up a few contacts here.

Ted G2HKU listed FY5YE (French Guiana) and ZD7BG (St. Helena Island) at 1800UTC on the 24MHz band, while Sean G4UCJ also using c.w. hooked up with 8Q7TV (Maldives Islands) at 0925UTC and T77C (Republic of San Marino) at 1611UTC on the 28MHz band.

Eric G0KRT also had a go at 24MHz c.w. and came up with RA6AU (European Russia) at 2012UTC and JA7KE (Japan) for a new country at 2123UTC. On 28MHz he hooked up with ZP7APO (Paraguay) at 1847UTC, as well as CX6ABZ (Uruguay) at 1811UTC and S57UYX (Slovenia) at 1108UTC.

SIGNING OFF

I receive endless letters from our readers telling me that they find the information in the column of great use to their DXing, especially the times of contacts given and so on, as well as letters from new licensees saying that reading the reports in 'HF Far & Wide' gave them that extra 'boost' needed to pull their fingers out and go for the RAE and Morse Test.

It's always a pleasure to receive such letters, but I must be honest and say that it is your reports which make this column a success. I'm just the bloke who puts it all together! So, thanks to all reporters for their valuable time and effort. Keep up the good work!

AS USUAL, REPORTS & INFORMATION (AND PHOTOS AS I'M STILL LOOKING FOR PHOTOGRAPHS OF OUR REPORTERS!) BY THE 15TH OF EACH MONTH. DETAILS AT THE TOP OF THE COLUMN.

PW LISTENING & OPERATING WATCH LIST

(All times are in UTC)

Charlie Blake M0AIJ listens and operates:
0500-0700 on 7.061MHz s.s.b. with an NRD-525 receiver & Sloping Wire antenna and is also busy with his mobile rig.

John Heys G3BDQ operates:
mainly weekends during daylight hours on the 136kHz band using 100W and an end-fed wire.

George Woods G3LPT (Suffolk) operates:
an open net on 29.630 f.m. every weekday morning except Monday at 0930 local time.

Don McLean G3NOF operates:
1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna.

John Wheeler G0IUE monitors:
28.600 n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 running 100W and a 2-element t.e.t. triband beam antenna/half-wave vertical antenna.

Leighton Smart GW0LBI operates:
On 1.949MHz s.s.b. and around 1.820-1.836MHz c.w. on weekday evenings between 1900 and 2230 using a Yaesu FT-747G QRP transceiver at 5W maximum and a 60m long wire Marconi antenna.

Rob Mannion G3XFD:
Is QRT from home at the moment due to a pending move to a new QTH soon. However, he'll continue to try to get on h.f. (also v.h.f.) from his car. Normal service will be resumed as soon as possible!

Sean Gilbert G4UCJ operates:
around 0700-1100 and 2100-0000 seven days a week on 14MHz and 7MHz using an FT-307 and an Alinco DX-70 transceiver at 3/30W output and a G5RV dipole antenna in the loft space.

DATA SCAPE

NEWS, VIEWS & PICTURES TO:

ROGER COOKE G3LDI
TEL: (01508) 570278
E-MAIL:
rcooke@g3ldi.freeserve.co.uk
PACKET: G3LDI @ GB7LDI

THIS MONTH ROGER COOKE G3LDI TELLS YOU HOW YOU CAN KEEP UP-TO-DATE WITH WHAT'S ON YOUR FAVOURITE WEB SITES, LOOKS TO THE FUTURE & FINALLY TELLS YOU A BIT MORE ABOUT DIGITAL TECHNOLOGY AND HOW IT MIGHT AFFECT RADIO AMATEURS.

Ever wished you could remember to keep a check on every one of your particular sites that you are interested in? Keeping updated need no longer be a problem. You can now ask somebody else to do it for you. Or rather, visit the Web page tracking service at **www.netmind.com** See **Fig. 1** for their introductory page.

You can ask to receive an E-mail alert whenever your favourite page, or pages, are updated. This saves you the bother of trying to keep ahead. I

ROGER COOKE G3LDI TAKES A LOOK AT A NUMBER OF COMPUTER RELATED AMATEUR RADIO GOODIES THIS MONTH.

RadioScene

Fig. 1: Introductory page to be found at the Web page tracking service: www.netmind.com

Competition from Internet-based telephone services will force telecom companies to cut their charges. Internet service providers will be able to separate different kinds of digital data, giving a much smoother service and personally, I shall be happy if my Freeserve connection stops timing out!

The **PSK31** and **Hellscreiber** modes will obviously become more popular in the new Millennium. However, the polar path is still proving to be an insurmountable obstacle. This always thwarted me with h.f. Packet.

Although VE7PL was well over S-9 and likewise the reciprocal, he could never get past a connect with my BBS, quite frustrating. However, it is understandable. RTTY fares better than that, but then that is at 45.5bauds and two distinctly separate tones.

The following comments came in from **Peter KD7MW** recently: "This evening between 0400 and 0600UTC, I had my all-too-usual, frustrating experience of hearing several European stations on PSK31 that were too fluttery to copy much of the time.

"Evidently, the North Magnetic Signal-Eater is directly between my Seattle QTH and much of Europe, because I heard stations in Southern California and Texas successfully working these Europeans. I did manage a brief QSO with F8RZ, but that was all.

"Signal strengths were S4-S7, and I could copy c.w. IDs with no problem. I believe that Feld-Hellschreiber signals would work well under these polar flutter conditions. Please, Europeans, Give Hellschreiber a try. If you're already using PSK31, your radio and your computer are already set up for Hellschreiber. All you need is the software".

Thanks Peter, information on Hellschreiber and links to software is available at: **http://www.qsl.net/zl1bpu/** Also, there's excellent Windows/soundcard software (best with a Pentium) available at: **http://www.freeweb.org/varie/ninopo/radio/Hell/index.htm**

There are Web sites available for both PSK31 and Hellschreiber. At each one you can subscribe to receive all the news for each mode. If you tire of reading it all, you can always unsubscribe to any subscribed site, so nothing is permanent. See **Fig. 2a &b** and **Fig. 3**

recently signed up to receive an E-mail alert for the GeoClock page. Sure enough, I just received the E-mail prompt for me to go look! It's easy and convenient and they even provide the URL for you too, so you only have to click on it to invoke your Web browser.

You can track hobbies, business information, job openings, band tours, sporting events, financial information and so on using the Web page tracking service. It has been rated among the "50 Most Incredibly Useful Sites" by **Yahoo.** To track any other pages or another site, you simply go to **www.mindit.netmind.com/**

If you're doubtful of the service working and have not received a prompt for a while, you will receive a reminder to let you know the system is still working, together with a note of all the pages/sites that are being monitored for you.

The only down-side to the service is that they do state you MAY receive a sponsor message in the notifications to keep the service free, small price to pay I think! You can also send them feedback at **feedback@netmind.com**

LOOK TO THE FUTURE

Now for a look to the future an what will the new Millennium bring us, apart from being that much older? Well, leading PC's should have a 1GB processor, a minimum of 25GB hard drive and possibly a flat screen instead of the most bulky component of the present system, the old CRT monitor. This might be slightly delayed because of the cost. Presently it is still prohibitive for the average individual user, but the cost will reduce.

Laptops will be faster and cheaper, most machines will be using the Celeron low-cost 300MHz chip and prices will be coming down to under £1000.

DIGITAL TECHNOLOGY

A controversial new Digital Power-line Technology (DPL), recently announced, could pose a major problem for the Radio Amateur. If you've ever lived near any major power-lines, you will appreciate the hash that these radiate, even more so when wet and this problem will be exacerbated if this new suggested technology takes place.

The proposal is to deliver Internet access over power-lines and unless we protest at this, political pressure will force the government to deploy it and it is already presently on trial in Manchester. This power-line technology would give insufficient protection to Radio Amateurs and no precautions can be taken against the radiation from the power lines. Earlier this year, the **Radiocommunications Agency (RA)** warned that any service launched using existing digital power-line technology could be shut down because of potential interference with military, GCHQ and the Civil Aviation Authority transmissions.

Nor-Web has the trial running in Manchester at present and refutes any interference with any system in the domestic environment, or with any published users of the radio spectrum. It might be a good idea for amateurs in the Manchester area to double-check on this before it's too late.

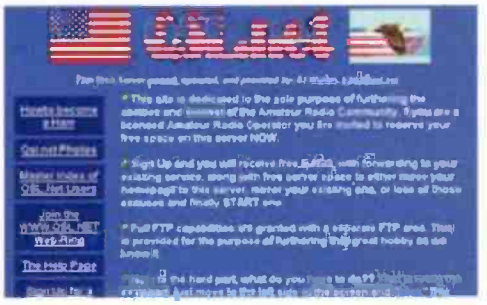

Fig. 2a & b: The Web site of PSK31 and an example of what can be found at www.qsl.net/zl1bpu/

At speeds of up to 1Mb/s, DPL is a marked improvement over today's dial-up environment. In today's world, the provision of up to 1Mb/s symmetrical to the home or small business is more than adequate to satisfy current requirements. However, it's only a matter of time before the technology is approved, judging by the government's interest in Internet technology.

DIGITAL VIDEO DISK

Digital Video Disk (DVD) looks like becoming the future standard, with more DVD offerings on the way, prices will reduce and it will catch on, given time. The origins of DVD go back to 1994, when **Philips** and **Sony**, the original developers of audio CD and CDROM, proposed the large capacity MM-CD.

Toshiba and **Matsushita**, among others, countered an alternative proposed format, SD, with even greater capacity. This early 'standards war' was a foretaste of things to come. Even now the DVD industry is still plagued by dissent, particularly over re-writable DVDs.

Sadly, the founding of the **DVD Forum** comprising most of the major CDROM manufacturers, has done little to end the battle of the standards between the rival factions. Most observers agree this acrimonious bickering between the competing companies over the DVD format has set back its acceptance by both industry and consumers. Strange how little changes! I remember the same battle over PAL and NTSC and the theoretical battles over digital TV standards!

To be fair, most DVD standards have stuck. Like CDROM, DVD is available in DVD-ROM, DVD-R, and DVD-RAM formats. The DVD-ROM serves as Read-Only Memory for computer data as well as for the DVD-Video.

The DVD-ROM was the first data format to be jointly developed by the computer and entertainment industries. The basic capacity was originally determined by the US film industry and is large enough to hold a 133 minute MPEG-2 encoded movie.

The one-time writable DVD-R is principally used for disk pre-mastering, while the DVD-RAM is quite similar to Magneto-Optical (MO) technology and is re-writable many times.

DVD has the same form factor as the CD: a diameter of 120mm and a thickness of 1.2mm. A DVD disc, however, can consist of two 0.6mm thick disks that are glued together

Fig. 3: There's excellent Windows/soundcard software (best with a Pentium) available at: www.freeweb,org/varie/ninopo/radio/Hell/Index.htm

back-to-back. Each side can also have two information layers (dual layer).

As a result of this dual layer, a DVD-ROM disk can have one of four capacities, see **Fig. 4** for more detail.

Dual-sided drives, either ROM or RAM, are not available at the moment. You have to manually flip a double-sided DVD disk to read or write the other side, rather like large capacity MO drives.

DVD-RAM drives are now available from makers such as Hitachi, Panasonic and Toshiba. Prices are falling under £300 now. Cartridges capable of 5.2Gb are available at less than £20 with single-sided 2.6Gb at around £13.

On top of this, DVD-RAM offers high reliability and usability and, like an ordinary hard disk, it is optimised for random, sector-level recording of data. It also supports defect management without the need for host-resident management software.

These characteristics make DVD-RAM suitable for many applications where the primary requirements are low cost per megabyte and fast access to data. This means that, in addition to conventional secondary storage applications, DVD-RAM is likely to find high acceptance in many back-up and archive applications.

World-wide sales are estimated to top 16 million in 1999, compared to around 736 000 in 1997. With figures like this, it's only a matter of time before the prices will tumble even further and make the re-writable DVD the user standard.

With software such as *Office 2000* being distributed on seven CDROMS, it's conceivable that, as these programs grow, they will be eventually distributed on DVD. More information on the DVD Forum can be found at **www.dvdforum.org**

HEALTH & SAFETY

I wonder how many of us have actually thought seriously about Health and Safety when designing our computer installations? Most 'designs' are an AOG (Act Of God - anything which you can't explain) when looked at from the Health and Safety point of view.

We put the computer on whatever work surface is available (it really is amazing how many horizontal surfaces are regarded as targets for our papers), grab what chair we can, accept the lighting that just happens to be there and so on. All this is not conducive to our health. If it happened in the work place, not only would we complain, but the employer would be legally liable.

Under the **Health and Safety at Work Act 1974**, computer installations should be designed in such a way that the users of the systems do not suffer health problems, stress or discomfort. The desk should have work space for pens and paper, as well as room for the computer and other equipment. There should be space under the desk for the knees.

The chair should be adjustable in both height and the back support, preferably with lumbar support and be a swivel type with castors. The monitor should be placed in such a position and at such a height that it does not cause neck-strain and should swivel and tilt. The keyboard should be stable and detachable.

The environment is important too. Working in a pleasantly decorated room in pastel colours with adequate ventilation and lighting all helps. Noise can be reduced with the use of acoustic tiles, carpets on the floor and curtains at the windows.

The monitor shouldn't face a window, avoiding reflections, an adequate desk angle-poise type lamp is ideal for the work-station, as is a copy-holder. Even a plant can add to the pleasant atmosphere. Eating, drinking and smoking at the computer is forbidden (that lets me out - I usually have a glass of orange-juice around!). I wonder how many shacks I have just described? Oh well, we can all dream of the ideal can't we!

Fig. 4: Table showing the definitions of various DVD formats.

Definitions Of Various DVD Formats

DVD-ROM:	Multi-read function, backwardly compatible with CDROM, CDRW, CD-R and CD media.
DVD-RAM:	Rewritable technology with 2.6Gb capacity per side, agreed format for 4.7Gb per side production latter part of this year.
DVD-R:	One-time recordable technology with 3.95Gb capacity per side, agreed format for 4.7Gb per side production latter part of this year.
DVD-RW:	Rewritable technology with agreed format of 4.7Gb capacity per side, compatible with all CD formats as well as DVD video, DVD-ROM, DVD-RAM, DVD+RW, Still under development.
DVD+RW:	Non-DVD Forum approved standard, proposed by Sony/Phillps/HP, alternative technology to DVD-RAM with rewritable technology and 3Gb capacity, compatible with all CD formats as well as DVD-ROMs. Still under development.

Web Watch

Web page tracking service: www.netmind.com
Information on Hellschreiber: http://www.qsl.net/zl1bpu/
Windows Software available at: http://www.freeweb.org/varie/ninopo/radio/Hell/index.htm
DVD Forum: www.dvdforum.org

LINUX RECEIVES BACKING

Linux recently received backing from IBM that could help the open source operating system win approval from corporate users. This system has its stalwart users and many amateurs among them, lots of software is now designed to be run under Linux.

Under the agreement with Red Hat Software, a Linux distributor, developers from both companies will work to improve performance, reliability and security for Red Hat Linux for commercial installations.

IBM has also released a beta version of its DB2 database for Linux and is working on Linux versions of Lotus Notes and Domino software. IBM doesn't plan to sell computers with Linux pre-installed. Instead, resellers will load the operating system onto the machines. This should all be good news to the Linux minded among us!

That's all I have for you this month. Keep me informed of anything which you feel you would like mentioned in this column.

APOLOGIES

Finally, I have an apology to make. In last month's 'Data Scape', you may remember that I wrote about **Ivor GI0AIJ's*** spectular antenna system and I was able to print a Web site address for those of you interested in taking a look at more of the pictures.

Unfortunately, the Web site address wasn't complete and if you've tried it to no avail than that is why. The full address should be: **www.mscomputer.com/gi0aij/** Please take the opportunity to visit this site, it is very interesting and, once again, my apologies.

** Apologies from the Editorial department for saying (in the captions accompanying the 'Data Scape' column) that this site belonged to Fred VE7PL. It is actually Ivor GI0AIJ's Web site and his antenna arrays!*

NEWS, VIEWS & PICTURES TO ME, DETAILS AT THE TOP OF THE COLUMN. UNTIL NEXT MONTH ...

73 Roger

BROADCAST

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IN THIS MONTH'S 'BROADCAST', PETER SHORE TAKES A FURTHER LOOK AT THE CUTBACKS AT DEUTSCHE WELLE, THE FIRST COMMERCIAL DIGITAL RADIO LICENCE TO BE AWARDED AND FINISHES WITH A SPECIAL OFFER FROM KNLS.

We start this month with a look at some cuts in services. As a result of the reduction in the budget granted to **Deutsche Welle (DW)**, Germany's international broadcaster has been forced to make massive cuts in staff and services. Around 740 staff will leave, including full-time and freelance employees.

A range of European languages are also going from DW, including Czech, Slovak, Slovene and Hungarian, along with Japanese and Spanish beamed to Asia and South America. Others affected include Albanian, Bosnia, Croatian, Macedonian and Serbian language services.

MORE FREQUENCY NEWS FOR YOU THIS MONTH AND THERE'S ALSO A SPECIAL OFFER FROM KNLS.

RadioScene

and an in-car set for around £300. (Look out for the receivers in the shops around Christmas time).

FREQUENCY NEWS

If you've been tuning to 5.935MHz at around 2130UTC on weekdays, you may have wondered what's become of the station that used to be on the air in English on that frequency. **Radio Latvia** used to transmit in English for just a few minutes during the week, plus a full half-hour on Saturdays to Europe. But since August, Radio Latvia has been off the air.

Fig. 1: Two stickers from Deutsche Welle.

Fig. 2: Card from Voice of America(VOA).

The Riga station didn't have much success in getting its programmes heard far and wide by short wave, relying on a single 49 metre band frequency from a low power transmitter.

Now it has decided to rely on the Internet where it is possible to log on and hear news in English, Latvian and Russian in reasonable quality using the RealAudio system. Check out **www.radio.org.lv** for Internet radio from Latvia.

Herald Broadcasting has ceased its short wave operations from Saipan in the Pacific. The transmitters on the island have now been sold to **Radio Free Asia** and Herald's programmes, intended for Asian listeners, now come from Taiwan through a deal between the UK transmission provider **Merlin Communications** and Radio **Taipei International**.

At the same time, **Radio Portugal International** is being relayed from Taiwan to East Timor, the province of Indonesia that voted for independence during the summer. Programmes, in Portuguese and Indonesian, are on the air via Taiwan at 1000 and 2200UTC on 11.55MHz, and direct from Portugal at 1000-1400UTC on 17.74MHz and at 2100-2300UTC on 17.60MHz.

The **Voice Of America (VOA)** has closed one of its short wave relay stations in the Philippines. Seven short wave transmitters were in operation at the Poro site, with powers from 35 to 100kW, according to a report on the VOA's *Communications World*.

The Poro site also has an important 1000kW (yes, 1MW!) medium wave relay transmitter - which stays on the air on 1143kHz. The other site, in the Philippines at Tinang, remains on the air with 12 short wave transmitters operating at 250kW.

In last month's column I reported on **Voice of Vietnam's** foray into the world of Internet audio and now here's their current 'traditional' schedule of English programmes (all times are in UTC):

0100-0130 to North America on 7.25MHz
0230-0300 to North America on 7.25MHz
0330-0400 to North America on 9.83MHz
1000-1030 to Asia and the Pacific on 9.84 and 12.02MHz
1100-1130 to Asia on 7.285MHz
1230-1300 to Asia on 9.84 and 12.02MHz
1330-1400 to Europe on 9.73 and 13.74MHz
1600-1630 to Europe on 9.73 and 13.74MHz
1700-1730 to Europe on 12.07MHz
1800-1830 to Europe on 9.73 and 13.74MHz
1900-1930 to Europe on 9.73 and 13.74MHz
2030-2100 to Europe on 9.73 and 13.74MHz
2330-2400 to Asia on 9.84 and 12.02MHz

Some of the transmissions to America are thought to be broadcast from Russian short wave sites.

The Middle East has a range of interesting stations to listen to, particularly as the Peace Process gathers speed again after the General Election in Israel earlier this year.

Try finding **Radio Damascus** from Syria. It broadcasts in Turkish at 1600UTC for an hour on 12.085MHz and then in Russian from 1700 to 1800UTC on 13.61Hz. At 1805UTC there is an hour of German on 12.085 and 13.61MHz followed by French on the same channels. English is heard at 2005UTC for two hours, the first beamed to Europe, the second to North America.

The **UAE Radio Dubai** service has English at 0330UTC for half an hour beamed towards North America on 15.40, 13.675 and 12.005MHz, at 0530-0600UTC on 21.70, 17.83 and 15.435MHz, at 1030-1100UTC on 15.395, 15.37 and 13.675MHz, and at 1330-1400UTC and 1600-1645UTC on 15.395, 13.675 and 13.63MHz.

Fig. 4: Card sent in from KNLS.

There's a high powered commercial station, **Medi-1**, that beams from Morocco on 9.575MHz from 0500 through until 0200UTC the following day. The programmes are in French and Arabic, including a high proportion of pop music with regular news bulletins in the two languages. You can also hear the station via RealAudio at **www.medi1.com**

You may remember that the **BBC World Service** closed its German service at the end of March. If you've ever wondered what goes on during the last few hours of a radio station that's been on the air for more than 60 years, log on to the unofficial 'Last Day' Web site put together by one of the members of the German Service - **www.schulze.demon.co.uk** It has a range of pictures taken on the last day and at the party that took place immediately after the last programme came off the air.

SPECIAL OFFER

Finally this month, there's a special offer from **KNLS**, the religious station based in Anchorage, Alaska - and thanks to Joanna Williams at *PW*'s Editorial offices for sorting this out!

Thanks to Jo, we've found that KNLS produces a couple of books that explain the intricacies of DXing and radio propagation for beginners. The station has offered the books, written by veteran American DXer **Carl Mann**, to 'Broadcast' listeners for just the price of a couple of international reply coupons (IRCs) that can be bought at any Post Office.

Write to **English Service, KNLS, Anchor Point, Alaska 99556, USA** and say that you've read about the books in *PW*. If you'd like to tune to KNLS, try the English service at 0800UTC on 9.615 or 7.365MHz, and again at 1300UTC on the same channels. KNLS also has programmes in Chinese and Russian.

THAT'S ALL FOR NOW - UNTIL NEXT MONTH'S COLUMN - THE LAST IN THE CENTURY WITH YEAR'S BEGINNING 19XX - GOOD LISTENING!

Peter

COMMERCIAL DIGITAL RADIO

In Britain, the first commercial digital radio licence for London was awarded to **CE Digital**, a partnership between **Capital Radio and EMAP Radio**. The new digital services - already running on a Radio Authority Restricted Service Licence - will be launched next May.

Capital FM, Capital Gold, Xfm, Kiss 100, Magic, Sunrise, LBC and **News Direct** will be aired in digital, along with a new adult contemporary station. Not much new choice in that selection so, will radio listeners go out and invest in a new DAB radio to tune in? Prices of the new generation of sets are falling, with a German manufacturer apparently bringing out a hi-fi tuner and an in-car set for around £300.

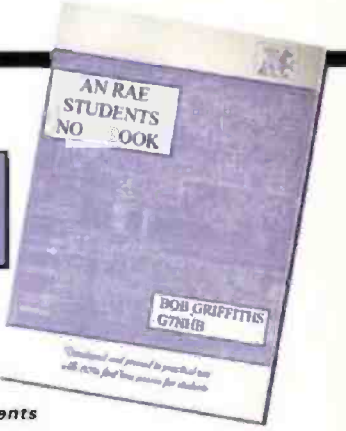
Fig. 3: Programme guide from the BBC World Service.

Web Watch

Internet radio from Latvia: www.radio.org.lv
Medi-1's Web site: www.medi1.com
Unofficial 'Last Day' Web site: www.schulze.demon.co.uk

Book Store

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Many titles are overseas in origin.



BOOK of the MONTH

An RAE Students Notebook

This month's 'Book Of The Month' comes from the shack of **Bob Griffiths G7NHB** and is quite topical for the time of year. If you've started an RAE Course this year, then ***An RAE Students Notebook*** could be just what you need to back up what you learn in the lessons.

It claims to have been "Developed and proved in practical use with 80% first time passes for students" and the author himself says that "This book is not enjoyable reading but is also essential for the aspiring radio 'ham' who wishes to make radio an interesting hobby". Flicking through the book, you'll discover that everything you need to pass the RAE is in this book but, most importantly, the author states that it will also help you to get the best out of the radio hobby.

This month the *PW* Book Store is offering *An RAE Students Notebook* to our readers for the price of **£6.95 including P&P UK AND overseas**. Hurry though, **offer ends 30 November 1999!**

To order please either use the form on page 82 or call the Credit Card Hotline on (01202) 659930 and quote *PW* 11.

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Abc AIRBAND RADIO GUIDE 4th Edition. G. Duke	80	£7.99
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