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£1895
Plus £7.50 Carr.

Free desk mic

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YAESU FT- 920AF

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SAVE

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£849
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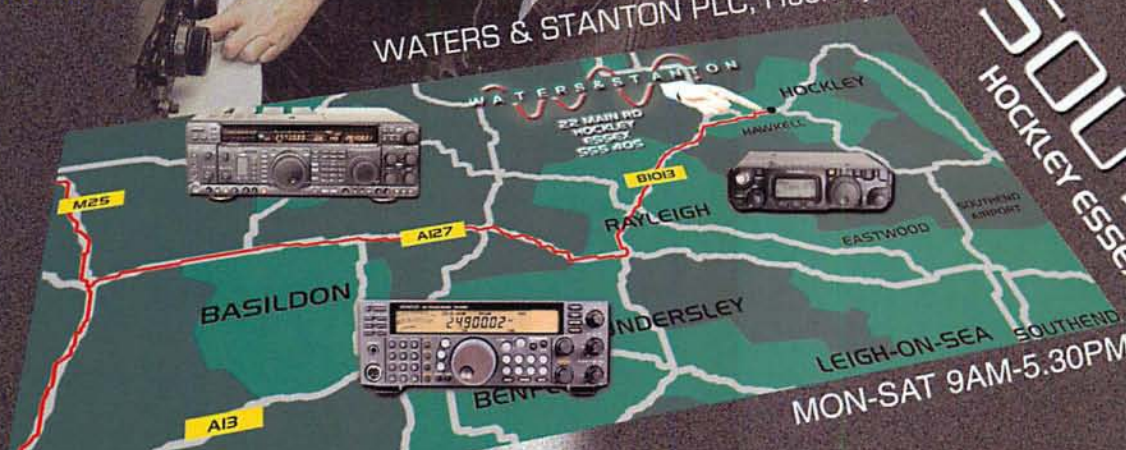

MON-SAT 9AM-5.30PM

In Matlock, Derbyshire, we aim to offer the same super prices, deals and personal over-the-counter service that customers in the south have enjoyed for many years. Customers wishing to see, operate, purchase or just talk about the latest amateur radio products now have the option of visiting us at Hockley in Essex, or at Matlock in Derbyshire. Both stores will carry our usual very comprehensive stocks of equipment and accessories. Mail order business will continue to be handled at our Hockley premises in Essex, from where we aim to get goods to customers within 48 hours; often less than 24 hours!

With the very wide range of equipment now available on the amateur radio market, Waters & Stanton PLC is probably the only company with sufficient resources to be able to carry comprehensive off-the-shelf stocks.

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TS-2000 Multi Band/Mode Transceiver - Coming Soon!

Kenwood promise a top performance 160m - 23cms transceiver. Full details are in our latest catalogue and product release is expected fairly shortly.

£1695 Plus £6.00 Carr.

KENWOOD TM-D700E 2m / 70cm Data Mobile

£429 Plus £7.50 Carr.

SAVE

Just arriving, this new model has built-in TNC, port for GPS, Data connector for SSTV, RTTY etc., CTCSS/DCS, Switchable TX/RX deviation, Dual receive, Wide receive option, Detachable head unit, 50 Watts on 2m, 35 Watts on 70cm, 200 memories, Alpha tag memo capability and a lot more. And who has the best price? - look no further!

WMM-3 Data Modes

£69.95 Plus £6.00 Carr.

If you want to receive data, then connect the audio output of your receiver to the WMM-3 and the output of the modem to your PC serial socket. A CD-ROM is provided with lots of software, this will get you started.

IC-910 VHF/UHF Transceiver - Coming Soon

Appox. £1300

IC-910 VHF/UHF Transceiver - Coming Soon The new IC-910 from Icom will shortly be available. 100W on 2m and 75W on 70cms, plus the option of 1.2GHz. Well placed to take advantage of satellite operation, you can simultaneously operate 2 bands at once. Phone For Details

Optional 23cms + £400

YAESU FT-11R 2-Metre Handheld

SCOOP!

Another find in a warehouse! Brand new, boxed with AC chargers and ni-cad packs. 75 Alphanumeric memories, AM airband rx mod possible. Last selling price £249! Very limited stocks.

£119 Plus £6.00 Carr.

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Reads Frequency & Codes

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Memory: 100 Channels
Decode: CTCSS, DCS, DTMF, LTR.
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Charger included

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YAESU Choice of the World's top DX'ers

FT-90R Can you believe the size?

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SAVE £289 Plus £7.50 Carr.

The tiny dimensions of the FT-90R from Yaesu, are hard to believe. Yet it produces 50W on 2m and 35W on 70cm. Auto repeater shift on UK channels and switched 12.5 / 25kHz deviation, make this a number one choice.

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Includes FREE Remote head cable.

ICOM IC-207H

£259 Plus £7.50 Carr.

* 2m / 70cm
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* 180 Memories and 7 Tuning Steps
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* Microphone, Mounting Bracket etc.

KENWOOD TM-G707E

£259 Plus £7.50 Carr.

* 2m and 70cm
* 50W and 35W
* Full CTCSS
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* Detachable Head with Amber Display

YAESU FT-8100R

£349 Plus £7.50 Carr.

* 2m and 70cm
* 50W and 35W
* Wideband RX AM & FM 208 Memories
* 7 Tuning Steps DTMF Remote Front panel
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KENWOOD TM-V7E

£339 Plus £7.50 Carr.

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* Clear LCD Readout
* CTCSS & DTMF
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* Includes Microphone & Mounting Bracket

£269 Plus £6.00 Carr.

YAESU VX-5R

* 6m / 2m / 70cm Handheld
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* CTCSS Encode / Decode
* 25 / 12.5kHz Steps
* Auto Repeater Shift
* AM Airband Receive
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YAESU FT-50R

£179 Plus £6.00 Carr.

* 2m / 70cm Handheld
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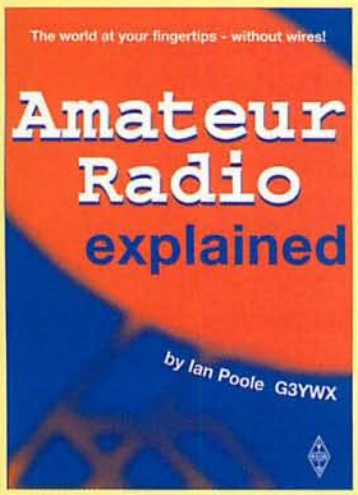
Amateur Radio Explained

By Ian Poole, G3YWX

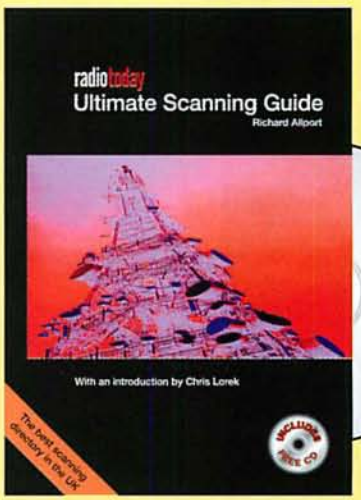


Have you ever needed to explain to someone what amateur radio is all about? Have you ever wanted something to help fan the flames of someone's initial interest in the hobby? Do you give talks about amateur radio? If so, this book will help you. Building on the success of Amateur Radio for Beginners (thousands of copies sold), this new volume covers setting up a station, what you are likely to hear on each band, how to receive and transmit, what's involved in getting a licence, codes, propagation, equipment, construction and much more.
In short an ideal introduction to the diverse world of amateur radio.

ONLY £9.99 + p&p

The Radio Today Ultimate Scanning Guide

By Richard Allport



The Radio Today Ultimate Scanning Guide is 640-page A5 book containing a huge listing of tens of thousands of frequencies between 30 and 1000MHz, and who uses them. Also included are reviews of scanners, an introduction to scanning, what's legal to listen to, and articles on what you might hear on the marine and air bands. Richard Allport has made every effort to ensure that the frequency listing is as up to date as possible. To make it even easier to find what you want, the 60,000+ entries are also listed on a fully-searchable CD-ROM that's FREE with the book. If you already have a scanner, or are thinking of buying one, this is the book for you.

ONLY £19.99 + p&p

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PW

MARCH 2001
(ON SALE FEBRUARY 8)
VOL. 77 NO 3 ISSUE 1128
NEXT ISSUE (APRIL)
ON SALE MARCH 8

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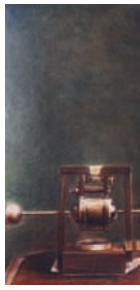
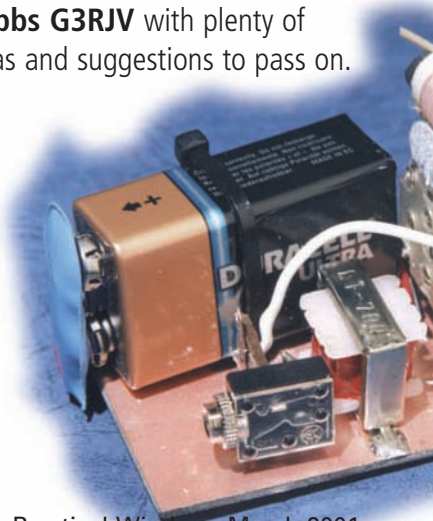
Cover Subject

Read how **Rob Mannion G3XFD** got on with using the Antex SD 690 Soldering station on pages 22 & 23 of this issue. Oh and in case you're wondering - it's **Clive Hardy G4SLU** from our Book Store who managed to sneak the SD 690 into his shack to see for himself what all the fuss was about!

Photograph by: **Tex Swann G1TEX**

March features





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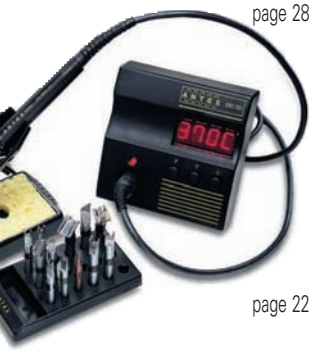

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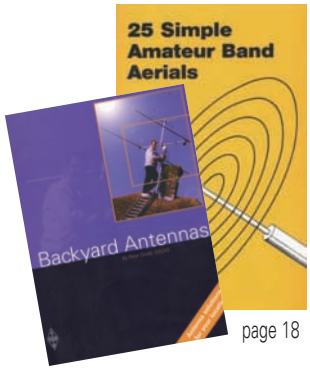
March regulars



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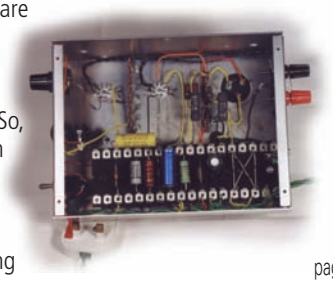

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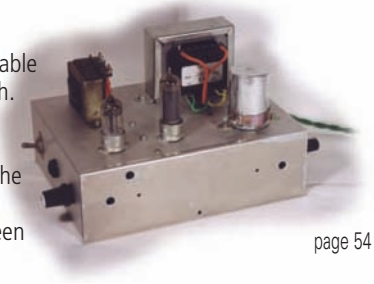

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmi h Court, Station Approach, Broadstone, Do set BH18 8PW. Tel: (01202) 659910. P inted in England by Warne s Midlands PLC, Lincolnshire Distributed by Seymour, 86 Newman St eet, London , W1P 3 D, Tel: 0171-396 8000, Fax: 0171-306 8002, Web http //www seymour co uk. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Cent a News Agency. Subscriptions NLAND £25, EUROPE £30, REST OF WOR D £32 (Airsaver), REST OF WOR D £37 (Ai mail), payable to PRACTICAL WIRELESS, Subscription Department PW Publishing Ltd., Arrowsmi h Court, Station Approach, Broadstone, Do set BH18 8PW. Tel: (01202) 659930.

rob mannion's keylines

Welcome to 'Keylines'! Each month Rob G3XFD introduces topics of interest and comments on current news.

How time flies by nowadays! The older I get the quicker my life seems to flash by and I say this because it seems only a moment ago since I was planning and looking forward to my delayed trip to visit the Telford & District Amateur Radio Society in Shropshire.

Well, this time I'm pleased to say I arrived okay, no thanks to the confusing layout of Telford, in time to thoroughly enjoy a most friendly and convivial evening with the members of the T&DARS. However, despite the welcome from the marvellous audience...I had to tell them I've found another new town, which is even more confusing than Milton Keynes! (Even a local Taxi driver told me that after many years of living there it wasn't easy to find your way around!). And even when I made contact with the club on 144MHz we had to decide what roundabout I was on!

Despite the fact I was late arriving, the 50 or so members of the T&DARS (including several visitors from as far afield as Stoke on Trent) were very patient and made the evening really pro-active. Great fun it was too and (thanks everyone) the buffet served was very enjoyable. I didn't even have to move from my seat as my food arrived on its own plate. What service!

Practical Wireless Tool Kit

The trip to the T&DARS saw the first 'outing' of the latest archive item which will now accompany me on *PW* Club Visits - a sample of an amazing historical 'free gift' tool kit presented with the September 1933 issue of *PW*. The tool kit, **Fig. 1**, came to me because of an extraordinary gesture of goodwill from a fellow Radio Amateur.

The gift was due to the generosity of **George Robbins G3LNG** from Liverpool. He promised me the kit some months ago and it duly arrived via TUX post (**Chris Rees G3TUX** of the QRP Component Company). The reason? George (a retired marine radio specialist and avid vintage collector) seems to attend every rally going and as Chris was coming to the *PW* offices he kindly delivered the precious package to me. However, there's no truth in the rumours that Chris is now trading as Consignia and wearing Post Office uniform shorts!

Thanks very much George! The tool kit now joins the travelling vintage archives which were donated to me so that readers could enjoy them during my visits to clubs. They certainly do that...and everyone was fascinated. So, I hope that when I come to visit your club that you too can share another item from the heritage of *PW* and our hobby and thanks to George G3LNG's kind actions.

● The *PW* tool kit, donated to Rob G3XFD for the 'travelling archives by **George Robbins G3LNG**.

Bargain Basement

Just a reminder that the new rules for our (extremely popular) Bargain Basement readers' advertisements section are now in force. **Everyone on the *PW* team asks that you play by the rules - which will be to the benefit of everyone! Help us to help you please!**

Understandably, there was a last minute rush of adverts before the new rules deadline. So keen was one reader to make sure he got his advert in before they payment deadline that he sent us three identical adverts. However, he'd forgotten the most important fact...he as a subscriber continues to receive free adverts!

● The September 1933 issue celebrated *PW*'s first anniversary by offering a free tool kit which has now become a collector's item!

Incidentally, during my visit several members of the Telford Club mentioned that they (as regular 'subscribers' - via their newsagents) should qualify for free adverts too. Although I fully understand their point of view (that they do support *PW* regularly) subscribers who pay **up front for a year or more** receive the privilege as a token 'thank you' for their extra support.

I hope you understand our situation - to survive, specialist magazines have to work very hard indeed. However, I've no doubt you'll raise the subject at shows and rallies during the coming year!

On Holiday & MV *Ulysees*

While on the subject of rallies, my holiday in Ireland (visiting **John Doherty EI9GB**, The Bangor & District ARS, the Foyle and District ARC (Londonderry), County Mayo and the IRTS Rally and AGM in Limerick) in April was booked early last year. Unfortunately, since then the RSGB have announced their new rally at Bletchley for 7 & 8th of April which coincides with the last weekend of my holiday! So, as the long arranged Irish trip takes precedence, again...let's hope we'll meet up at the Longleat Rally or the Leicester Show!

Finally, despite the best efforts of IRTS Vice President **John Corless EI7IQ** and myself it has not been possible to organise the joint EI/G Maritime Mobile operation. Hopefully though, once the MV *Ulysees* is in regular operation Irish Ferries may re-consider their decision not to allow such an operation. In fact -ending on a positive note - I'm sure the event has only been put on hold for a while. I hope so because we've had enough volunteers - from both sides of the Irish Sea - to join us on the trip to form our own crew let alone radio operators!

Rob G3XFD

practical wireless services

Just some of the services *Practical Wireless* offers to readers...

Subscriptions

Subscriptions are available at £28 per annum to UK addresses, £35 in Europe and £38 (Airsaver), £45 (Airmail) overseas. Subscription copies are despatched by accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both *Practical Wireless* and *Short Wave Magazine* are available at £55 (UK) £68 (Europe) and £74 (rest of world), £85 (airmail).

Components For *PW* Projects

In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article. The printed circuit boards for *PW* projects are available from the *PW* PCB Service, **Kanga Products, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115 - 967 0918. Fax: 0870 - 056 8608.**

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues for *PW* are £2.50 each and photocopies are £2.50 per article.

Binders are also available (each binder takes one volume) for £6.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Prices include VAT where appropriate.

A complete review listing for *PW*/*SWM* is also available from the Editorial Offices for £1 inc P&P.

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., FREEPOST, Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **(01202) 659930**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **(01202) 659950**.

The E-mail address is **bookstore@pwpublishing.ltd.uk**

Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.

amateur radio waves

Make your own 'waves' by writing into *PW* with your comments, ideas, opinions and general 'feedback'.

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.

Harrogate Morse Camp Success

Dear Sir

On the 16 and 17th of December 2000 I attended a Morse Camp along with 19 other people. Firstly, we were met by the Morse instructors who made us very welcome.

Next, we were sent Morse at 5w.p.m. to assess our standard and were then put into further groups and sent code at either five or 12w.p.m. according to our standard. Every 30 minutes or so there was a break for either tea or coffee. At about 1pm we had a one hour 30 minutes for dinner.

On the Sunday it was the same format. If you thought you needed one-to-one tuition the instructors where more than willing to help. Of the 20 people who went to the camp 17 passed the 5w.p.m. test and two passed the 12w.p.m. test. **And Yes - I Did Pass the 12w.p.m. test!**

Alan M1EFD/M0???
Bromborough
Merseyside

Editor's comments: Congratulations to you Alan! And thanks too for the hard work (and organising) of the instructors. Without goodwill like that shown, our hobby wouldn't be what it is!

Articles In *PW* & Data Modes

Dear Sir

Just a short note to congratulate you and your team for an excellent edition of *PW* in January. I found the articles on notch filters, Radio Basics and audio tailoring in Carrying On The Practical Way particularly interesting.

Being from Kent the article on Radar with concrete evidence of early experiments still standing today was fascinating. I would be very interested in a sequel to this enthralling story.

Funnily enough I recently took out a *PW* subscription and ended up with two copies of the January edition - I went and bought one just in case! Still I can always give it away and maybe someone else will find it as interesting as I did.

The February edition (just arrived) is well received, I can tell you. Ironically I am just about to make a few printed circuit boards so the timing is terrific!

And no less than four pages are devoted to the PSK31 mode! In Kent and Essex there is a growing number of PSKers on 144MHz. We are considering a net and if anyone would be interested I should be pleased to hear from them via E-mail: **steveseabrook@nationwideisp.net**

You might like to mention the v.h.f. and u.h.f. allocations for PSK in a future issue: 50MHz - 50.385000, 70MHz - 70.085000, 144MHz - 144.085000 and 430MHz - 432.085000.

All in all another great issue. Keep up the good work!

Steve Seabrook M1ECS
Sittingbourne
Kent

Prelude To Radar - My Memories

Dear Sir

I have read with great interest the article Prelude To Radar by **Brian Kendal G3GDU** in the January 2001 *PW*. And my own memories I'm sending in this letter, I think will be of interest to him and other readers of *PW*.

I was born in Yorkshire in 1930, on my Grandfather's farm in a little place called Kilnsea which is about three miles to the north of Spurn Head, just North of the river Humber.

My grandfather's farm had some fields that extended to the cliff edge on the North Sea coast and in one of those fields stood a concrete structure similar to one of those described by Brian G3GDU.

However, please remember that the following description is of something I saw about 60 years ago and mental pictures become a bit hazy after a while! The structure I remember was at least 30ft square and about 6ft thick and in the side facing the sea was a hollow depression shaped like a parabola and in front was a metal tube with a seating at the top for something (probably a listening device) placed at the focal point of the parabola.

Having thought about it on numerous occasions I thought it could be a listening device for detecting German airships coming in across the North Sea. However, Brian's article has more or less confirmed this for me.

I hope this will be of interest to Brian and readers of *PW* and if anyone has any information I would be pleased to hear from them. I very much doubt if the structure exists today as there has been considerable coastal erosion since 1939. 73 to you all!

'Jack' Warner G3XUF
Fareham
Hampshire

Editor's comment: Fascinating memories Jack! Many readers have responded to G3GDU's article and I too enjoyed reading the responses from you all. Any more reminiscences readers?

Prelude To Radar & Chain Home

Dear Sir

Thanks to the Editorial team for a fine magazine and more especially for the article in the January 2001 issue containg the Prelude to Radar article.

I find that there are almost no articles or books on our Second World War-time effort on radar stations at home or abroad. These include Chain Home (CH) and Chain Home Low (CHL) stations in the UK and the mobile type 6 in the Western Desert both before, during and after the landings in Sicily, Anzio and Taranto not to mention the long drag up the Adriatic coast of Italy to Udine and beyond to Victory Europe (VE) day.

While much has been written on Bletchley Park and Enigma also having played a decisive role in getting the job done, do the Air Ministry Experimental Stations (AMES) as they were then called overseas not merit a history. Not even a mention!

Many of the operators of these are now reaching their allotted lifespan, if sadly they haven't already done so. The heroic 510 station (a CHL type) sited on the bakery in Tobruk, the day one landings in Sicily of a number of Type 6 ASV (modified Air to Surface Vessels) sets mounted on Crossley four wheel drive lorries had proved their worth as aircraft early warning and anti-tank detectors before and after those landings. These are just some examples.

Based on our landings in the south the Second Front must surely have put them later to good use. Your resident historian will certainly have a whole bunch of tellers of tales ready and waiting for him if he visits me! I thank for your kind attention and remain yours sincerely

Ken Jones
Varmo
Italy

Editor's comments: The reason why we've not heard much (until relatively recently) about our radar in the 1939-1945 conflict Ken is that it was still 'on the secret list' right up until the 1960s in many cases!

Bristol Breaks Through!

Dear Sir

I couldn't resist sending you a quick E-mail on the Editor's regular Radio Basics column where he mentions the MK484 for use in simple receiver projects. I don't have any experience with the MK484, but I do with it's predecessor the ZN414. It doesn't work well in my area - as BBC Radio Bristol have a local medium wave transmitter that simply breaks through all over the place!

It can be persuaded to work by careful manual 'fiddling' with the a.g.c. voltage - normally just wired through with the 100kΩ in your circuit, but that kind of defeats the object of simplicity. In this age of many local radio stations, this may be a problem in other areas.

The audio i.c. LM386 should also come with a health warning! I encountered one of these recently in a door entry phone I installed for my mother, when she asked if I could add an extra speaker for the call tone. This involved modification to the circuit, which worked on my bench (don't they always!).

However, when I re-installed it at my mother's house it promptly taught me an unpleasant lesson about the importance of earth paths with high-gain

amplifiers. I'd inadvertently moved an earth connection, causing the input and output circuits to share a short length of p.c.b. track on the earthy side. Only a few millimetres of broad p.c.b. track, the voltage developed couldn't have been more than a couple of microvolts but it was enough and it was positive... the thing sat there and howled at me!

Fortunately, I had a soldering iron with me and was lucky enough to correctly guess the cause of the problem. Otherwise, the '386 is a good little amplifier, and has subsequently found it's way into an intercom design I have published in *Everyday & Practical Electronics* January issue.

I bought this issue of *PW* for the Prelude to Radar article. When I was a kid, around 45 years ago, I was taken to a holiday camp near Dungeness and we discovered the remains of one of the sites mentioned. I remember my father demonstrating how the sound carried along that curved wall - he whispered at one end and I could hear it at the other as clearly as if he was right next to me. I stood close to the focal point of one of the bowls, and could clearly hear a mechanical excavator operating well over a mile away... and I've always wondered about the history of these strange structures. Fascinating stuff! Keep up the good work.

Andy Flind
Taunton
Somerset

Editor's comment: Break-through can be a problem with the ZN4124/MK484 i.c. Andy, but my advice is that (generally, in my experience) it's better for constructors blighted in this way to take advantage of the local transmitter and use diode receivers with amplifiers. However, a MK484 radio (with a suitable slot for the ferrite rod to see out can be built into an aluminium die-cast box. Great care has also to be taken with audio i.c amplifiers too - as you've demonstrated and I've mentioned in the Radio Basics column.

Antennas - A 'Black Art'?

● **Dear Sir**

Over the years I have heard many Radio Amateurs, Scientists among them, inclining to the view that antennas and radio waves have an element of 'Black Art' despite all the modelling and synthetic testing that can be accomplished on modern computers. I have sympathised with this view because there seems to be so many unanswered questions, at least so far as I'm concerned.

The number one question might be: "Where and how is the plane wave generated, is it early or late in the whole process?"

If we consider an early birth does it have to fight its way through the near (induction field) to emerge perhaps two wavelengths from the Antenna?

If we consider a late emergence what is the process, is there some kind of phase transition between near and far fields? By that I mean a transition like that of water to water vapour or indeed ice, including the change in actual phase relationships.

We could argue for early creation on the basis that a gain antenna with multiple or lengthened elements carries the gain through to the plane wave.

The second question has got to be: "How much of the power conducted to the antenna is evident in the plane wave?" Alternatively how much power is lost in maintaining the induction field surrounding the antenna?

If we view the antenna as simply a means of coupling electromagnetic energy to space ought we consider antenna design as a matching problem. The impedance of space is said to be 120Pi about 377Ω. I suppose there will be some point along a resonant dipole where the impedance of the antenna matches that of space. Does this kind of thinking have any relevance? Or are we compelled to ignore this notion and to leave this coupling and matching to the 'Antenna Fairies!'

If we select wave rather than particle aspects of the wave/particle duality of electromagnetic fields then do not waves require a medium of some nature to waggle in. There has been a suggestion, I do not know how seriously it was made, that one of the rolled up dimensions of the ten dimension Universe is required by some cosmological theories might fit the bill?

The induction near, field that surrounds an antenna tends to have high degree of complexity. Could this provide a situation where complexity on the edge of chaos produces an orderly offspring - the plane wave. After all this idea is not unknown in such areas as fluid dynamics with strange attractors and the like?

On the other hand question three might well be is the induction field absolutely necessary in the production of a plane wave? I ask this question because the thinking behind Maurice Hately's crossed field antenna is what amounts to direct synthesis of the plane wave and suppression or at least some reduction of the near field. (Despite the past cynicism about his theory, GM3HAT has been the first person to my knowledge over 62 years who has produced an entirely new antenna theory and backed it with practice an in the broadcast world at least there are fare paying customers).

Now comes question four. If we had definitive answers to all the questions I have posed, would it contribute in anyway to the design and operation of the antennas?

I feel there must be someone out there who can answer most of my questions and possibly eliminate some of them as unnecessary in the process. I have submitted this writing to *PW* on the basis that the Editor might take pity and help me to locate the gentleman or lady with the answers.

Bryan Wells G3MND
Chesterfield
Derbyshire

● Keep your letters coming to fill *PW*'s postbag

Letters Received Via E-mail

A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, 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 include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'.

Editor

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amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

2001

February 11
The 10th Northern Cross Radio Rally
Contact: John G7JTH
Telephone: (01924) 251822
E-mail: rally@sandalmagna.demon.co.uk
Website: http://www.sandalmagna.demon.co.uk/rally/
Takes place at Thornes Park Athletics Stadium, Wakefield, West Yorkshire, just out of town on the Horbury road. Easy access from M1 J39 & J40 well signposted and with talk-in on 144 and 430MHz. Doors open 1100 (1030 for disabled and Bring & Buy). Usual attractions plus Morse tests on demand.

February 11
The Cambridge & District ARC Annual Radio & Computer Rally
Contact: Bob G0GVZ
Telephone: (01223) 413401
E-mail: bob.grimes@btinternet.com
This annual event including Car Boot Sale has a **new venue** this year - Lordsbridge Arena, Wimpole Road, Barton, Nr. Cambridge, opposite Mullard's Radio Observatory on the A603 off J12 on the M11. Doors open 1000 for disabled visitors, 1030 general public. Admission is £1.50, £1 OAP/disabled and under 14s free. Talk-in on S22.

February 11
Harwell ARS Radio and Computer Rally
Contact: Ann G8NVI
Telephone: (01235) 816379
E-mail: annstevens@compuserve.com
Taking place at the Didcot Leisure Centre, Mereland Road, Didcot, signposted from A34 will feature Talk-in on S22, car park, admission £1, doors open 1015 (disabled)/1030, trade stands, Bring & Buy, special interest groups, licensed bar, light refreshments and disabled facilities.

February 17
The Reddish Rally
Contact: John McKae G4ILA
Telephone: 0161-477 6702
Take trip to St Mary's Parish Hall, St. Mary's Drive, Reddish, Stockport. Signposted from M60 Junction 27 for this year's Reddish Rally. Doors open 1000. Talk-in on S22.

February 25
Contact: Roger GW4HSH
Telephone: (01792) 404422
The Swansea ARS will be holding their 20th Amateur Radio & Computer Show in the Swansea Leisure Centre. Doors open 1030. There will be traders, Bring & Buy, operational h.f./v.h.f. station and local groups, etc. Admission is £1.50 for adults, 50p for children.

March 11
The 16th Wythall Radio & Computer Rally
Contact: Chris G0EYO
Telephone: 0121-246 7267 eves/weekends
E-mail: chris@g0eyo.freeserve.co.uk
There will be plenty of traders in three halls and a large marquee, bar and refreshment facilities on-site, plus a big Bring & Buy stand and talk-in on S22 at the Wythall Rally, taking place at Wythall Park, Silver Street, Wythall, near Birmingham on the A435, just two miles from J3 on the M42. Doors open from 1000 'till 1600 and admission is just £1.50. **Free** park and ride.

March 17
The 8th West Wales Amateur Radio & Computer Rally
Contact: Ray GW7AGG
Telephone: (01686) 628778
E-mail: enquiries@mwmg.demon.co.uk
To be held at Penparcau School, Aberystwyth. Doors open at 1000 until 1530 and admission is just £1. There are good parking facilities with easy access for disabled visitors and traders. There will be demonstrations on h.f., v.h.f., packet on the air, amateur radio and computer traders, Bring & Buy, clubs, special interest groups and catering facilities. Talk-in on S22.

amateur radio news

A comprehensive look at what's new in our hobby this month.

Upgraded and improved

New Timewave DSP

Nevada anounce the release of the new Timewave DSP-599ZX Version 5 advanced DSP unit.

The Timewave DSP-5999ZX has been upgraded and boasts a whole host of new features. These include:

☛ **PC-Radio Interface and Filter for PSK-31**
The modes PSK-31 and SSTV require connection and matching of a radio's audio input/output and transmit/receive control line to a computer sound card and serial port. The DSP-599zx with Version 5.0 firmware can perform these tasks while maintaining the ability continue its other signal processing.

Using the DSP-599zx it's possible to operate RTTY, PSK31 and SSTV with just the DSP-599zx, a transceiver and a computer with appropriate software. No other interface boxes or multi-mode controllers are required!

☛ **Noise Reduction Algorithm Modification**
Tweaking the DSP-599zx's noise reduction algorithm means there is a better low-end response for s.w.lers and improved noise reduction over the entire range.

☛ **Binaural CW**
Binaural c.w. enables the operator to use the powerful combination of their brain and both ears to separate c.w. signals in a panorama with lower pitch signals to the left and higher pitch signals to the right. This exclusive feature makes c.w. listening easier and takes the pile out of pile-ups!

☛ **Morse Code Practice Oscillator**
Many of Nevada's customers wanted a practice oscillator included as even 5w.p.m. takes some practice. Just plug in your key and start sending! This is also a great way to test your new keyer off the air while you get your fist tuned up.

If you like the sound of the upgraded Timewave DSP-599ZX Version 5 and can't wait to get your hands on one, it's priced at £359.95 and is available now from Nevada.

Nevada,
Unit 1, Fitzherbert Spur,
Farlington,
Portsmouth PO6 1TT
Tel: (02392) 2313090
Fax: (02392) 2313091
E-mail: info@nevada.co.uk
Website:www.nevada.co.uk

Special Event Station

200 Years of Lifesaving

Scarborough Lifeboat Station celebrates 200 years of lifesaving this month.

To celebrate 200 years of lifesaving in the seas off Scarborough by the lifeboat crews stationed there, the **Royal National Lifeboat Institution** have announced that they will honour this outstanding achievement by the award of a special Bicentenary vellum. Scarborough lifeboat station was one of the original three lifeboat stations first established in the United Kingdom between 1800-1801. Before this local fishermen risked their lives in their own cobles (boats) to save the lives of shipwrecked colleagues.

Lifeboats stationed at Scarborough have been launched 1096 times and saved 563 lives. Over the years 17 medals have been awarded to crew members for bravery.

In connection with the celebrations The Scarborough Special Events Group will be active as **GB2SLS** from the presentation day on 3 March and a full colour souvenir QSL card of Scarborough Lifeboat will be issued to commemorate the occasion. Activity will be mainly in the 7MHz band using s.s.b and c.w. Short wave listener reports are very welcome and QSL cards can be sent via the Bureau or direct to the club call G0OOO.

It's no joke!

April First Licence

There's a surprise in store for the over 75s from April 1 2001 upon renewing their licence.

As from 1 April 2001, anyone aged 75 receiving a Licence Renewal reminder from the Post Office Customer Management (Formerly Subscription Services Ltd.) Radio Licensing Centre (RLS) in Bristol to renew their Amateur Radio Licence **on or after 1 April 2001 can renew their licence without payment**.

However, please note that the new arrangement does not come into force until the new financial year on April 1 and *PW* assures you it's not an April fool spoof! The RLS inform the Newsdesk that **no exceptions can be made**, even if your licence expires on 31 March. For further details please contact the RLS Helpline on **(01179) 258333.** And if you're fortunate enough to qualify the RLS says 'Don't forget to cancel those Direct Debit arrangements!

PW pays tribute to an author

Joe Carr K4IPV

Rob Mannion G3XFD pays tribute to an author, who although not long established in PW really made his mark among readers.

I was privileged to meet **Joe Carr K4IPV** on many occasions at the Dayton HamVention in the USA. He, like myself, was a big chap and big hearted too! Always ready to give advice and to listen to it in return, Joe will be sadly missed, especially as we had more ideas for *PW* readers on the way and in the planning stages.

Longer established as a specialist author with our sister publication *Short Wave Magazine*, Joe was looking forward to a working lunch in Bristol with **Kevin Nice G7TZC** (Editor of *SWM*) and I in February when he was due on one of his regular visits to Europe. Bonnie, Joe's wife has very kindly

Tributes to Electronic Pioneers

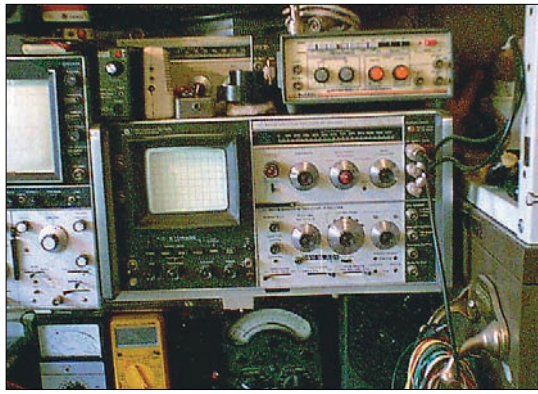
Pioneers Pass On

Rob G3XFD takes some time to reflect on two radio and electronic pioneers who have recently passed on.

William Hewlett, one of the co-founders of Hewlett-Packard has died in California at the age of 87. Born in Michigan in 1913, his father soon moved to Stanford University at Palo Alto and the family moved to nearby San Francisco.

In effect William Hewlett helped create an entirely new industry. Nowadays, the Hewlett Packard (HP) name is synonymous with high quality test equipment and recently the company had a world-wide advertising campaign featuring the (now preserved as historic building!) garage which he and his partner **David Packard** used to start the business.

From their humble beginnings in 1938 William Hewlett and David Packard (who died in 1996)



Hewlett-Packard are renowned for their spectrum analysers. This one resides in Rochdale and the owner is very proud indeed!

(Photo courtesy of Rev. George Dobbs G3RJV).

provided some background information on Joe. This was very helpful because he was not over-keen on blowing his own trumpet very loudly!

Bonnie Carr writes: Joseph J. Carr was born on 5 November 1943 in Washington DC. He grew up in Arlington, Virginia and graduated from Washington-Lee High School in 1961. He attended Old Dominion University in 1969 where he met me. We were married on 26 December 1969.

He was an electronics engineer who published more than 85 books and 700 articles since 1968. His books include popular titles on electronics and technology, college level textbooks and professional technical/reference books and two books dealing with the Holocaust.

Joe wrote monthly columns and feature articles in magazines such as *Popular Electronics*, *Popular Communications*, *Nut 'n Volts* and *73*, plus magazines published in Europe including *Elektor Electronics, Shortwave Magazine, Electronics World/Wireless World, Practical Wireles.* His works have been translated into Russian, Bulgarian, Swedish, Spanish, French, Dutch and German.

He received a Masters of Science in Electrical Engineering from George Washington University, and a Bachelor of Science degree from the University of the State of New York (Regents College). He worked as a biomedical engineer for GW University Hospital, the FDA and as an engineer in avionics for Nav Air, with experience in radar, electro-optics, sensors, open systems, computing and other disciplines. Prior to receiving his BSc in 1978, he worked as an electronics technician for sixteen years. Most recently he worked as Head, Systems Engineering Branch, Marine Corps System Command.

On 25 November 2000, Joseph Carr left behind a loving wife, Bonnie, two children, Bucky and Julianne, and granddaughter, Amani. He will be missed dearly.

Thank you Bonnie, and on behalf of *PW* readers within our Island group and world-wide I send you my best wishes for the future. We will remember Joe with respect.
Rob G3XFD.

created a business which is today the modern computer and electrical super-business. The original garage is now credited as the birthplace of what has now become internationally famous as Silicon Valley. In 2000 HP bought the house and land (which came with the garage!) for $1.7million. William Hewlett received many honours, including becoming an Honorary Fellow of Harris-Manchester College in Oxford.

However, the best tribute should surely be the incredibly high quality HP oscilloscopes and other equipment which we all know so well. It's a proud Radio Amateur who owns an HP spectrum analyser and **George Dobbs G3RJV** is amongst them! I'll never part with my HP programmable scientific calculator - it was a pioneer in 1980 and still works well some 21 years on!

The Lysander aircraft, this example is now preserved in flying condition, had a special role in the Second World War - flying to and landing behind enemy lines to deliver and collect agents. On many occasions such missions were helped by the ground-to-air v.h.f. transceivers developed by Al Gross W8PAL.

(Photo courtesy Christine Mlynek, reprinted from *SWM* Sept '99).

Alfred Gross W8PAL, who has recently died at the age of 82 in Arizona, may not be familiar figure to many European Amateur Radio enthusiasts. However, his work and ideas have played a major part in our hobby, modern day communications and also helped save many lives in the Second World War.

Born in Canada to parents who had emigrated from Romania, the family eventually moved to Cleveland, Ohio in the USA. He first obtained an Amateur Radio licence at the age of 16 and went on to carve an career inventing such (now everyday) items as hand-held 'walkie-talkie' transceivers, telephone pagers and the technology behind cordless and mobile telephones.

At University he was selected for further specialist training. This led to Al Gross being sent to the Institute for Advanced Study at Princeton University, where he was taught by Albert Einstein. He then went on to make his first 'walkie talkie' transceiver in 1938 and this led directly to an extremely important development in the Second World War.

Much of Al Gross' work on the founding of technology for CB radio - as far back as the late 1940s and selective calling pagers is well known. However, due to wartime security and the Cold War much of his specialised work for the life-saving S-Phone v.h.f. ground-to-air radio telephone units weren't so well publicised.

These units, very similar indeed in size to modern hand-held transceivers (but using valves), were credited as saving many lives, especially those of the Special Operations Executive (SOE) and the (American) Office of Strategic Services (OSS) agents dropped behind enemy lines in the Second World War. Such was the importance of the hand-held transceivers that they weren't taken off the secrets listings until the mid 1970s!

One of the tributes paid to Al Gross was the award of the Marconi Gold Medal in 1995. A fitting tribute to a remarkable man.

amateur radio clubs

Keep up-to-date with your local club's activities and meet new friends by joining in!

HAMPSHIRE

Andover Radio Amateur Club
Contact: Terry Cull M0BVO
Tel: (01980) 629346
Website: www.arac.co.uk
Meetings are held on the 1st & 3rd Tuesdays of the month at the Village Hall, Wildenham, Andover, Hants from 1930 hours. The meeting on the **20 Feb** should be an interesting one as it's a Workshop and operating night. The club are also involved in radio rallies which they encourage members to get involved with. Two to look out for are: **Sunday 29 April** - First Spring Boot Sale at Wildhern and The Sixth Middle Wallop Radio & Computer Boot Sale taking place on **Sunday 2 September**.

NORTHERN IRELAND

Bangor and District Amateur Radio Society
Contact: Mike GI4XSF
Telephone: 0284 2772 383
Website: http://welcome.to/bdars
On **Wednesday 7 March 2001** at 2000 hours the Bangor club are hosting a talk on ATV presented by **Tony Wise GI0UZG** and will cover all aspects of ATV, including a section on the new Northern Ireland ATV repeater which will hopefully be in operation soon. This is should be an interesting evening and as always, visitors and new members are all very welcome.

All meetings are held at The Stables, Groomsport, County Down on the first Wednesday of the month at 2000. Please note that this is a **new** venue, the club are no longer meeting at the Clandeboye Lodge.

SHROPSHIRE

Telford and District ARS
Contact: Mike Street G3JKX
Telephone: (01952) 299677
Website: www.telford-rally.co.uk
The Shropshire based, Telford club meet every Wednesday at 2000 hours at the Community Centre, Bank Rd, Dawley, Telford, Shropshire. Their programme of events is varied and interesting. Forthcoming meetings include: **14 Feb:** HF Antennas - how they work, Which is the one for you?; **21 Feb:** Under £5 construction competition; **28 Feb:** Chairman's discussion evening? **7 March:** Committee/OTA/Natter night.

SUFFOLK

Bury St. Edmunds Amateur Radio Society.
Contact: George G3LPT
Tel: (01359) 259518
E-mail: tpl3g@aol.com
Meetings are held every 3rd Tuesday of the month at Culford School, Nr. Bury St. Edmunds at 1930. Talks usually start at 2000 hours. A weekly Morse tutoring class takes place on Wednesdays, over the air and in a alternating members QTHs. New members are all very welcome, whatever their special slant, on the hobby.

WILTSHIRE

Trowbridge & District Amateur Radio Club
Contact: The Secretary
Telephone: (01225) 864698.
Website: www.gertdarc.plus.com/
The club meets at the Southwick Village Hall, Southwick. Main meetings commence at 2000 hours unless otherwise stated. All main meetings may be subject to change depending on availability of guest speaker please watch for updates on the club Website, GB2RS or on the club 144MHz net on Monday evenings between 1930 and 2000. Meetings coming up in the next few weeks include: **21 Feb:** Natter night; **7 March:** Natter night and **21 March:** Table top surplus equipment sale. Visitors are always welcome to all meetings.

Keep those details coming in!

amateur radio **trade**

The north-south divide closes

W&S @ Lowe

Waters & Stanton PLC announce that they now have a showroom and retail counter at the premises of Lowe Electronics Ltd. in Matlock, Derbyshire.

From the beginning of February Waters & Stanton in the South are joining forces with Lowe Electronics in the North. **Peter Waters G3OJV** told the *PW* Newsdesk that "this would give customers in the Midlands and the North the opportunity of seeing and purchasing the same wide range of products at the same competitive prices that customers in the South have enjoyed for many years when visiting Waters & Stanton's Hockley premises in Essex. They will also benefit from the excellent after-sales service, for which both Waters and Stanton and Lowe Electronics are renowned".

Richard McLachlan G3OQT, Managing Director of Lowe Electronics Ltd, explained that his company had "recently been concentrating on developing their commercial business which included the acquisition of two additional companies. Although they see their future expansion in the commercial field, they still have their retail showroom, for many years the Mecca of Amateur Radio".

Richard said that it "made sense to find a way of being able to continue to offer an Amateur Radio retail facility at Lowe Electronics, as Amateur Radio is a very specialised field in which they have many years of experience. Matlock is geographically well situated for motorway access, and the collaboration with Waters and Stanton should offer the finest amateur radio facility in the North, with free parking and beautiful countryside views".

The new showroom is called W & S @ Lowe and is now fully operational. Waters & Stanton's mail order and Web ordering service will continue to be handled at their main premises in Hockley.

W&S @ Lowe, Chesterfield Road,
Matlock, Derbyshire
Tel: (01629) 582380.

Don't Miss This Bargain

Ten Tenna-Tourers Lying Around!

Time for a song - Ten Green Bottles - not really but it does signify news of a great bargain for you.

Remember the Tennamast Tenna-Tourer as featured by G3XFD in Antenna Workshop on page 54 of *PW* Feb 2001? Well here's your chance to buy one at a very special price.

Following the interest shown in the fibreglass telescopic Funktechnik mast with Rob's Tenna-Tourer mast base **Norrie Brown GM4VHZ** of Tennamast told the Newsdesk that due to the boat trailer building programme (very busy just after the Boat Show!) they've got **10** Tenna-Tourers taking up valuable space (**ten only - first come first served**).

So, in a bid to create space Norrie is offering the 10 sturdy hot-dipped heavy duty galvanised Tenna-Tourers for **£56.50** including VAT and P&P instead of £84 plus P&P. But hurry this offer is strictly on a first come, first served basis and ends on 31 March.

How's that for a Mad March offer! Rob G3XFD was so impressed with the Tourer at that price he's thinking of getting another as a spare!

Norrie GM4VHZ or Rose GM4NHH
Tennamast (Scotland) Ltd.,
81 Mains Road,
Beith,
Ayrshire,
Scotland KA15 2HT
Tel/FAX: (01505) 503824
E-mail: nbrown@tennamast.com

Amateur Radio Help

Help out your fellow amateurs

Bill Collier contacted us with the following cry for help: "I have just finished restoring a 1930 three valve domestic receiver made by Red Star Radio Ltd, who had a factory in Birmingham. I can find no mention in any books of this company.

There is a photograph of it in *Radio Radio*, page 120, fig. 308, stating that the radio used all Lotus components. All components in mine without exception however, are made by Telsen.
In the book *The Setmakers* on page 108, there is a cartoon of the personalities that attended the 1930 Radio Olympia exhibition, and fig. 4 shows H. Green Telsen and Red Star. So there is obviously some link between Telsen and Red Star but no matter where I look I can find no mention of it.

Did Telsen buy out Red Star at some point, but continued to use their own components in existing cabinets, either to fulfill outstanding Red Star contracts, or until stocks of existing cabinets and fittings were exhausted?

It would appear that my 1930s unit was the only Red Star radio ever sold, in both a two and three valve versions, as I've never seen another model. Why is it that no information can be found, even amongst the finest books on the subject of vintage radio on a company that was obviously linked to one of the radio giants"?

If you think you can help Bill shed some light on the matter E-mail him at: **bill.g0tgu@tesco.net**

In the Jan issue of *PW* we mentioned Aussie reader, Dan Bedford, who was in need of some help. However, it appears that the E-mail address of coilstoadhall@silchip.com.au we were given is wrong.

Pete Norman G0PKS thinks he can help Dan and says if he would like to E-mail him at **pete-g0pks@supanet.com** he may have the answer Dan is looking for.

There's a real treat in store at the National Exhibition Centre (NEC), Birmingham on Sunday 29 April for anyone interested in any vintage technology.

Whether your vintage interest be in radio magazines, old wireless set or wind-up gramophones! You name it and you'll find it for sale at the National Vintage Communications Fair (NVCF) at the NEC on the outskirts of Birmingham, so be tempted and consider it as **Rob G3XFD** says of a visit he made several years ago.

"**Tex Swann G1TEX** and I visited the NVCF several years ago and thoroughly enjoyed the event. I was astounded to see many stalls selling vintage copies of *PW*, which rather took me by surprise. It was truly amazing what was on sale, everything from vintage microscopes to beautifully restored clockwork motors for wind-up gramophones.

Of course, you're bound to meet many Radio Amateurs and friends because they too will be fascinated. **But don't expect Amateur Radio show prices**....this is for the serious collector, although you'll get the chance of finding something really fascinating **even if you didn't intend buying anything!** A thoroughly enjoyable day out and something I intend to do again".

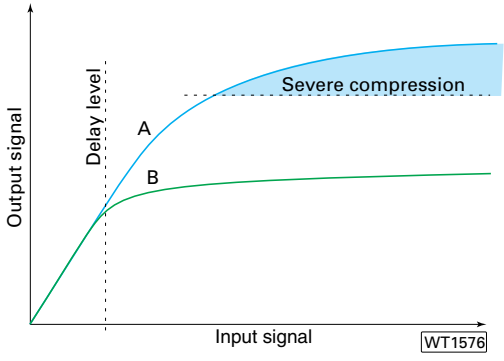
So, take Rob's advice if you want to see vintage radios, crystal sets, 1920s valved receivers, horn speakers, early transistors, scientific instruments plus all electrical and mechanical antiques and collectables head for the NEC and the Sunday NVCF on 29 April, 1030 to 1600. Admission £5 tickets on the doors, under 14s free.

NVCF 2001,
13 Belmont Road,
Exeter,
Devon EX1 2HF
Tel: (01392) 411565
Website:
http:/www.anglefire.com.sunpress/index.html

THE AUTOMATIC GAIN CONTROL

Gordon King G4VFV looks at how automatic gain control has evolved since its use in early valved sets and points how beneficial it can be!

In past editions of this column I have peeped in at the automatic gain control (a.g.c.) circuitry but now it's time to look at it in more detail. Firstly I'll go back to the very early days of radio when valves were vogue and even domestic receivers were equipped with a multiplicity of manual controls. Two controls in particular were the radio-frequency (r.f.) gain control and the audio-frequency (a.f.) gain control, more colloquially known as the volume control.



● Fig. 1: Curves showing the basic a.g.c. action.

As domestic designs and valve techniques advanced and the superhet receiver became the overall standard, the number of manual front panel controls was reduced. An early deletion was the r.f. gain control. The r.f. and i.f. stages were engineered for optimum gain and a circuit was included which automatically reduced the gain in sympathy with the strength of the received signal.

Blasting Distortion

Blasting distortion was the name given to the function of the automatic volume control (a.v.c.), as it kept the sound level from the loudspeaker reasonably constant regardless of the strength of the received signal. It thereby avoids blasting distortion on strong stations while the receiver was being tuned. Today the technique is known as a.g.c. With modern communications receivers and their multiplicity of controls, which invariably include a manual r.f. gain control (as well as a.g.c.), we seem to have come full circle.

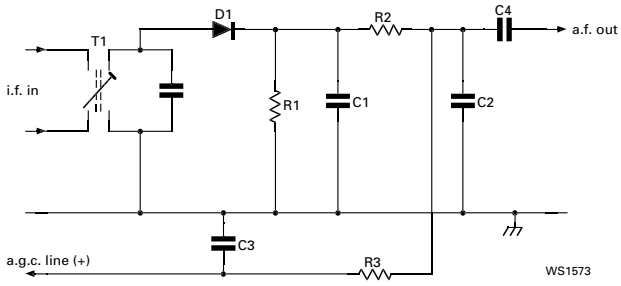
The transfer curves in **Fig. 1** reveal the secret of a.g.c. Upper curve A shows how the a.f. output signal might increase with increasing strength of a modulated antenna signal tuned on a receiver without a.g.c.

Initially, the output signal would rise fairly linearly with the input signal. As the strength of the input further increased, the output would fail to increase at the same rate, resulting in compression and non-linearity. Non-linearity in any stage is undesirable since it can be responsible for harmonic distortion and spurious signals.

The level of the a.f. signal delivered by the detector is linked to the level of the i.f. signal at its input. This means that the stronger the received signal the louder the sound will be from the headphones or loudspeaker. Of course, to avoid overloading and non-linearity occurring in the a.f. stages a manual volume control would normally be used!

Automatically Varied

With a.g.c., the gain of the controlled stages is automatically varied inversely with the strength of the tuned signal. The a.g.c. action is usually delayed until the tuned signal reaches a predetermined strength.



● Fig. 2: The a.g.c. voltage is obtained from the detector diode in least complicated receivers.

Stronger signals then start to activate the a.g.c., which reduces the gain so that the a.f. signal from the output of the detector remains fairly constant, as shown by lower curve, B in Fig. 1. Signal fades (QSB) are ironed out by the gain increasing with falling strength and decreasing with increasing strength.

Communications receivers and transceivers generally include a front panel control which allows the speed at which the a.g.c. follows the changing strength of the tuned signal to be adjusted to suit the operating conditions. A switch allowing the a.g.c. to be deleted may also be present.

When using Morse code under severe conditions of interference (QRM) there have been times when I've found it best to switch off the a.g.c. and to establish the overall gain manually by the r.f. and a.f. gain controls. For most of my h.f. Morse operating, though, I generally set the 'speed' control between fast and slow, tending more towards slow when the channel is fairly clear of near-frequency QRM.

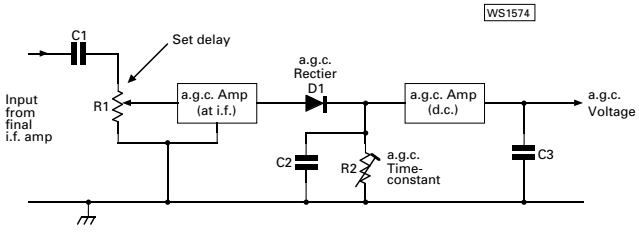
When operating J3E or F3E the slow setting may be best, depending on the presence or speed of any QSB. However, if close-frequency QRM is troublesome on any of the 'phone modes it may pay to delete the a.g.c. and control the signal input manually by the r.f. gain control.

Same Principle

The principle of a.g.c. remains the same today as when it was first adopted and called a.v.c. Overall gain of the i.f. and r.f. stages is linked to the strength

Continued on page 16...

● Fig. 3: A more complicated a.g.c. voltage source circuit, commonly found in communications receivers and transceivers.



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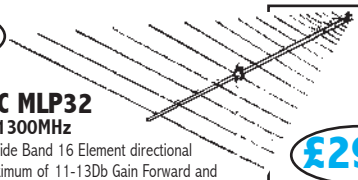

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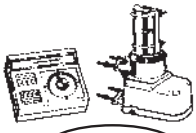

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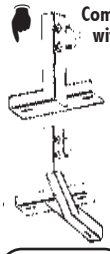

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(Stainless Steel)
Freq. Range Recieve 117-140MHz Transmit 117-140MHz Length 825mm Connector-N TYPE

This is a transmitting & receiving antenna designed for the aircraft frequency range. *(For the control tower & aircraft listener)*

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Freq. Range 0-2000MHz Length 1000mm

It will receive all frequencies at all levels unlike a mono band antenna. It has 4 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals. *(Ideal for the New Beginner and the Experienced Listener alike)*

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SUPER SCAN STICK II

Freq. Range 0-2000 MHz. Length 1500mm.

This is designed for external use. It will receive all frequencies. at all levels unlike a mono band antenna. It has 8 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals plus there is an extra 3db gain over the standard super scan stick. *(For the expert who wants that extra sensitivity)*

£39.95

MULTISCAN STICK

Freq. Range Receive - 0-2000 MHz. Transmit 144 - 146 MHz gain 2.5 DBd 420 - 430 MHz gain 4.5 DBd Length 1000 mm.

Although marginally compromising sensitivity the multi scan stick has within its transmitting capabilities plus gain makes it an excellent antenna for the amateur and expert alike.
Comes complete with mounting hardware and brackets.
(Ideal for the amateurs ham radio - user)

£89.95

IVX 2000

Freq. Range Receive - 0-2000 MHz. Transmit 50 - 52 MHz gain 2.00DBd 144 - 146 MHz gain 4.00 DBh 420 - 430 MHz gain 6.00 DBd Length 2.5 m.

For external use, but at a pinch can be used in the loft. It has been finely tuned to make this Antenna the best there is. It has stainless steel radials and hardware. *(THE BEST)*

£49.95

MULTI SCAN STICK II

Freq. Range Receive (0-2000MHz) Transmit (144-146 MHz) Gain 4.00Dbd (420-430 MHz) Gain 6.00Dbd Length 1500mm

Same as Super Scan Stick but with extra gain, makes it an even better antenna for the amateur and expert alike. *(Ideal for the Ham Radio user)*

FULL RANGE OF SCANNERS AVAILABLE. PLEASE PHONE FOR PRICE.

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SWP 2000 FREQ. 25 - 2000 MHz. Length 515mm.

Multiband good sensitivity for its small size. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. *(Good for the car user who doesn't want an external antenna)*

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SWP HF30

Freq. Range 0.05-30MHz Length 770mm

Although small, surprisingly sensitive for the H.F. user. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. *(Good for the car user who doesn't want an external antenna)*

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HF DISCONE

Freq. Range 0.05-2000MHz Length 1840mm

Internal or External use (A Tri-Plane Antenna). Same as the Super Discone but with enhanced HF capabilities, comes complete with mounting hardware and brackets. *(Ideal for the Short Wave H F Listener)*

TRI SCAN III

Freq. Range 25-2000MHz Length 720mm

Desk Top Antenna for indoor use with triple vertical loaded coils. The tri-pod legs are helically wound so as to give it its own unique ground plane. Complete with 5mts of low loss coax and BNC plug. *(Ideal for Desk Top Use.)*

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(Stainless Steel)
Freq. Range Receive 25-2000MHz Transmit 50-52MHz 144-146MHz 430-440MHz 900-986MHz 1240-1325MHz Length 1540mm Connector-N TYPE

The Ultimate Discone Design. 4.5DB GAIN OVER STANDARD DISCONE! Highly sensitive, with an amazing range of transmitting frequences, comes complete with mounting hardware & brackets *(The Best There is)*

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SUPER DISCONE

Freq. Range 25-2000MHz Length 1380mm

Internal or External use (A Tri-Plane Antenna). The angle of the ground planes are specially designed to give maximum receiving performance within the discone design. The Super Discone gives up to 3Db Gain over a standard conventional discone. Comes complete with mounting hardware andbrackets. (Ideal for the Experienced Enthusiast.)

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TURNSTILE 137

Freq. 137.5 MHz Length 1000mm

This Antenna is designed for external use to receive weather satellite signals.

Complete with mounting hardware.

(Simple and easy to install a must for the enthusiast who has it all)

£39.95

MRW-40 (Rubber Duck)

Dedicated for Civil & Military Airband VHF/UHF RX & TX Capabilities Length 215mm. P.P £2.00

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MRP-2000 (Preamplifier)

Freq Range 25-2000 Mhz 9-15v input (Battery not included) 14 db Gain. Complete with lead and BNC connectors.

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MRP-125 (Preamplifier)

Freq Range 118-137 Mhz 9-15v input (Battery not included) 14 db Gain Complete with lead and BNC connectors.

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G. SCAN II

Freq. Range 25-2000 MHz.Length 620 mm.

Magnetic mount Mobile Scanner Antenna. 2 vertical loaded coils for good sensitivity complete with magnetic mount and 4mts of coax, terminated with BNC plug. *(Good for when you are driving about)*

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...continued from page 13

of the received signal by an a.g.c. voltage derived from rectified i.f. signal. The a.g.c. voltage is then fed to each controlled stage in a way that adjusts its gain.

The simple arrangement in **Fig. 2** obtains a.g.c. voltage from the rectified i.f. signal present at the detector output. The stronger the i.f. signal, the greater the a.g.c. voltage. This voltage is positive-going, but reversal of the detector diode D1 would change it to negative-going, which may be necessary for some applications.

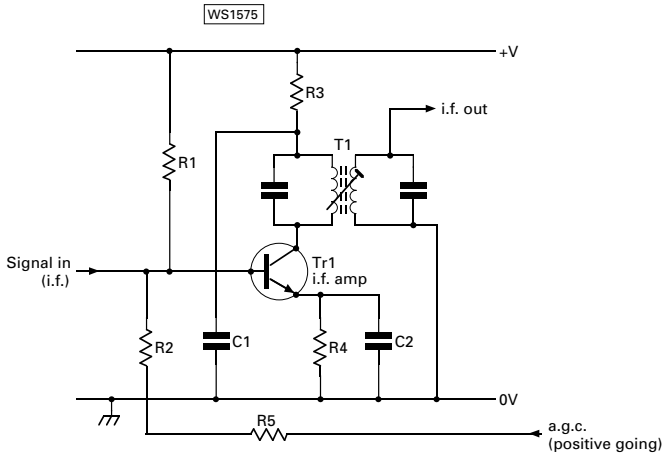
Detector load is R1, while C1, R2 and C3 provide a.f. filtering. The resulting a.f. signal is passed to the a.f. amplifier through C4, and any unwanted a.f. on the a.g.c. line is cleared by R3 and C3.

In the more advanced scheme shown in **Fig. 3**, the i.f. signal is amplified specifically for the a.g.c., with the input control R1 setting the delay level. The amplified i.f. signal is first rectified by D1 and the resulting voltage itself is also amplified before being applied to the controlled stages. Filtering is by C3, with C2 and R2 setting the time-constant for fast or slow operation.

In the days of valves the a.g.c. voltage was applied as a negative-going bias to the first grid of the controlled valves. These valves had variable-mu (variable gain) characteristics, which provided a 'smooth' reduction in gain with increasing bias.

The application of. a.g.c. shown in **Fig. 4**. is known as forward a.g.c. because the transistor is forward-biased by the a.g.c. With rising signal strength, therefore, the collector current increases, as does the voltage across R3, which is an essential resistor of forward a.g.c. Hence, the voltage across the transistor falls. With transistors designed for this application, the decreasing voltage reduces the gain of the stage accordingly.

Another application, known as reverse a.g.c., is where the controlled stage is biased by the a.g.c. voltage in the reverse sense (positive-going for pnp transistors and negative-going for npn devices). The gain of the stage is then reduced by the reducing collector current.

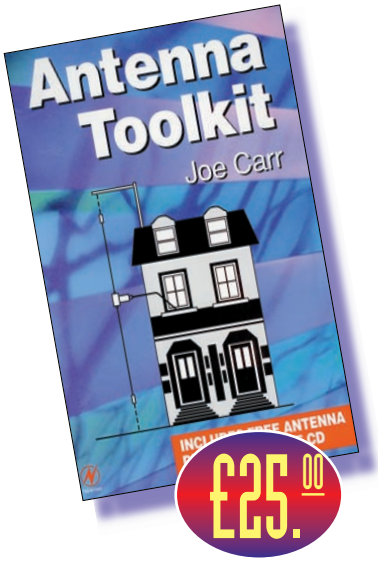


● Fig. 4: The circuit shows the application of forward a.g.c. voltage. With increasing signal strength the collector current rises and the collector voltage falls due to the increasing volts drop across R3. This reduces the gain of the stage.

Control voltage of suitable polarity is applied to the input gate of a field-effect transistor (f.e.t.) which, for instance, may be operating as an r.f. amplifier. Stages using integrated circuits receive the voltage at the appropriate gain-controlling port.

Well that's it for this instalment. My next 'Looking at'.. will focus on the signal-strength meter. See you then! PW

Book Profiles



As we look forward to the spring (it really is coming you know!) Rob Mannion G3XFD takes a look at some antenna books to get you ready. With these titles on your book shelves and armed with some good ideas - Rob says you'll be ready for the antenna erecting season!

Antenna Toolkit

Joe Carr K4IPV

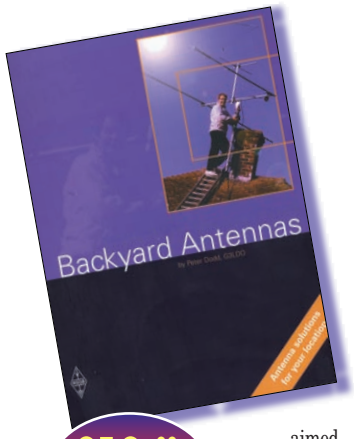
The late **Joe Carr K4IPV** was a prolific writer and one of his favourite subjects was an interest many of us share - antennas. And although this book was first published in 1977 and reprinted in 1998, I'm afraid to say it was one of rare occasions I'd missed seeing a copy of his work. Having now discovered it, I realise I've missed out on a very useful, practical and exceedingly readable book, which now comes complete with a free Antenna Design Software CD.

Contents include: Radio signals on the move (propagation, etc.), antenna basics and theory (particularly good explanations and diagrams), wire, connections grounding, Marconi and other un-balanced antennas. Joe then goes on to describe doublets, dipoles, and other antennas, limited space antennas, large loops, wire arrays and impedance matching. Simple instrumentation and measurements and 'getting a good ground' are also discussed.

This is in effect a miniature - very enjoyable - antenna manual. Very good technical explanations without over-doing the maths for not-so-keen mathematicians! Drawings and illustrations are superbly clear and the section on instrumentation is very helpful, at 216 pages it's a superb 'pocket sized' manual ideal for both absolute beginners and the keen experimenter alike. **Highly recommended**.

Backyard Antennas

Peter Dodd G3LDO

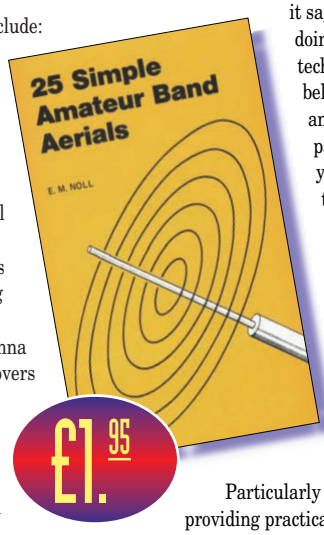


Originally written and self-published by **Peter G3LDO**, this book is now published by the RSGB. Peter, as a regular author for *PW* has earned himself the reputation as a thoroughly practical antenna designer and author. Never could he be accused of just writing about the hobby - he really does get stuck in (the front cover proves the point!).

Sub-titled *Antenna solutions for your location* the book does as it says! An excellent read in Peter's easy-to-read style with very many ideas.

Chapter 1 entitled Overcoming the Limitations, is in my opinion one of the most useful sections of any book aimed at the Amateur Radio enthusiast. Read it and you'll soon understand what you've got to do to maximise your success in radiating that signal!

Other chapters include: Centre fed antennas, end fed antennas, matching and tuning (with plenty of circuits, advice and techniques), loops and slots for h.f., and small rotary beams for h.f., v.h.f. and u.h.f. aspects are also covered, along with materials, construction and antenna supports. Peter also covers estimating and measuring antenna performance using the methods he's proved work so well in *PW* articles.



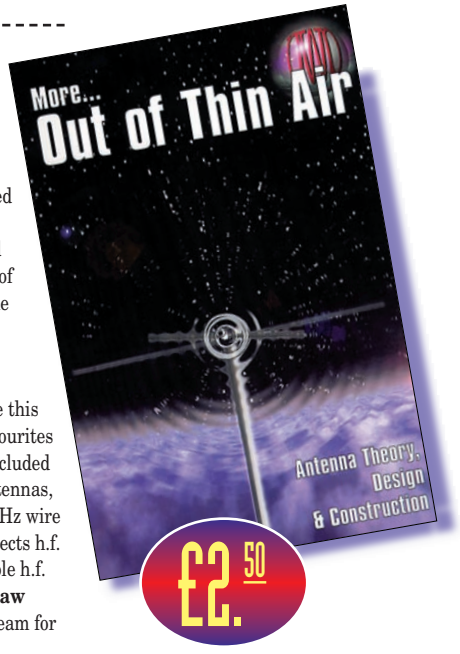
This is an excellent reference and practical book - superbly written and it deserves to become a classic. **Very highly recommended**.

More...Out Of Thin Air *Special Price*

The original *Out of Thin Air* reprint (using articles published in *PW*) was tremendously successful for many years. And indeed, along with having one of my own articles featured in the original - I used the book as a reference source for teaching purposes.

However, not to be outdone this second edition contains old favourites plus new ideas and articles. Included are: antenna data, 1.8MHz antennas, loops, wire dipole for 50, 430MHz wire antennas, Novice antenna projects h.f. and u.h.f. There's also a portable h.f. antenna design by **Doug DeMaw W1FB**, a portable 9-element beam for 144MHz, and the famous 'Slim Jim' Antenna by **Fred Judd G2BCX**.

Very readable, this book is also an effective mini manual on practical antenna projects and ideas. **Highly recommended**.



25 Simple Amateur Band Aerials

E. M. Noll

To (partly) quote the advert on British TV - this book does what it says on the cover in doing so and covers the techniques and ideas behind 25 simple antennas. Nothing particularly exciting you may think but the author has gone out of the way to prepare as much basic information as possible to help the inexperienced (or reluctant calculator-operator) achieve the best results.

Particularly useful are the tables providing practical dimensions (in feet) of antenna systems from 1.8 to 144MHz, including the WARC bands. **Ideal for the antenna-constructor in a hurry and the less experienced**.

POUNCE ON IT!

John Worthington GW3COI offers a light hearted suggestion to stop you feeling alone and ignored on the CQ circuit!

One day I was idly tuning around the c.w end of the 7MHz band minding my own business when I heard a very faint CQ from **G3XFD** - our Editor. The callsign rang a weak bell in my ancient brain and in a trice my hand reached across for my dusty Vibroplex keyer.

I instantly called him back with matching fist. I don't know whether most operators are aware, but our Editor is one of the very few active Radio Amateurs who belong to the magazine crews of this fair isle.

In fact, at the present time G3XFD's operating is unique and has been for some time. The last magazine man who could be actually worked on the bands was **G4FAI** when he edited *Morsum Magnificat*.

To make a short story even longer Rob G3XFD described my contact with him as that I had 'pounced' on him to secure a QSO. Hence the seed for writing this article was sown!

Rob said sharing my story with fellow *PW* readers would be helpful to those who suffer from 'Ostracisation Syndrome' in other words the frustrating problem of nobody answering their calls or CQs. Nearly every Amateur is a victim of this sickness which seems to get worse as the operator grows older.

One simple reason for the apparent avoidance of having your cries of CQ ignored is that the callsign under which you are transmitting is too well known. Quite simply those who have worked you many times tend to steer clear as they have often laboured with your personal history to the point of terminal fatigue. (*He's certainly right in my case readers*! **Editor**.)

One obvious antidote and solution to the problem is to go QRT for a year or two and then return. However, such a drastic course of action is difficult and not really practical, especially when you have spent serious money on a new rig. So, the question is how can you get replies to your frantic calls?

Pouncing - A New Technique

Pouncing can make a difference. The pouncing technique means getting on the caller's frequency reasonably accurately and calling with the strongest r.f. you can muster immediately their transmission ceases.

It's also a good idea to send plenty of the caller's callsign - psychiatrists say that the sweetest sound a person can hear is their own name. Of course the technique doesn't work every time due to the reasons I've already suggested, so what else can be done?

Some operators call CQ with their tight, narrow filter switched in. This means you have to be spot on their frequency to make contact.

If you are operating c.w. it means matching the caller's note with the frequency of your side tone. This is quite a feat, especially to those who are tone deaf due to the fact that a received signal may be rich in sub-harmonics and so on. I'm a retired piano tuner and even I find it difficult at times!

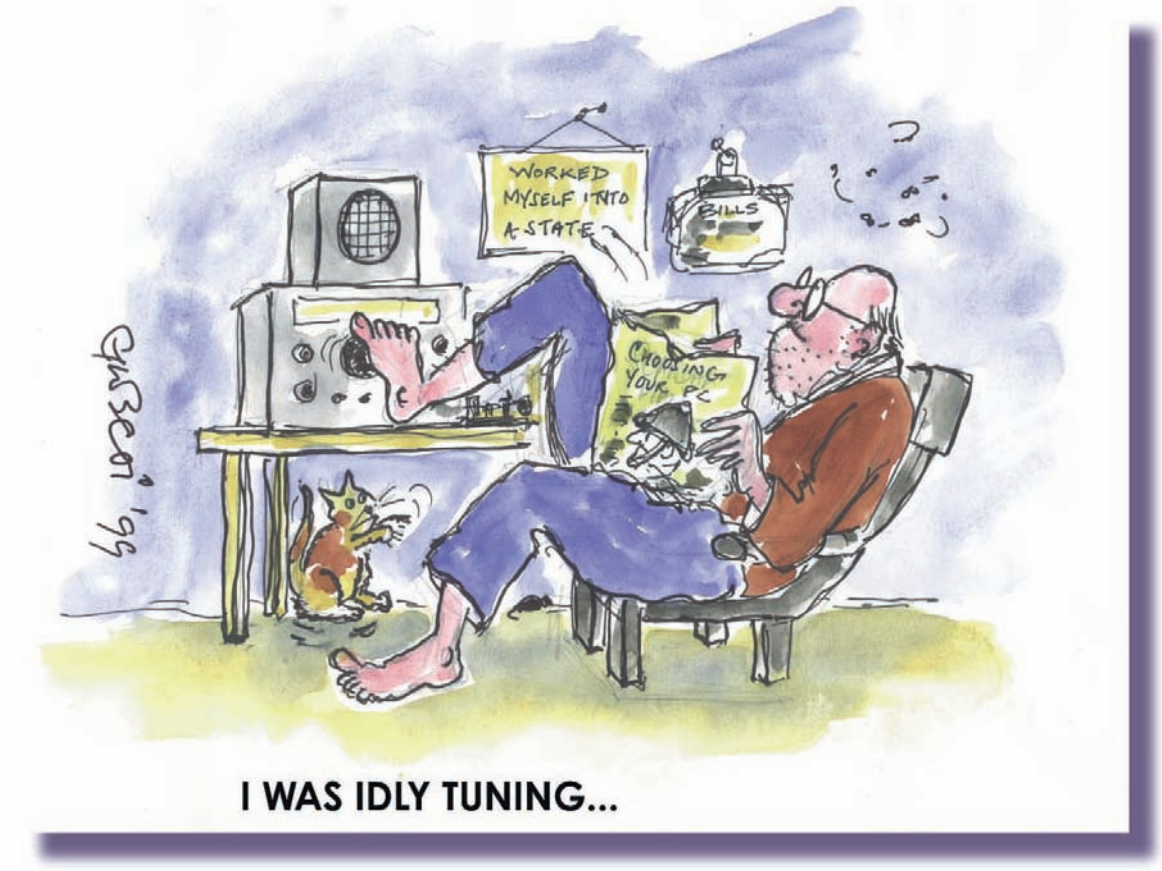
Umbrage Often Taken

There are some operators who take umbrage if you do not tune plumb accurately on their frequency and many a time I have been scolded and even rollicked for laxity in this area. Why such operators can't move slightly to accomodate you I can't say, because after all it is you who is offering your services.

When all the advice fails, the only thing you can do is to get friendly with a local Radio Amateur who has recently obtained their licence. Get them to visit you so that you can use the new callsign under their supervision on your own rig.

Follow this and you will then hopefully find QSOs coming in fast and furiously until the regulars you work begin to suspect they've heard your life story somewhere before. Don't try to thank me - I'm having a sabbatical as there's nowt like taking your own advice!

So, go on get pouncing! *PW*



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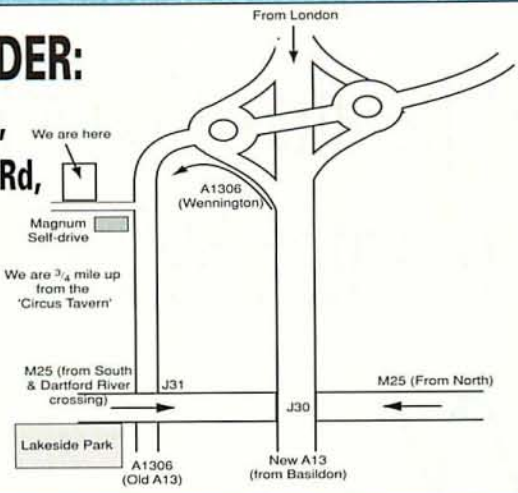

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Temperature Controlled Luxury
The Antex 690 SD Soldering Station

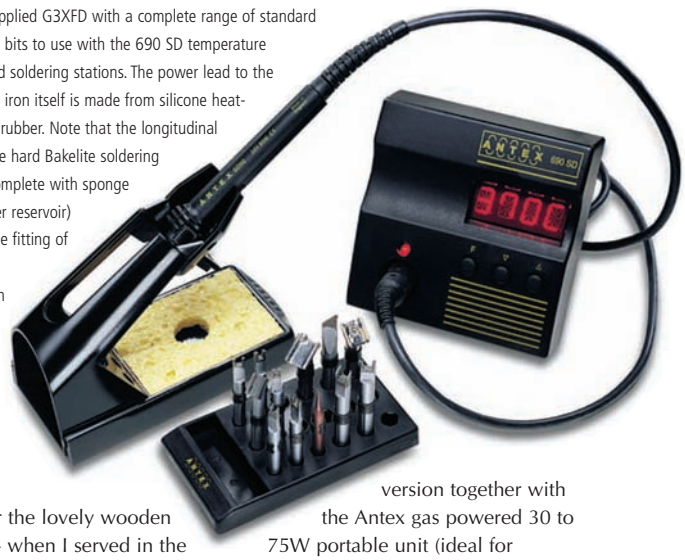
Although Rob Mannion G3XFD, like many radio enthusiasts, normally uses an ordinary soldering iron he's recently tried a professional soldering station. An expensive luxury perhaps? - Rob doesn't think so now!

When I first got really involved in building my own radio projects in the mid 1950s my parents wouldn't let me have a mains soldering iron! They thought it would be too dangerous. Connected to the mains? No fear..."you might melt the lead and electrocute yourself" said Mum!

Well, I'm still here and still soldering but Mum, now nearly 80 years old, (but don't tell her I told you!) has relented as she knows most soldering irons are safe. But to be honest...I think the deciding factor which led to my first AEI Solon soldering iron in 1956 was the damage I caused on the kitchen table with the iron I heated up on the gas stove!

Over the years I went through many soldering irons - the old Solon irons eventually ended up with the actual soldering bit seized into the alloy head. Frustrating that...but despite all my attempts at regular cleaning they all ended up that way.

I was introduced to the **Adcola** range of soldering irons - remember the lovely wooden handles? - when I served in the Royal Navy and they always seemed excellent. However, for many years now I have used the lightweight but robust Antex irons to great effect.



Antex supplied G3XFD with a complete range of standard soldering bits to use with the 690 SD temperature controlled soldering stations. The power lead to the soldering iron itself is made from silicone heat-resistant rubber. Note that the longitudinal slot in the hard Bakelite soldering stand (complete with sponge and water reservoir) allows the fitting of a fume extraction device (see text).

Having a ready 12V supply in the workshop, for the past 20 years or so I've always preferred the Antex 12V 25W iron - and usefully it comes with very long leads. Designed for use in cars, boats, etc., this iron and the mains version together with the Antex gas powered 30 to 75W portable unit (ideal for outside antenna work) have served me well afloat, repairing remote low power TV stations on Scottish mountains and at home in the workshop...although of course my mountain climbing days are long over!

Recently though, Antex sent me one of their **690 SD** Temperature Controlled Stations to try our on behalf of readers. Sceptical at first, especially as I've always thought that an iron is expensive at £20, I quickly realised the unit was certainly not a luxury item for a keen constructor!

Shown here are a selection of surface mount (s.m.) and integrated circuit re-working tools. The s.m. re-work tools have a letter stamped on the shank which, when that letter is entered into the menu control, automatically sets the temperature on the bit to melt the solder to remove the component (see text).

What's On Offer?

So, what's on offer for the keen constructor who might consider the Antex 690 SD? Well, to answer, let's look at the practical details.

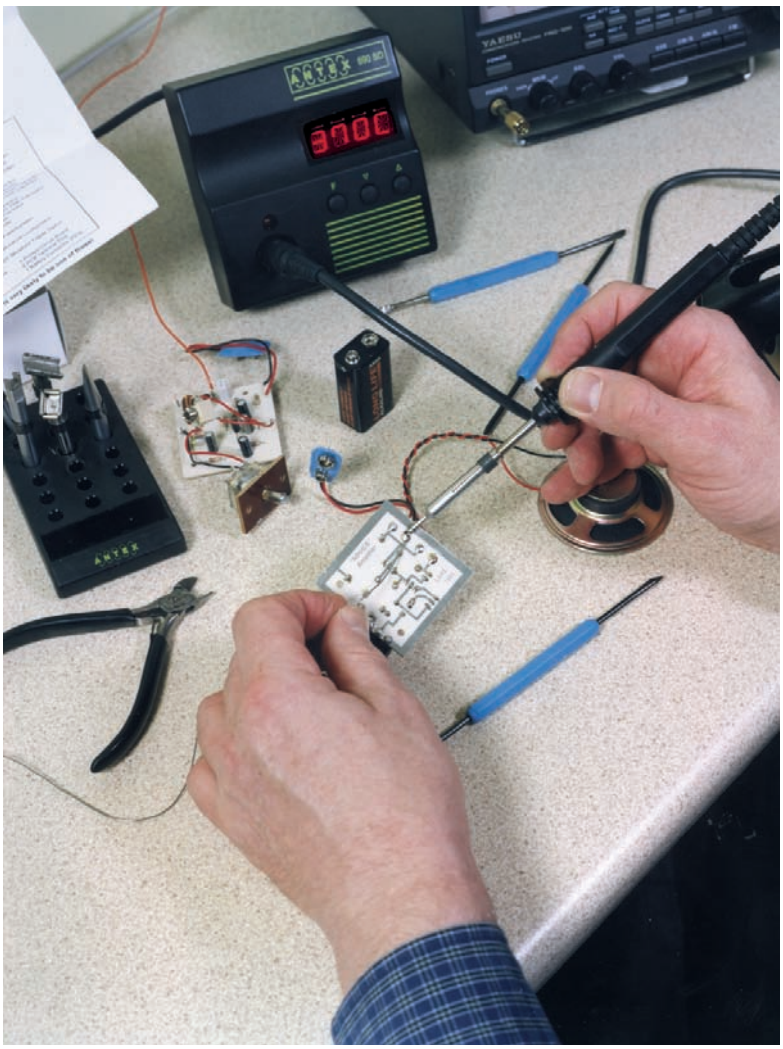
Powered from the mains the 690 SD incorporates a fully electronically stabilised integral, digitally controlled - via the three front panel buttons - supply for the iron unit itself. The soldering iron actually runs on 24V at a maximum of 50W, with the soldering tip being earthed via the leads to the mains p.s.u. and the mains earth. Maximum earth current leakage is 1.5µA.

The power lead connecting the

iron to the supply is made from silicone rubber and is heat resistant. The casing is fabricated from static dissipating materials to minimise possible damage to sensitive integrated circuits.

When working, the temperature is controlled to with ±5°C with 'repeatability' (of previously selected temperatures) being quoted as within ±2°C. The minimum and maximum temperatures available from the system range from 65 to 450°C.

Always leaving your soldering iron switched on? Don't worry...this unit is designed with this in mind - it can be left on all day quite safely. In fact, Antex tell me that in some industrial applications the irons are in use continuously from 6am to 9pm and cope very well. So, a keen constructor would be hard put to over-work the unit!



● The 50W Antex 690 SD in use in Clive Hardy G4SLU's workshop. The temperature selected for the soldering process is shown on the digital display (see text).

Fully Programmable

The 690 SD is fully programmable for set temperature and many other facilities, including language displays! The languages include English, French and German and many others (the complete list is available from Antex) but the unit comes pre-set for English. You can even choose to select temperatures calibrated in °F if you wish.

I don't propose to slavishly mention all the program options...but they are very comprehensive*. The unit can also be used very simply by setting the temperature required on the display with the control buttons - my preferred option simple fellow I am!

However, the single most useful facility on the unit for re-working or recovering components from p.c.b.s - **particularly surface mount components** - is the pre-set coded bit guide system. With this facility (top mark Antex) all the user has to do is select the same letter as engraved on the shank of the re-work bit - press the button and you're ready to de-solder. An excellent idea!

*If you are interested in the complete range of the program options I strongly recommend that you contact Antex direct.

In Use

In use I found that the 690 SD was a delight to have on the bench and it left me thinking that - considering how important soldering is in our hobby - why I've not considered one before! I've even flinched before now at a much cheaper and basic soldering station. I've come to the conclusion that you can penny pinch too far sometimes.

The unit made the job of soldering very easy indeed and recovering components (**this will appeal to many constructors!**) is extremely straightforward indeed. It's time saving and there's less risk of damaging the recovered components.

Changing bits from hot wasn't difficult either, I just speeded up the process by cooling the tips on the wet sponge. There are also a large variety of specialised bits available from Antex, with many designed for specific tasks and some for general purpose use.

However, waiting for the iron to cool is no problem as the truly dedicated constructor or professional could get another iron unit which could be sitting waiting for its next job - unplugged - ready to have the appropriate bit attached to the shank. Altogether it's a very flexible system.

However, if you're like me (very sensitive to fumes/smoke of any sort) there's another advantage to the 690 SD soldering station in that it's very easy to install a fume extraction kit. In fact, Antex only supply the metal tubing for the iron and flexible piping to attach to the extractor of your choice. So, the ingenuity of the constructors comes into play and in my case it's to be an old microwave over extractor/cooling fan.

In Rob's Workshop?

So, will you find that the Antex in Rob's workshop permanently? And of course, the answer is yes, certainly. It's an investment and I'll definitely build up the accessories and this will of course include another soldering iron as I suggested for maximum flexibility. *PW*

Product

The Antex 690 SD Soldering Station

Pros & Cons

Pros: *Fully programmable, temperature controlled, easy to use and operate and can be left on for long periods of time.*

Cons: *A little higher priced than some other soldering irons but for the keen constructor it's money well spent.*

Summary

The 690 SD is a delight to use, does not take up much room and provides such great assistance I really wish I'd invested in one some while ago. Once I've fitted up the fume extraction kit I'll be much more comfortable when working on projects as I won't be wheezing anywhere as near as much as I do when working without an extraction system.

Thanks

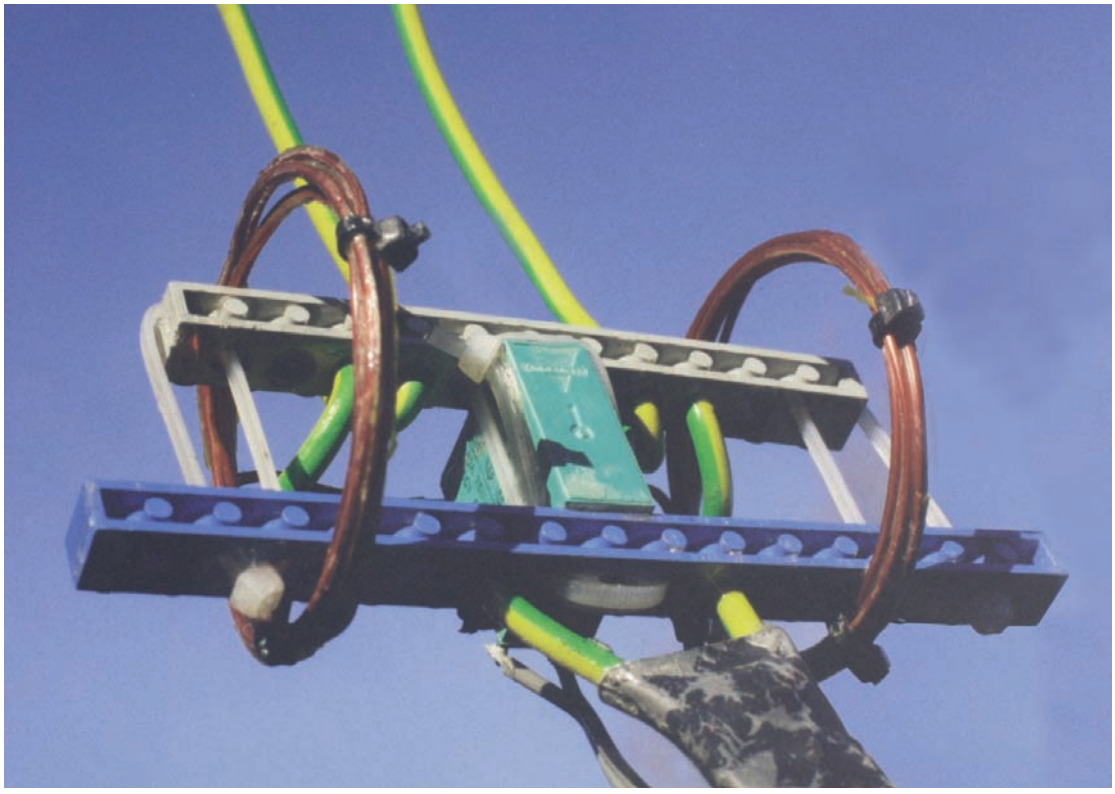
My thanks go to
Antex, 2 Westbridge Industrial Estate, Tavistock, Devon PL19 8 DE. Tel: (01822) 613565, FAX (01822) 617598. E-mail: sales@antex.co.uk Website: www.antex.co.uk for the loan of the 690 SD Soldering Station.

Prices

*The 690 SD with stand costs **£159**. (Discounts are available, details from Antex). A pack of 12 re-working bits are available separately for **£63** or you can choose to buy the complete package for **£220** with a voucher for two additional (free) bits of your choice. A single iron fume extraction kit costs **£9.14**.*

A PRACTICAL 'V' BEAM FO

Here's an antenna that thinks it's a dipole for 3.5MHz and above, but it's really a V beam for the 18MHz band. Read about the antenna that Edward Rule G3FEW used on returning to Amateur Radio.



● The two additional coils allow the 18MHz V beam to work effectively on 3.75MHz (see text for details).

Returning to Amateur Radio after being away from it for 14 years, I found many changes had taken place during our separation. Not least the introduction of the WARC bands of 10, 18 and 24MHz. But let me explain how this antenna grew out of my new start.

My new start in Amateur Radio was on my old favourite of 3.5MHz and from there I was soon encouraged to try the new WARC band of 18MHz. My first antenna for this band was a simple vertical, one that allowed me to find out that this new, to me at least, band had much potential.

The 18MHz band, was I quickly found, a friendly band with something of the old Amateur spirit, with stations more interested in a chat, rather than a simple rubber stamp QSO. However, I decided that a better antenna was needed if I were to enjoy the band's full capabilities.

The first antenna was a full-wave length long simple wire antenna, voltage fed from a quarter-wave length matching stub. The results I had were very encouraging, but I felt that I could do better.

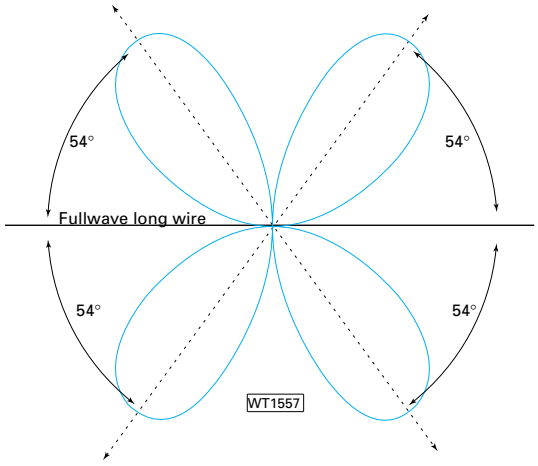
The design presented here is the culmination of my attempts to do better. And I think I have done better as, in my first year on 18MHz, I've managed to work over 120 countries, including some of them through pile-ups!

Why A V?

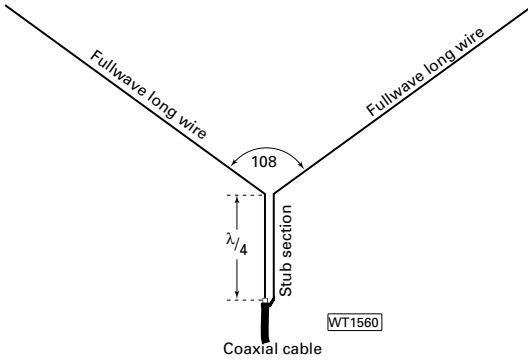
I should first explain why I'm using a V beam. Look at the illustration of **Fig. 1** where I've shown the relative pattern of a full-wave wire antenna. As is shown there are four major signal lobes with maxima at angles of 54° from the line of the wire.

I reasoned that, with correct phasing, if two full-wave wires were angled as shown in **Fig. 2**, then some of their lobes could add together and

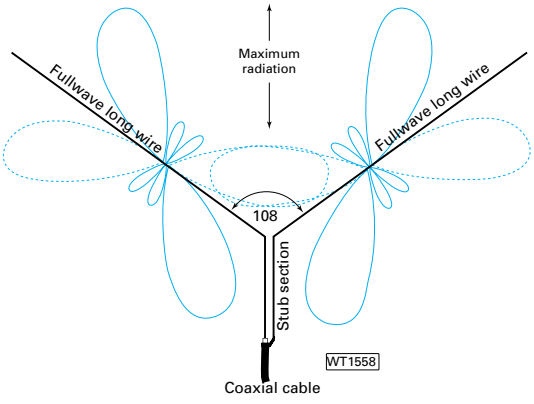
● Fig. 1: A full-wavelength long wire give four signal lobes at 54° away from the run of the wire.



OR 18MHz



● Fig. 2: This is the design, using two wire antennas, that G3FEW settled on.



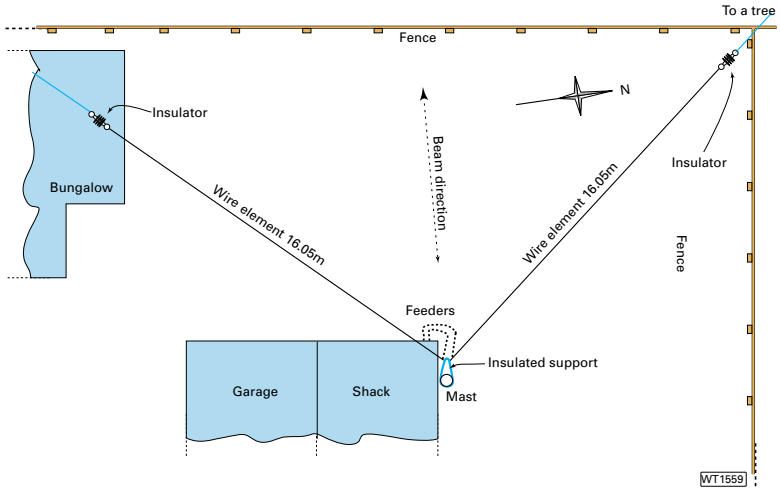
● Fig. 3: Using two full-wavelength angled at 108° allows two pairs of the individual lobes to add, giving improved performance in two directions, and yet has some good all-round capabilities too!

provide useful gain in two directions. The two directions would bisect the lines of the two full-wave antennas.

The angle of the major lobes decreases as the number of (full) wavelengths increase. This would allow the design of a narrow, high gain beam antenna to be built. In fact, such antennas are used for point-to-point communications, but are not really suitable for Amateur Radio use, due to the limited coverage resulting from the narrow angled beam.

For most Amateur Radio use, a single full-wave V beam antenna would give useful gain in two main directions with a beamwidth which is fairly broad. The remaining side lobes, giving coverage in other directions, but without the gain of the main directions.

So, the result is an antenna with good overall radiation, but with a gain of 1-2 S-points in two

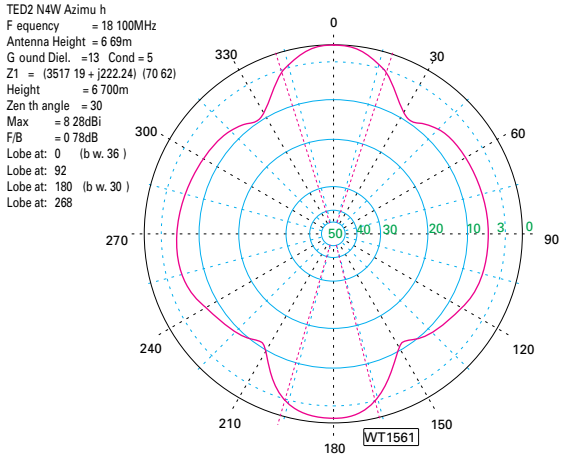


directions. The illustration **Fig. 3**, shows the addition of the two forward and reverse lobes, but that the side lobes will not cancel one another. They neither in nor out out phase with one another. So, some energy is directed to the sides as well.

● Fig 4: This is the layout at the QTH of G3FEW meaning the antenna fires roughly East-West, but also works to other points of the compass..

Construction Considerations

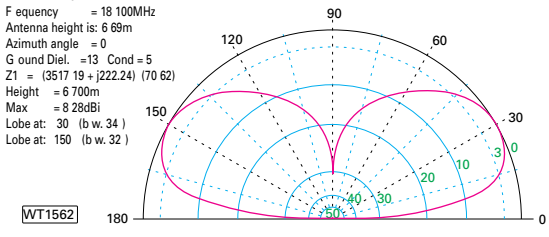
Now to look at the construction considerations. My garden is around 17m wide in an east-west direction and around 27m long in a north-side one with the shack roughly in the middle at one side. So, it may be considered ideal for this design as the main lobe directions are effectively east-west.



● Fig. 5: Some 6dBd of gain in two directions in the horizontal plane, but only a slight loss against the dipole in other directions makes this a useful antenna to have.

The main layout is shown in **Fig. 4**. The rear end of my shack (an extension of the garage) is on the eastern side and has just one support mast around 7m tall mounted on the end wall of the shack. This mast is the centre support for the system.

One wire end is supported with an insulated line tied to a tree in my neighbour's garden. The other, is held in place by a nylon rope passing over the roof of the bungalow. The average height of the antenna is only around 6m, but the results



● Fig. 6: The front and back lobes have launch angles slightly higher than would be considered ideal, but they're still a better than many antennas when near the ground.

Table 1

Band (MHz)	Match (s.w.r.)
3.75	1.5:1
7.05	Max:
10.15	Max:
14.250	Max:
18.125	1.1:1
21.250	Max:
24.938	2.1:1
28.500	Max:

● Table 1: Measurements of s.w.r. taken without using an a.t.u. By using an a.t.u. it should be possible to use the antenna on some of these bands.

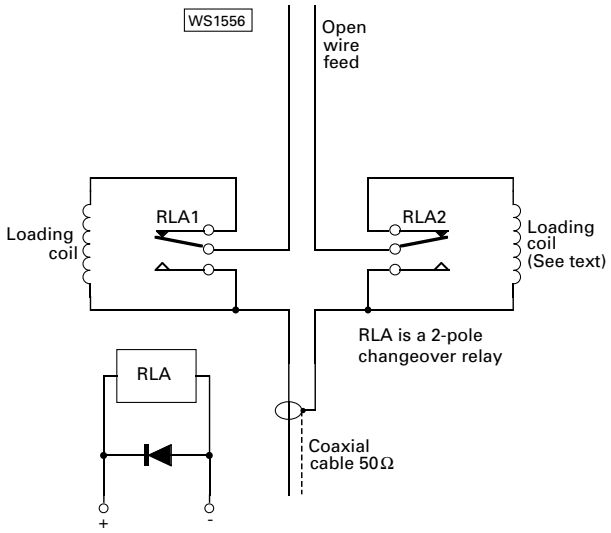
have been outstanding on s.s.b. with 100W of r.f. from the Kenwood TS-530S.

The antenna is simple to make, being just two wires, each some 16.05m long using, in my case, heavy gauge insulated earthing wire with a cross sectional area of 2.5 square millimetres. It's available from most d.i.y. outlets and is, I feel, ideal for antennas.

The length of the two legs is rather shorter than the theoretical 16.5m, but the antenna works well. Also, the wire's separation angle of 108° is not that critical and in practice, there seems to be room for variation without dramatic changes of performance.

The wires are fed from at their close ends with a quarter-wave matching stub of 600Ω open wire twin feeder. The length of this matching stub should be 3.55m, which is connected in turn to a 10m length of 50Ω coaxial cable to connect to the transceiver in the shack. The redrawn plots of **Fig. 5** and **Fig. 6** show the computer analysis of the antenna set-up

Due to the layout of my garden, the main lobes are slightly south of East and North of West, giving a gain of about 6dB over as dipole. The side lobes giving good radiation in other directions, giving an additional overall coverage.



● Fig. 7: A simple changeover relay adds the coils in series for use on the 3.5MHz band. The control voltage is taken on a separate wires that run alongside the coaxial cable.

Almost Perfect

The standing wave ratio (s.w.r.) was almost perfect at the 18MHz band centre without any other form of matching. But if you experience problems, then adjustment of the lengths of the wire elements will alter the s.w.r. to bring the s.w.r. within the range you would like.

The arrangement described was in use for several months and proved to work well. However, with all the wire available I also wanted to use it on other bands, and my eventual choice was for dual 3.5 and 18MHz use. So, I set about modifying the system.

The length of the 18MHz full-wave wire, plus the 600Ω feeder added up to just rather short of a quarter-wave length on 3.5MHz. All that was needed was a small additional inductor in each leg (to keep the system balanced) to resonate the antenna on that band too!

Neither the fact that the angle of the elements is only 108°, nor the fact that the centre section of the 3.5MHz dipole is vertical open wire feeder has had any noticeable effect on my use of that band. I've had signals of S9 consistently from Europe and a reasonable amount of DX work.

Extra Wire

The extra wire switched into circuit to bring the antenna to resonance on 3.5MHz consists of two small coils at the coaxial feed-point. Each coil is made up of five turns of heavy insulated wire with a diameter of 50mm. The heading photograph on page 24 shows the coils and the simple band-change relay. The circuit that I use for change-over is shown in **Fig. 7**.

Some adjustment of the number of turns and their diameter may need to be made to bring the resonance point to the centre of your area of interest on the 3.5MHz band. The point of lowest s.w.r may be adjusted quite easily by altering these coils.

Make sure that the antenna is set-up correctly on 18MHz first, then make and temporarily fit the two coils in line, then check the s.w.r. on 3.5MHz. To adjust the point of lowest s.w.r. on 3.5MHz lower the centre point and adjust the spacing between turns or number of turns until the s.w.r is acceptable.

I've found that when the centre point is lowered only part way and a set of step-ladders used to gain access to the coils, there's little need to raise the antenna again to check the s.w.r. as this make only a slight difference.

I set my antenna to lowest s.w.r at 3.570MHz as my interests lay in the s.s.b. portion of that band, but it would be possible to set the lowest s.w.r. anywhere in the band.

You should be able to see from Fig. 7 that I've used two lengths of Lego material (it's stable and has good insulation properties) as the support for the coils. But whatever you use you should give the coils and changeover relay several good coats of varnish to weatherproof them before hauling the finally back up again.

Simple Arrangement

On this simple antenna arrangement, I've managed to work All bands except 1.8MHz with the aid of a good antenna matcher. Without a doubt, a better arrangement would be to use extra relays to bring in different coils for each band, but I've not tried this idea yet.

Although the dimensions given work well at my location, you may have to experiment with your version to obtain the best results. My layout gives a low s.w.r. over the whole of the 18MHz band and has been optimised for lowest s.w.r in the 'phone section of the 3.5MHz band.

You will probably need to use an a.t.u. for other bands, to reduce the s.w.r. to acceptable levels. The values shown in **Table 1** give the values, I found with my antenna. A better solution would be to use a balanced output a.t.u. and extend the open wire feeders down to the shack, dispensing with the coaxial cable feed all together.

Such a simple antenna, but very affective nonetheless!

PW

BRINGING PACKET ALIVE!

Richard Newton G0RSN, with help from his friend Terry Bain 2E1EJC, **provides a background to Automatic Packet Reporting System.**

There's been a surge of interest recently in Automatic Packet Reporting System (APRS), a system first thought of by the American Radio Amateur **Bob Bruning WB4APR**. Simply stated it's where packet radio is used to report the position of both static and mobile stations.

Using the information obtained, a choice of several shareware software packages will enable you to see stations appearing and being plotted on a map. For example, if a mobile station is using a GPS receiver connected to a packet APRS set-up you'll see the mobile moving on the map and be able to track it along its route.

● The possibilities when using APRS are boundless.

For me APRS brought Packet alive as a mode. I have always dabbled in packet, although I could never get too excited about bulletin boards!

However, mobile packet always held a fascination for me and a good friend of mine **Terry Bain 2E1EJC**. We would tape various bits of equipment together and have great fun trying out our own mobile packet network!

Slowly our interest turned to other things, until, that is, I was asked to review the TMD-700E dual-band transceiver from Kenwood with a built in packet modem (TNC) and APRS firmware. Things really took off then!

● Using APRS you can receive the latest weather reports.

Terry had tinkered with APRS before, but without much success. But while doing some tests for the TMD-700E review our interest was rekindled and we decided to look into the APRS mode.

We found that there was a wonderful UK based shareware programme being developed by British Radio Amateur, **Roger Barker G4IDE**, called *UI-View*. So, I got a copy of Roger's software and then Terry and I were well on our way up the perpendicular APRS learning curve.

Possibilities Are Boundless

The possibilities for APRS are boundless. In fact it's already used by Radio Amateurs for a whole variety of interesting applications. For example, to display weather reports. This is done by connecting a meteorological station directly to APRS radio station, the information is then transmitted and displayed on a map.

The system is can be used to great effect on RAYNET exercises. Another common use is to send general text messages either as bulletins that can be addressed to everyone or people in specific message groups. Text messages can also just be sent to individuals. All across the world APRS is being used for applications from search and rescue to tracking friends around the local neighbourhood.

Terry and I intend that this article should be an introduction to APRS, because (to be honest) we are still learning and the mode is still growing in its abilities and functions. The software is still being developed and the whole thing is very much still an open book.

Understanding The Basics

If you know anything about AX25 packet operation, you shouldn't have a problem understanding the basics of APRS. However, if you're new to packet then you'll probably think we are talking a load of gibberish....**but it is worth trying to make sense of it all** and we're here to help! This is not meant to be a thorough explanation, but just enough to get you going.

So, off we go with frequency information. The National frequency given to the use of Unconnected Packet operation is 144.800MHz, so that's the frequency you'll need to be using.

● Set up your parameters to allow your computer and TNC to talk to one another.

As APRS is **unconnected packet** it does not require you to connect to any other station to pass messages. Everything is done using what's known as **Unnumbered Information Frames**. The abbreviation for these frames is UI, hence one of the programs used to run APRS is called *UI-View*.

Everything that you transmit is, in effect, just transmitted blind into the ether. The UI frames can contain all sorts of information and they are mainly used for sending location information, but they can be used to send just about anything you want.

In practice APRS is used to send information such as: weather information, the speed and direction of a moving station and message text. When these frames are received, they are decoded by whatever software the receiving station is using and the information displayed on a map or message window.

– APRS

The most obvious drawback of APRS is that the range that you are able to communicate over will not be very great. Packet has a maximum transmitted power limit of around 25W on 144MHz. To overcome this, a system of repeaters has been devised.

Digital Repeaters

Repeaters are known as **Digipeaters** (Digital Repeaters) or Digis. Everything that a Digi receives and 'understands' it re-transmits. Remember this is unconnected packet, so you'll not connect as you would with a node. Instead you'll put your trust in the system of Digis to keep radiating your signal out through the Network.

In practice APRS uses a 'ripple' method to spread the transmissions of unconnected information. The Digipeaters retransmit the information, spreading it out from the source. It does this by using two basic generic names for the Digipeaters: **Relay** and **Wide**.

As you can imagine the effectiveness of the system relies heavily on the correct use of the Digipeaters. As in normal packet they are given an alias, but instead of picking your own alias, aliases should only be set as either Relay or Wide.

If you have set your station to Digi, your own callsign should be used as a sub-alias. This is because under certain circumstances it will be substituted in the Digi-path of frames passing through a Digipeater.

To explain, if you call your Digi, Relay and set the **Sub Alias** as your own callsign (G0RSN for example) after your station's Digi re-transmits the data frame your callsign will appear on the list of Digipeaters used to get the message safely that far. (This is very useful for finding out how the frame got to your station and the best way to get back to the originator).

To Digipeat?

Should you decide that there's a need for you to Digipeat, the first 'alias' to consider is Relay. The Relay mode should be used as an alias by stations that are not in a very good location but have direct access to a Wide Digi and can assist other low powered or badly sited stations to increase their range. This is especially helpful for mobiles to keep contact with the system as a whole as they travel around.

In practice Wide should only be used as an alias by well sited stations that cover a large area and are able to be on the air 24 hours a day, seven days a week. An important note to remember is that a Wide Digi should also be set to Digipeat as a Relay.

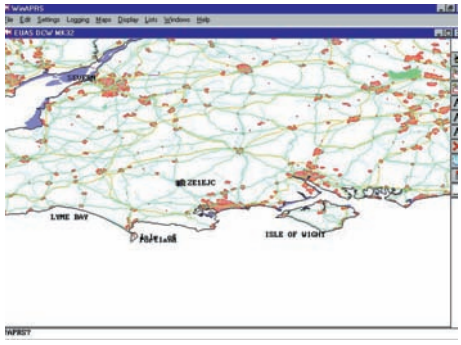
Need To Digipeat?

A question that's often asked a fair bit is: "Do I need to Digipeat"? In reply Terry and I can assure you it's not necessary to set your station up as a Digipeater to use the APRS system.

In fact, if you are in an area with lots of people using APRS, you'll find that too many Digipeaters will just slow everything down. On occasions it can clog the system completely with Beacons rattling around and around in circles. (I've even seen cars moving backwards and then leap-frogging along the on-screen representation of a road because too many Digipeaters were operational!).

The best advice Terry and I can give is for you to set up and see what sort of activity there is in your area. Once you find out how busy your area is and you have contacted local users of the system, you can decide whether to be a Digipeater or not.

Warning: You should be aware that if you decide to set up as a full Digipeater, your radio would do an awful lot of transmitting! Additionally, other users would expect a Digipeater to be on the air for 24 hours a day, or at least at regular times.



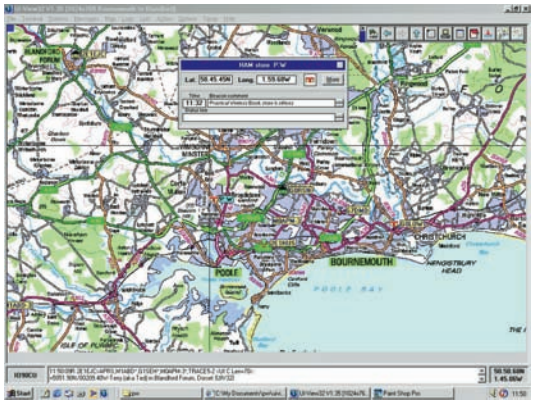
● WINAPRS was the first software package Richard G0RSN and Terry 2E1EJC tested.

How your own station eventually appears on other people's maps and their station on yours is really quite simple. To convince you I'll explain!

Your station is set to automatically **Beacon** (It does this at preset intervals, and we'll come on to that a little later) and this Beacon will contain of your callsign and location, typically in Latitude and Longitude, although locators can also be used.

Beacons can also carry lots of other information. For example, your station will also transmit a separate information string called the Status Text and people can read this by simply double clicking their mouse pointer on your station icon on the map. If you are using *UI-View* on a computer with a sound card stations can be announced as they appear.

The distance over which your station's transmission is received by others is determined by something called the **Unproto Path**. This sets the route that your frames will take when they are transmitted from you station. In essence, how far accross the pond your transmission will ripple!



● The location of the *PW* offices.

A simple example of an Unproto Path is CQ,RELAY,WIDE (**note there are no spaces after the commas**). Using this example, your frames will be transmitted from your station and will be re-transmitted by every Relay Digipeater within range and then by every Wide Digipeater in range of those Relays.

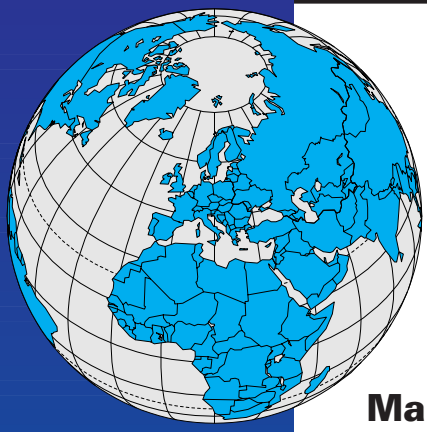
You can see, even with this simple example, that your frame has the potential of being re-transmitted by a large number of Digipeaters over a wide area. You can also see that if there were too many Digis, especially if they were set to Wide, the local area would be clogged with transmissions and your signal would end up not getting very far at all.

Three Main Elements

Let's now look at what's required for an APRS station and basically speaking there are three main elements needed. This rises to four if you want to go mobile and be tracked by other stations. You will need:

- A radio covering the National APRS frequency of 144.800MHz.

Continued on page 32



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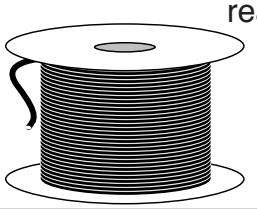

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DRAKE	DRAKE L7 LINEAR AMP (MINT CONDITION!)	£899.00
DRAKE	R-8 RECEIVER (MINT!)	£550.00
HEATHERLITE	2M EXPLORER 2m AMPLIFIER	£399.00
ICOM	IC-207 DUAL BAND MOBILE	£210.00
ICOM	IC-229H 2M MOBILE	£120.00
ICOM	IC-251E AC 2M Mulit-mode	£325.00
ICOM	IC-275H 2M 100W BASE TRANSCEIVER	£550.00
ICOM	IC-3J UHF MINI HANDY	£89.00
ICOM	IC-475E AC 25W MULTIMODE 70CM BASE	£525.00
ICOM	IC-706MK1 TRANSCEIVER	£499.00
ICOM	IC-706MK11 DSP TRANSCEIVER	£599.00
ICOM	IC-706MK11G (AS NEW!)	£799.00
ICOM	IC-725 HF MOBILE 100w	£400.00
ICOM	IC-728 HF MOBILE 100w	£425.00
ICOM	IC-729 TRANSCEIVER HF/ 50MHz	£425.00
ICOM	IC-735 HF 100W	£450.00
ICOM	IC-746 HF/50/2M 100w	£999.00
ICOM	IC-756 HF/6M BASE TRANSCEIVER	£1,050.00
ICOM	IC-W31E DUAL BAND HANDY	£175.00
ICOM	PCR-1000 PC RECEIVER SSB/FM/AM	£200.00
ICOM	PS-15 POWER SUPPLY	£100.00
ICOM	PS-55 PSU 20 amp	£120.00
ICOM	PS-85 POWER SUPPLY	£175.00
ICOM	R10 HANDY SCANNER	£199.00
ICOM	R2 HANDY RECEIVER	£110.00
ICOM	R-7000 25-2000MHz ALL MODE RECEIVER	£575.00
ICOM	R-72 RECEIVER AC	£450.00
ICOM	R-72 RECEIVER DC	£400.00
ICOM	R-75 RECEIVER	£450.00
ICOM	SP-21 EXTENTION SPEAKER FOR IC-706 etc	£45.00
ICOM	T8E HANDY 2/70/6m	£195.00
ICOM	W-21E DUAL BAND HANDY	£199.00
JRC	JR-535 RECEIVER	£675.00
JRC	JR-545 DSP RECEIVER	£999.00
KANTRONICS	KAM PLUS TNC	£220.00
KENWOOD	AT-200 ATU	£125.00
KENWOOD	AT-230 ATU	£140.00
KENWOOD	AT-300 ATU	£225.00
KENWOOD	BC-15 RAPID CHARGER	£40.00
KENWOOD	DFC-230 FREQUENCY CONTROLLER	£89.00
KENWOOD	PS-50 PSU	£130.00
KENWOOD	PS-52 HEAVY DUTY POWER SUPPLY	£175.00
KENWOOD	R-5000 RECEIVER Inc Converter	£595.00
KENWOOD	SP-950 SPEAKER	£90.00
KENWOOD	TH-22E HANDY 2M	£89.00
KENWOOD	TH-46 UHF HANDY	£100.00
KENWOOD	TL-922 LAST SERIAL No. (MINT!)	£999.00
KENWOOD	TM-455E 70CM MOBILE MULTI MODE TRANS	£495.00
KENWOOD	TM-751E 2M 25W MULTI MODE	£325.00
KENWOOD	TM-V7E DUAL BAND TRANSCEIVER	£250.00
KENWOOD	TR-851E 70cm Mulit-Mode	£325.00
KENWOOD	TS-140S HF 100W BASE/MOBILE	£399.00
KENWOOD	TS-680 HF 6M BASE/MOBILE	£395.00
KENWOOD	TS-690 SAT TRANSCEIVER HF/6M	£695.00
KENWOOD	TS-811E 70cm MULTI MODE TRANSCEIVER	£400.00
KENWOOD	TS-850 SAT 100w HF BASE TRANSCEIVER	£850.00
KENWOOD	TS-870 DSP HF/BASE TRANSCEIVER	£999.00
KENWOOD	TS-940SAT HF BUILT IN ATU BASE	£750.00
KENWOOD	TS-950 SD DIGITAL 150W TRANSCEIVER	£1,250.00
KENWOOD	TS-950S HF 150W BASE BUILT IN ATU	£999.00
KENWOOD	TS-950SDX HF 150w TRANS (FLAG SHIP!)	£1,799.00
KENWOOD	VFO-180 VFO	£60.00
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LOWE	HF-225 RECEIVER	£225.00
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MFJ	1278 TNC Incl SSTV	£225.00
MFJ	MFJ-259B ANTENNA ANALIZER	£175.00
MFJ	MFJ-784B DSP FILTER	£150.00
MFJ	MFJ-962 1.5KW ATU	£175.00
MFJ	MFJ-989 ATU 3KW INPUT	£220.00
MICRO MOD	Microwave mod's 144/100 100w 2m	£120.00
MIRAGE	D3010 430-450MHz AMPLIFIER 100W	£200.00
NAG	144XL 2M BASE AMPLIFIER 400W	£325.00
PACCOM	320 TNC	£99.00
PACCOM	TINY 11 PACKET TNC	£99.00
PAKRATT	PK-232 MODEM	£140.00
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REALISTIC	PRO-2026 SCANNER	£99.00
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TOKYO	HY-POWER HL 166V 6m 180w	£195.00
TRIO	TR-9130 25 Multi-mode 2m	£225.00
WATSON	DPS 2012 PSU	£70.00
YAESU	SP-6 SPEAKER	£85.00
YAESU	FL-110 AMP 100w HF	£120.00
YAESU	FL-2025 25AMP FOR FT-290R MK11	£100.00
YAESU	FP-107 PSU	£120.00
YAESU	FP-757GX Power Supply (Heavy Duty)	£140.00
YAESU	FP-757GX SWITCH MODE	£95.00
YAESU	FRG-100	£295.00
YAESU	FRG-7700 RECEIVER	£250.00
YAESU	FRG-9600	£199.00
YAESU	FT-100 HF/6M/2M/70CM MOBILE DSP	£675.00
YAESU	FT-1000 D 200watt TRANSCEIVER	£1,499.00
YAESU	FT-1000MP AC LATEST SERIAL No. !	£1,399.00
YAESU	FT-101ZD HF TRANSCEIVER	£275.00
YAESU	FT-101ZD MK111 FM HF TRANSCEIVER	£325.00
YAESU	FT-225RD 2M BASE MULTIMODE	£325.00
YAESU	FT-2500M 50w 2m MOBILE	£200.00
YAESU	FT-290MK1 2M Multi-mode	£195.00
YAESU	FT-290R MK11	£275.00
YAESU	FT-3000M 70w 2m MOBILE TRANS	£225.00
YAESU	FT-480R 2M MULTIMODE	£220.00
YAESU	FT-530 2/70cm HANDY	£175.00
YAESU	FT-690MK11 6M MULTI-MODE TRANSCEIVER	£295.00
YAESU	FT-726R 2/70/6M TRANSCEIVER	£599.00
YAESU	FT-736R AC 2M/6M/70CM BASE	£799.00
YAESU	FT-736R AC 2M/70CM BASE	£599.00
YAESU	FT-757GX	£395.00
YAESU	FT-757GX11	£425.00
YAESU	FT-840 HF MOBILE-BASE TRANSCEIVER	£450.00
YAESU	FT-847 HF/6M/2M/70cm/4m	£999.00
YAESU	FT-8500 DUAL BAND MOBILE TRANS 50w	£295.00
YAESU	FT-900 HF MOBILE/BASE FACE OFF	£525.00
YAESU	FT-900AT BOXED	£695.00
YAESU	FT-901 Delux model Transceiver	£300.00
YAESU	FT-902 Delux model Transceiver	£300.00
YAESU	FT-920 AF HF- 50 MHz BASE TRANSCEIVER	£899.00
YAESU	FT-990 TRANSCEIVER AC HF BASE	£795.00
YAESU	FT-990 TRANSCEIVER DC HF BASE	£695.00
YAESU	FT-ONE BASE HF	£425.00
YAESU	FV-707DM DIGITAL VFO + MEMORIES	£99.00
YAESU	MD-1 DESK MICROPHONE (MINT!)	£80.00
YAESU	MD-100 DESK MICROPHONE	£70.00
YAESU	QUADRA AMPLIFIER HF/6M 1KW	£2,999.00
YAESU	SP-980 EXT SPEAKER	£75.00
YAESU	VX-1R MICRO 2/70 WIDE RECEIVER	£109.00
YUPITERU	MVT-125MK11 AIRBAND SCANNER	£125.00
YUPITERU	MVT-8000 BASE	£240.00

...continued from page 29

- A Terminal Node Controller (TNC), this will be the same as the TNC that you would use for normal AX25 packet operation. Nothing special is required, however the ability to run the TNC in **Kiss** mode will be helpful.
- A computer running an APRS software package.
- A Global Positioning System (GPS) satellite receiver if you want to be tracked! (The good old optional extra!).

It's also possible to get started with APRS with a stand-alone radio. The Kenwood TMD-700E and THD-7E both have a TNC built in. Amongst a myriad of other extended functions these radios run an APRS firmware and act as their own computer interface. With the addition of a GPS that plugs effortlessly into the radios, you'll be able to let everybody know where you are while you are walking or driving around.

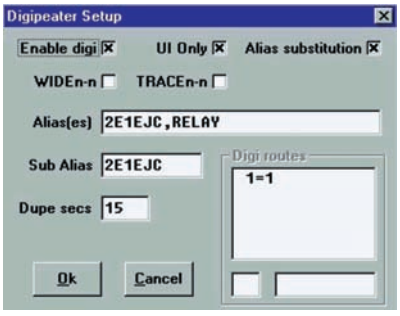
● Tracking G0RSN using UI-View.

One of the functions of APRS is an ability to exchange text messages with individual stations or groups of stations. Both the TMD-700E and the THD-7E have full messaging facilities, although it's a bit like trying to send text messages on a mobile phone. Trying to hold a quick text QSO will normally end in anything from a mild sweat to walking headlong into a lamp post!

Most people will probably want to set a station up in the shack and this is a little more complex than just buying a radio and turning it on. However, if you already run a packet station and have access to 144.800MHz all you'll need is one of the Shareware software packages and a little patience!

So back to the list of the main elements, first of all a radio is needed. And, as mentioned, 144.800MHz is a national frequency that has been allocated for unconnected packet use and this is the best place to start.

The radio doesn't need to be anything special. It just needs some way of connecting audio in and audio out for example. A speaker/microphone jack, external speaker connection, microphone connection and the like. Some modern radios and ex p.m.r transceivers may well have discriminator taps and or dedicated packet connections.



● Setting up your station to Digipeat.

A Terminal Node Controller (TNC) is also needed. Almost any TNC will do although, to get the best out of the software, it should be capable of being used in Kiss mode.

The Kiss mode is where the TNC acts merely as a data interface between the computer software and the radio. It works better in this mode because it lets the software and the PC do all the work.

If you don't have a TNC there's software available that will allow you to use the soundcard in your computer to decode the data. (Terry and I didn't investigate this option as it's probably worthy of a review in its own right*).

A computer will be required to run the software and anything from a 286 upwards will suffice. There are both DOS and Windows based programmes around.

The Windows based programmes are both 16 and 32bit and there are versions available for *Windows 3.1* up to *Windows 2000*. there is also an application for small hand-held computers running the Palm OS (Operating System). Terry and I also believe that an APRS shareware application for the later Psion hand-held computers is currently under development.

Personally, I'm sure that there are even more about for other operating systems I have heard that there are also Windows CE, Linux and Macintosh applications available.

To help, here are the Shareware software offerings Terry and I found when researching for the review: *DOSAPRS*, *WinAPRS*, *MacAPRS* and *PocketAPRS*, which has written specifically for, use with hand-held computers running the Palm OS; this would include Palm or Handspring hand-held computers for example *UI-View*.

They are all shareware and can be registered for as little as £10. We had a look at the two main PC Windows based programmes, *WINAPRS* and *UI-View*, read on to see what we found.

***** *Hint taken Richard*! **Editor**.

Ready To Go!

Once you have secured, purloined, begged and borrowed all of the elements required all you have to do is connect your radio, TNC and computer together, fire up the software and that's it you're ready to go! "Yeah...right Richard" - I hear you all saying! Well, okay, it's not quite that simple, but it is fairly straightforward.

For the purposes of this review we've had to assume some degree of previous knowledge as far as connecting the radio, TNC and computer together are concerned. If you do have difficulties there are many books and people around that would be only too happy to help out. If you are completely new to digital modes, it would be far better to get a friend who knows or your local club to give you a hand.

So, let's assume that you now got everything connected together. To this end, we'll now have a look at the software and getting the equipment 'talking' to each other. The first of the software packages we looked at was *WinAPRS*.

The *WinAPRS* software was written by **Mark KB2ICI** and **Keith Sproul** and is copyright to Mark. Both Terry and I used *WinAPRS* and we also talked to others who had tried it. The consensus of opinion was that the software was very comprehensive in what it offered: Separate v.h.f. and h.f. ports, integrated DX cluster decode and a long list of extended options.

The *WinAPRS* software is definitely tailored for the American market and therefore the maps supplied are all of America. We did find one map of the some of the British Isles that could be zoomed in and out, however the quality and detail left a little to be desired. Terry and I could not find an easy way to create your own maps either.

In our humble opinion, a beginner would have difficulty getting to grips with *WinAPRS*. The help files were a little difficult to interact with. When we eventually found the extra maps help file we discovered that a Cd-ROM was available with 600Mb of maps to street level as long as you live in any of the following areas: Canada, Central America, Greenland, Japan, Mexico, Puerto Rico, South America or the good old USA*****.We then looked at *UI-View*. And...what a relief!

***** *What...no Alaska or Hawaii Richard?* **Editor**

Software Favourite

Of the software that's available, Terry and I have a favourite contender - *UI-View* although we would by no means suggest that you shouldn't try any other.

The *UI-View* shareware is written by **Roger G4IDE** who is continuously updating and improving the program and also has an on-line forum to sort out problems.

There's a 16bit and a 32bit version of the program available to suit different computers. The 16bit is available as shareware, so you can try before you buy. The 32bit is only available to registered users. It's simple to use and has a very good Windows interface and a superb Windows type help file.

As *UI-View* is written in the UK it's therefore far more oriented towards the UK and Europe. Additionally UI-View has many advanced features because besides supporting the TNC in terminal mode; it also supports Kiss, AGWPE and BPQ, including proper support for multiple ports. The making of extra maps for use with *UI-View* is a very simple process and can be done using electronic maps such as those found on *Auto Route* or similar software.

Getting Up & Running

The following advice assumes that you're using *UI-View*. But the basic principles of operation are pretty much the same whatever you are using and we would encourage you to experiment with as many programs as possible.

The first thing to do is to go into the **Comms Set-Up** menu and set up the parameters so that your TNC and computer are talking to each other. If your TNC supports Kiss mode then this will be the best setting to use for a quick start. In the **Host Mode** box, select Kiss. Next click on the Set-Up tab and select the correct TNC.

The Next thing to do is to complete the **Station Set-Up** menu. To do this you'll need to know the Longitude and Latitude of your station. If you're not sure of the references, all you have to do is place the cursor over where you want to be on the *UI-View* map and read the Longitude and Latitude in the bottom right hand corner of the screen.

Next you need to fill in the **Unproto Path** which is the part of the program that decides how beacons and some replies are transmitted. I would suggest that CQ,RELAY,WIDE or APRS,RELAY,WIDE is good enough to get you started.

In operation *UI-View* also gives an ability to use something called TRACEn-n and WIDEn-n. Here the 'n' is replaced by numbers e.g. TRACE2-2), which enhances the way in which Beacons are exchanged within the network of Digipeaters, counting down the number of times the frame has been re-transmitted and in the case of TRACEn-n, tracing the path it has taken.

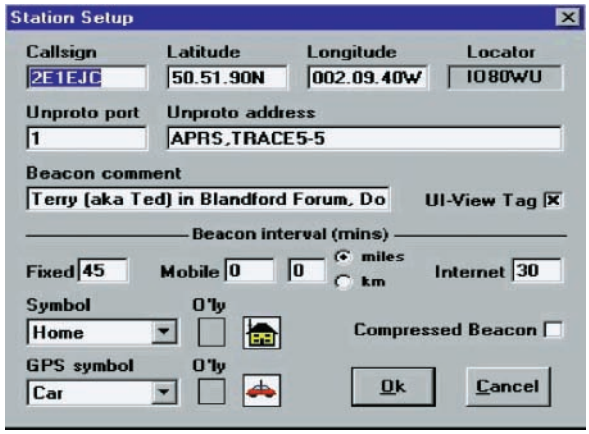
Some Digis, especially a stand-alone system not using software back-up may not recognise TRACEn-n or WIDEn-n in your Unproto Path. **Reassuring note**: If this little bit has left you wondering whether I'm still speaking English...don't worry, just use Relay,Wide for now!

After filling in your Unproto Path, All you have to do is to complete the **Beacon Comment.** This is normally a simple statement to let other people know something about you and your station. You could perhaps put your name and E-mail address, or when you are at the keyboard and available for a 'chat'. Or perhaps include a local voice frequency that you monitor regularly. Another way of giving others information about you or your station is by setting up the **Status Text** and the **Station Information**.

You will have to set a beacon interval and pick a symbol from the drop down menu that best describes your station. This will be what appears on everybody else's maps.

As soon as you hit the button labelled **Ok**, the radio should send out your first beacon. You can then sit back and see who appears on your map.

If you get impatient, you can always go to the **Action** tab and click *Query All Stations*. However, we ask you to do this in moderation...as it will force all stations using *UI-View* that receive the command to send their beacons. It is a fast way to fill up your map but in an area of high APRS activity all those beacons going off simultaneously does tend to snarl the air up rather.



● Typical parameters for a station set up.

If you want to put something on the map for all to see, you can create an **Object**. To illustrate this I created an object entitled PW and placed it on the map to represent where the *Practical Wireless* book store and editorial offices are located. Other stations use it to show locations of rallies or special events and he like. I am sure that there are a multitude of things that it could be used for.

Top URLs - Good Sites With Lots Of Links

www.peaksys.fsnet.co.uk
http://website.lineone.net/~apritch/uiview.htm
www.aprsuk.net
www.mb7uiv.co.uk
www.packetradio.com
www.packetradio.org.uk
http://web.usna.navy.mil/~bruninga/aprs.html

Attention Listeners!

Attention all short wave listeners! If all you want to do is listen then you can, as APRS is not only for licensed Radio Amateurs to enjoy.

You don't have to transmit at all to enjoy APRS. Instead, by using a receiver on 144.800MHz connected to a TNC and using the software you can join in too!

You'll be able to receive the messages and bulletins, see where stations are, see the weather stations and their information and track mobiles, it's all there for the monitoring. In fact using a computer with a sound card and later versions of *UI-View* it's possible to have any text received in the message window, spoken to you by the computer, so you really can listen!

This article **has been and was intended to be**, a very quick insight into the world of APRS. Terry and I hope that you have had a taste of how useful and diverse it is as a mode. It has brought packet radio alive for us and we hope we've whetted your appetite too!

If you are running a packet station now, nothing could be easier than to have a quick look at the world of APRS. So go on - have a go! *PW*

Top Tips

Here are our Top Tips on how to get started and some Websites where you will find additional information, make contact with the real experts and discover things like APRS Internet portals, miniature APRS stations and other wonderful things. What can be done, tracked and achieved with APRS is only limited by the imagination of the user - have fun!

1. Do not be afraid to ask for advice.
2. If possible, try all the software programs until you find one that suits you.
3. Use the TNC in Kiss mode if available.
4. Use the minimum power required - all you need to do is get to the nearest Digipeater.
5. Only Digipeat if in doing so you will enhance the system.
6. Enjoy experimenting. Don't panic! Remember it should be **fun**!

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ICOM 725 .....100W HF TRANSCEIVER 395.00
ICOM IC729 .....100W HF + 10W 6M 499.00
ICOM IC735 .....100W HF TRANSCEIVER 399.00
ICOM IC765 .....100W HF TRANSCEIVER 799.00
KENWOOD TS140S ..100W HF TRANSCEIVER 349.00
TENTEC SCOUT .....QRP TRANS 20/40/80M 295.00
TRIO TS 430S .....100W TRANSCEIVER.....375.00
YAESU FT920AF .....HF/6M DSP TRANSCEIVER ..999.00
YAESU FT1000 .....200W HF TRANSCEIVER 1299.00
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ALINCO DR-140E ....2M FM MOBILE TX 149.00
ALINCO DR 510E ....2M/70CM MOBILE TRANS ..179.00
ALINCO DR605 .....2M/70CM MOBILE TRANS ..269.00
ICOM IC4E .....70CM HANDIE 59.00
ICOM T8E .....2/6/70CM HANDIE 225.00
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YAESU FT227R .....2M FM MOBILE TRANS 99.00
YAESU FT23R .....2M HANDIE 125.00
YAESU FT411 .....2M FM HANDIE - BOXED.....125.00
YAESU FT726R .....6M/2M/70CM BASE TX.....499.00
YAESU FT736R .....6M/2M/70CM BASE TRANS 699.00
YAESU FT5100 .....2M/70CM MOBILE TRANS ..269.00
YAESU FT709R .....70CM HANDIE 69.00
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ICOM ICR72 .....HF RECEIVER 399.00
JRC NRD345.....HF RECEIVER 325.00
KENWOOD R-5000 ..HF RECEIVER 599.00
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LOWE HF-225.....HF RECEIVER 249.00
YAESU FRG-9600 ....BASE SCANNER+HF CONVERTER ..329.00
YAESU VR-500 + ADMS-3 SCANNER & SOFTWARE ..175.00

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OSCAR SWR-200 ....SWR POWER METER.....35.00
SHURE 444.....BASE MICROPHONE 39.00
SWAN WM6200 .....50-150MHZ POWER METER ..30.00
SYMEK TNC 2H+RF DECK..9.6K TNC +10W RADIO179.00
DRAE .....3 WAY ANTENNA SWITCH.....12.00
TONO Q-550 .....TERMINAL UNIT 125.00
TRIO SP-430 .....EXTENSION LOUDSPEAKER 49.00
YAESU FC-1000 .....AUTO ATU FT757 ETC 189.00
YAESU FIF232C.....COMPUTER INTERFACE 55.00
YAESU VL-1000 .....SOLID STATE LINEAR AMP ..2399.00

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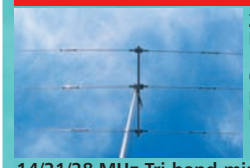
Yaesu VX-1R Dual band.....£169
Kenwood TH-D7 MkII.....£269
Yaesu VR-500 Scanner £199
Icom T-81E Triple bander £325
Palstar KH-6 50-54MHz..... ~~£159~~ £69
Icom T-81E 6m-23cm .....~~£419~~ £325

ANTENNAS



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28MHz	2	0.9	6.3	£98.00
28MHz	3	3	9.1	£115.95
28MHz	4	5	11.4	£149.00
50MHz	2	0.6	6.2	£48.95
50MHz	3	1.75	9.1	£81.95
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MARCONI'S GREAT TRANSATLA

Although not a Radio Amateur, Hari Williams is a Chartered Engineer with a great interest in the work of Marconi. Here, in tribute to the great pioneer's work Hari reminds us of the great achievement.

The year 2001 has been declared a Marconi Centenary Year, to commemorate the young Italian's historic wireless transmission across the Atlantic Ocean, from Cornwall to Newfoundland in December 1901. This account outlines Marconi's pioneering work and gives simple explanations of the apparatus and high-voltage plant that he used to achieve his success.

Guglielmo Marconi's claim to fame rests on his success in assembling items of apparatus, invented by others, so that he could communicate over a distance by means of electromagnetic or radio waves.

Marconi was born in Bologna on 25 April 1874 and by the age of 20 had set up his own laboratory, where he expanded on the work of Heinrich Hertz.

By the summer of 1895, in need of greater financial support to develop his system, he offered his discovery to the Italian government. They rejected his offer and he decided to take his apparatus to London, where arrangements were made for him to meet William Preece, Engineer in Chief to the Post Office.

Marconi Arrives

On a morning in July 1896, at the age of 22, Marconi arrived at Preece's office, together with two large trunks of apparatus. It was the beginning of a long professional co-operation because over the next few years, Preece went out of his way to help and encourage the young Italian.

On 27 July, Marconi gave a public demonstration of his system in London. Later, between September 1896 and the following March, he gave demonstrations to representatives of the Army and the Royal Navy on Salisbury Plain*

In May 1897, a successful transmission over 14km between Lavernock near Cardiff and Brean Down, near Weston Super Mare, impressed potential investors. As a result, the Wireless Telegraph and Signal Company was formed on 20 July 1897.

Marconi then terminated his formal association with the Post Office. In February 1900, the company changed its name to Marconi's Wireless Telegraph Company.

● The young Guglielmo Marconi in 1896. Five years later this great pioneer proved that long distance radio communication was possible with his transatlantic success of 1901.
(Photograph courtesy of Marconi PLC).

**The bungalow on the site just off the A30, now a private home, has a plaque recording the historical connection of the building with Marconi's work.*

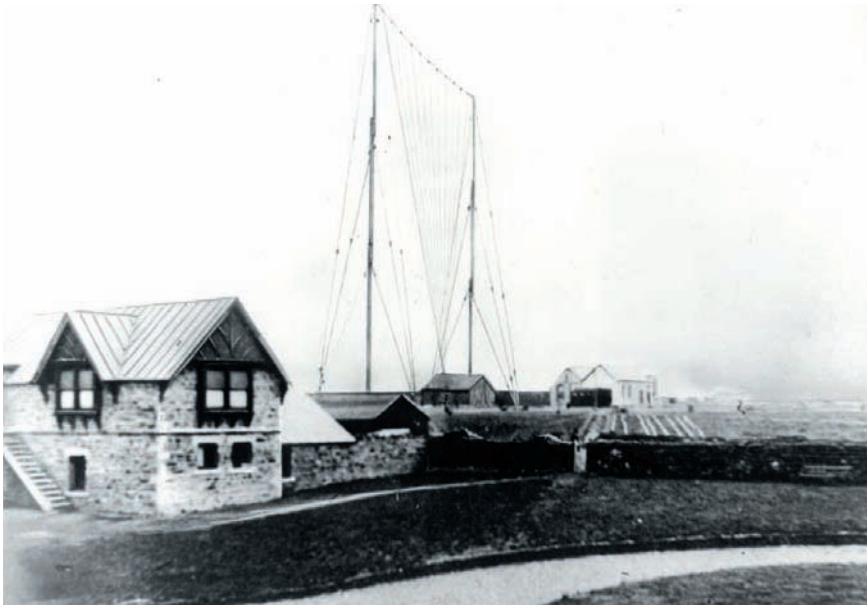
Beyond The Horizon

By early 1900, Marconi had realised that radio waves were somehow travelling beyond the horizon, making a transatlantic wireless-telegraph link a possibility. Towards this goal the Marconi company began work in October 1900 on a large transmitter and antenna at Poldhu, Cornwall. Soon afterwards, a corresponding American station was under construction at Cape Cod, Massachusetts.

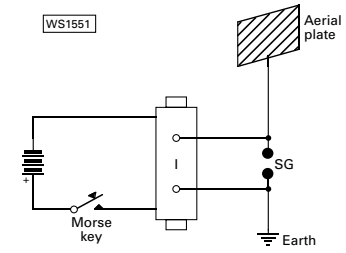
Unfortunately, the large antennas at both stations collapsed in severe gales in the autumn of 1901 and a smaller, temporary antenna was erected at Poldhu. With this antenna in use, the signals received at a coast station at Crookhaven, County Cork in South West Ireland, were strong enough to encourage Marconi to go and listen for them on the other side of the Atlantic Ocean.

Hari Williams, Chartered Eng. MIEE, is the author of the book *Marconi And His Wireless Stations in Wales* (Reviewed in *PW*, page 12 December 2000). In this book, reflecting his own Welsh heritage (Hari is the Welsh version of Harry) he provides a unique insight to the fascinating early transmitters working in North Wales in the 1900s. **Further details on this book are available by calling (01492) 642031.**

NTIC VENTURE



Marconi chose the nearest point to Cornwall and with a small team, arrived at St John's, Newfoundland on 6 December 1901, setting up his equipment on Signal Hill above the harbour. On 9 December, a telegram was sent to Poldhu asking for the letter S in Morse Code to be transmitted at agreed times from 11 December. On that day, a balloon supporting the antenna was badly buffeted by gale force winds and broke away.



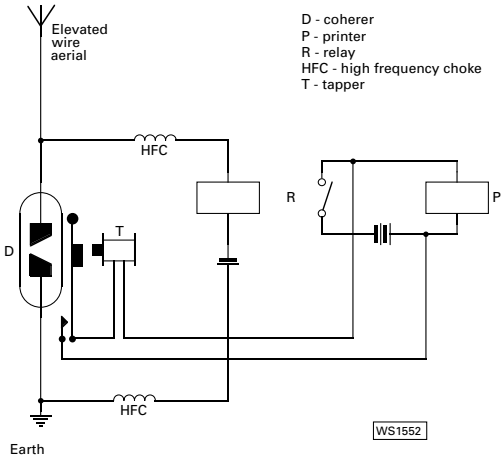
● Fig. 1: Circuit of an early transmitter (1895).

Varying Capacitance

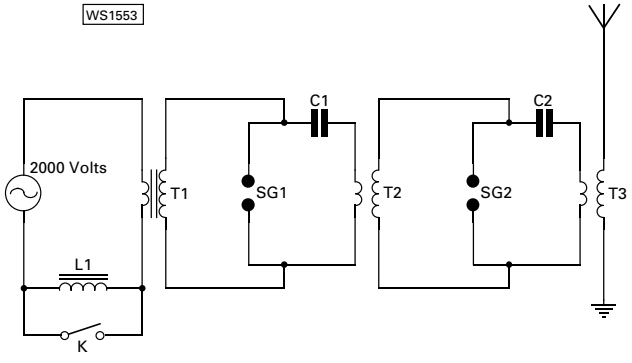
Marconi reasoned that the movements of the kite-hauled antenna were varying its natural capacitance, which affected the tuning of his receiver. To overcome this, he used a mercury detector connected in series with the antenna, a telephone headset and earth.

No signals were received that day but on the afternoon of Thursday 12 December 1901, the three dots of the letter S were heard several times before they were lost in static noise. Marconi telegraphed his office with the good news and two days later he informed the press.

The telegram to London was handled by the Anglo-American Telegraph Company, which lost no time in informing Marconi of its monopoly of all telegraphic communication in Newfoundland. Faced with the threat of legal action, he ended his trials but the Governments of Nova Scotia and of Canada offered him land and a financial incentive to stay in Canada. As a result, Marconi's company built a new station at Glace Bay, Cape Breton Island.



● Fig. 2: Receiver - 1896 - with coherer detector tapper device incorporated (see text).



● Fig. 3 : Circuit of the 1901 Poldhu, Cornwall transmitter (see text).

Having proved the feasibility of a transatlantic wireless link, Marconi faced and solved many problems before achieving his goal. A regular service was at last set up between a new station in Clifden, Galway, and Glace Bay in October 1907. However, it was March 1920 before a direct service became available between London and New York, through new stations in north Wales and New Jersey.

● Fig. 4: The Poldhu site, December 1901.
(Courtesy of Marconi PLC)

Early Experiments

In his early experiments, Marconi used a modified Hertz transmitter, as shown in **Fig. 1**. He later replaced the antenna plate with an elevated wire.

With the Morse key closed, the induction coil was energised, producing a series of high-voltage pulses across the spark gap G. Each pulse produced a spark and each spark generated a burst of radio frequency oscillations in the antenna, sending radio waves into space.

The radio waves were detected with a simple receiver, using a coherer, employing metal filings. It had been known for some time that the electrical resistance of a small quantity of loosely packed metallic filings changed from a high to a low value when an electric spark was discharged nearby.

Professor Edouard Branly of Paris investigated the metallic filings phenomenon in the late 1880s, using a small glass tube in which the filings were contained

Continued on page 40

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- All Mode
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- All Mode
- DSP

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- Remote Head

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MARCON 'S VENTURE

...continued from page 36

between two electrodes. He found that the change in resistance was caused by the electromagnetic wave which was generated by the spark.

The Branly Tube was modified by Professor Oliver Lodge in 1894 for use as a detector of electromagnetic waves. He referred to the tube as a Coherer, because the filings became closely packed together (cohered) whenever an electromagnetic wave impinged on them.

When the wave was no longer present, the filings returned slowly, or de-cohered, to their normal high-resistance state. This process could be accelerated by gently tapping the tube.

Marconi improved the design of the coherer and also connected in series with it a small electromechanical relay, as in **Fig. 2**. The relay operated from a dry cell whenever the coherer went into its low-resistance state.

At first, the relay was used to operate a Morse printer but later it also energised a small hammer device, rather like an electric bell, that tapped lightly against the coherer tube. This de-cohered the filings quickly and signalling speed was increased.

Receiver sensitivity improved in 1897 when a small high-frequency transformer, known as a **Jigger** was used to couple the antenna to the coherer. By 1900, receivers became available that could be tuned continuously over a limited range of frequencies. Antenna coupling coils were also used in transmitters.

The mercury detector, used by Marconi in Newfoundland, was an early type of semiconductor device, sometimes known as the Italian Navy detector. Although erratic in performance, it was much more sensitive than a coherer when used with a pair of earphones.

● Fig. 5: Marconi and team in Newfoundland, December 1901. (Courtesy of Marconi PLC)

● Fig. 6: One of the most often published and familiar photographs of Marconi, taken in Newfoundland during the transatlantic tests in 1901. (Courtesy of Marconi PLC)

The Poldhu Transmitter

The design of the large Poldhu transmitter was entrusted to Professor J. A. Fleming of University College, London. He decided on a two-stage arrangement but the design was modified a number of times during the station's working life. The rather unusual circuit configuration is shown in **Fig. 3**.

A large oil engine drove a 25kW alternator, which gave an output of 2kV at about 50Hz. The alternator output was regulated by a series choke L1 and a large, well-insulated Morse key K. With K closed, the full alternator output was applied to the main transformer T1, which stepped it up to 20kV.

The high voltage charged capacitor C1 and, at a critical voltage, a spark passed across the gap G1. This discharged C1 through the primary of the high-frequency transformer T2, which had a step-up ratio. The oscillatory currents produced in T2 charged C2 to produce a spark across gap G2. This discharged C2 through the primary of the high-frequency transformer T3, producing oscillations in the antenna. For the initial tests, spark gap G1 was set at 7.5mm and G2 at 40mm.

As long as K remained closed, a rapid succession of sparks was produced across gaps G1 and G2, as capacitors C1 and C2 were repeatedly charged and discharged. In this way, oscillations were sustained in the antenna, corresponding to the Morse signals.

The transmitter output was quoted as about 10kW. In the absence of any means of measuring it, the operating frequency was estimated as 820kHz, equivalent to a wavelength of 366m.

The efficient operation of the transmitter depended on the correct tuning of the oscillatory circuits, C1-T2 and C2-T3. Because of the high voltages and currents present in these circuits, all the components were solidly constructed, occupying a lot of floor space. Care had to be taken to prevent spurious voltage surges, which could damage the plant.

The Poldhu transmitter became obsolete in 1907, when Marconi introduced his disc dischargers. Poulsen-arc machines followed soon afterwards and Alexanderson alternators were in general use by the 1920s.

The development of high-power thermionic valves in the 1920s made possible the design of short-wave transmitters, opening up a new era of world-wide communication. And of course, Marconi's were deeply involved in that era too! *PW*

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AN OFF-AIR 198kHz FREQUEN

Need a frequency calibration aid? Dave Allen G8XRS shows you how to lock onto the Droitwich transmissions to create a very stable frequency source.

This design for a frequency reference source was inspired after driving past the legendary and tall, 198kHz transmitting masts located alongside the M5 motorway at Droitwich in Worcestershire. The signal sender at this site is said to be remarkably accurate and stable so, I thought that by using the carrier of this transmitter a suitable signal could be derived to check the accuracy of my selection of frequency counters - all two of them.

My proposed frequency source has been used with a popular hand-held counter in the £100, range made by Thurlby Thandar Instruments. The circuit has also been used successfully with an ancient Farnell counter which uses 'nixie' tubes for the display.

Accuracy

For the average radio enthusiast, the Droitwich signal is incredibly accurate. According to the BBC, the frequency of the 198kHz carrier is held at 2 parts in 10^{11}. For those who are fond of lots of zeros that is 2 parts in 100,000,000,000 or two parts in one hundred thousand million.

The Droitwich day-to-day stability is also quite good at 1 part in 10^{11}. This level of accuracy and stability is achieved by controlling the carrier frequency with a Rubidium gas cell standard whose performance is checked against the Caesium Standard at the National Physical Laboratory, which in turn, closely monitors the carrier emanating from Droitwich.

There are, however, two lesser known Radio Four 198kHz transmitters in the UK, one of which is located at Burghead (east of Inverness) and radiates 50kW. The other is at Westerglen (between Glasgow and Stirling) and is also 50kW. Both are synchronised to the Droitwich transmitter and could be used to good effect. My home town is Cheltenham in the Cotswolds and lies about 40 miles south of Droitwich.

The Circuit

The circuit of the unit shown in **Fig. 1**, comprises four distinct sections. The antenna input tuned circuit L1 and C1, C3 and C4, the r.f. gain stage, Tr1, which consists of a 3N201 dual-gate f.e.t. and its surrounding components, the phase locked loop/in-lock indicator, IC2, and of course a source of regulated power, IC1.

The long wave antenna consists of a home-wound coil L1 and L2, made up of 200+20 turns (give or take a few) of fine (0.305mm or 30s.w.g) enamelled copper wire close-wound at the centre of a 180mm long x 10mm ($7 \times 3/8$ inch) diameter ferrite rod. The rod is first covered in a length of heat-shrink sleeving which acts as the coil former.

Winding The Coil

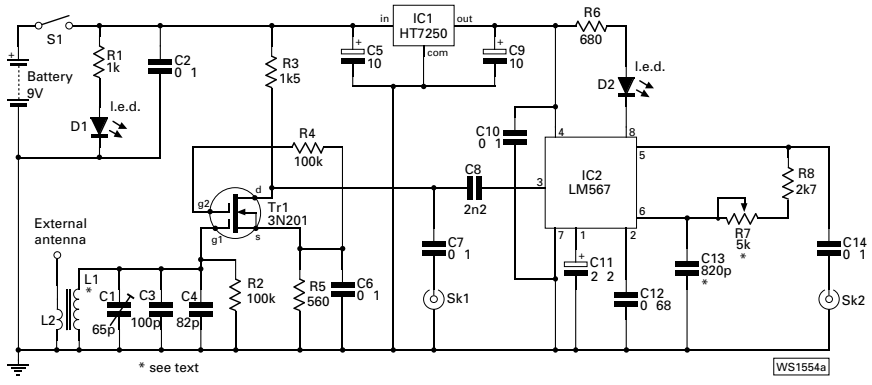
Let's start with winding the coil antenna. Firstly make a mark 65mm in from one end of the sleeved ferrite rod; this will be the start point. A strip of thin double-sided adhesive tape, placed at the centre of the rod. This will hold the turns in place.

Have a look at the illustration of **Fig. 2**, then **carefully** close-wind on the 20 turns of the wire for L2 onto the rod. Bring a loop of wire out and twist it together. This forms the earthy connection of L1/L2 leaving a little spare at either end for termination. Then, again carefully, wind on a further 200 turns for L1.

As the wire used for the coil is rather delicate it's a good idea to terminate the ends with a short length of 7/0.2mm stranded hook-up wire, soldered to ends of the coil. The flying leads can then be anchored to the rod with a piece of insulating tape or a smear of suitable adhesive thus making the antenna more manageable when connecting the assembly to the rest of the circuit.

Tuning Capacitors

The tuning capacitors are mounted on the circuit board and, with L1 forms the input tuned circuit. Resistor R2 in parallel dampens the tuning slightly. As with any r.f. tuned circuit there is inevitably a certain amount of stray capacitance but this appears to make little difference in the present application.



● Fig. 1: The circuit of a stable frequency source using an LM567 tone decoder i.c. to lock an oscillator to the 198kHz radio signal from Droitwich.

NCY SOURCE

A small positive bias is required on g2 of Tr1 to ensure correct quiescent operation of the stage, and the method used appears to be a good choice. This first stage, wired as a common source amplifier is coupled to the input (pin 3) of the phase locked loop (p.l.l.) (IC1) and to Sk1.

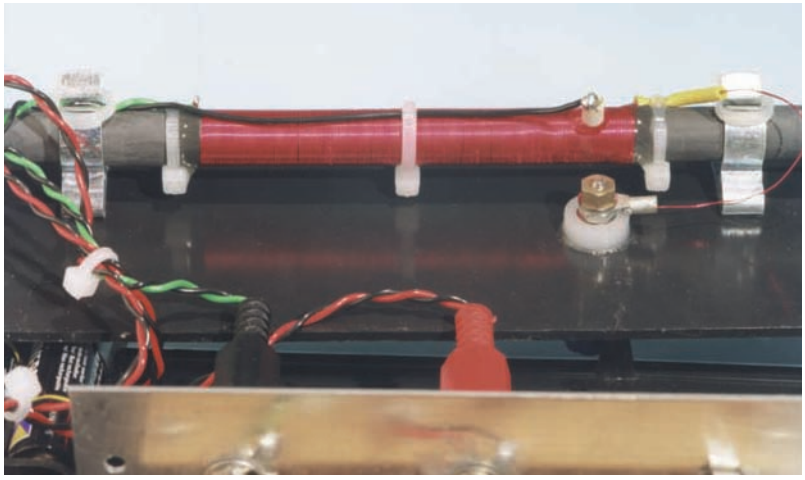
The phase locked loop used in my design, is an LM567 i.c. which takes the signal as a whole from the output of the r.f. gain stage. It then removes the modulation from this signal and produces a square wave signal at the 198kHz carrier frequency.

Tone Detector

The LM567 i.c. is primarily intended for use as a tone detector, in this case the tone is the 198kHz carrier. This device was chosen because, as it's an easy-to-use p.l.l., but it also contains a useful tone detected signal. The LM567 p.l.l. comprises a voltage controlled oscillator (v.c.o.), phase comparator and a circuit that indicates when the frequency of the v.c.o. is locked to the input signal at pin 3.

The free-running frequency of the v.c.o. is defined by C13, R7 and R8 and it.'s output is compared, in the phase comparator, with the signal from the r.f. stage. Should the two signals fall out of step, a series of error voltage pulses are produced representing the direction of the error.

The error pulses, when filtered and smoothed by the loop filter (C12), give a d.c. voltage that's internally connected to the control input of the v.c.o. that, automatically, adjusts the v.c.o.'s frequency until it again matches the average frequency of the 198kHz r.f. input. Eventually the loop reaches a steady state when the two signals are of the same frequency.



● Fig. 2: A close up shot of the ferrite rod. Winding the coil can be a rather difficult task with thin enamelled copper wire.

In this steady controlled condition the circuit is said to be locked, the modulation is effectively removed from the radio signal and the v.c.o. output then becomes a squarewave at the carrier frequency. The v.c.o. output from pin 5 of the LM567 is a.c. coupled to the output socket which in turn goes to your counter.

In essence, the tone detector output is an an open collector *npn* transistor that is switched on when the frequency of the v.c.o. is equal in frequency to the input signal. This drives a low current l.e.d. (D2) which forms the 'in-lock' indicator. You'll find this l.e.d. a great aid to setting-up, as when D2 is lit, the circuit should be in lock.

Mechanical Consideration

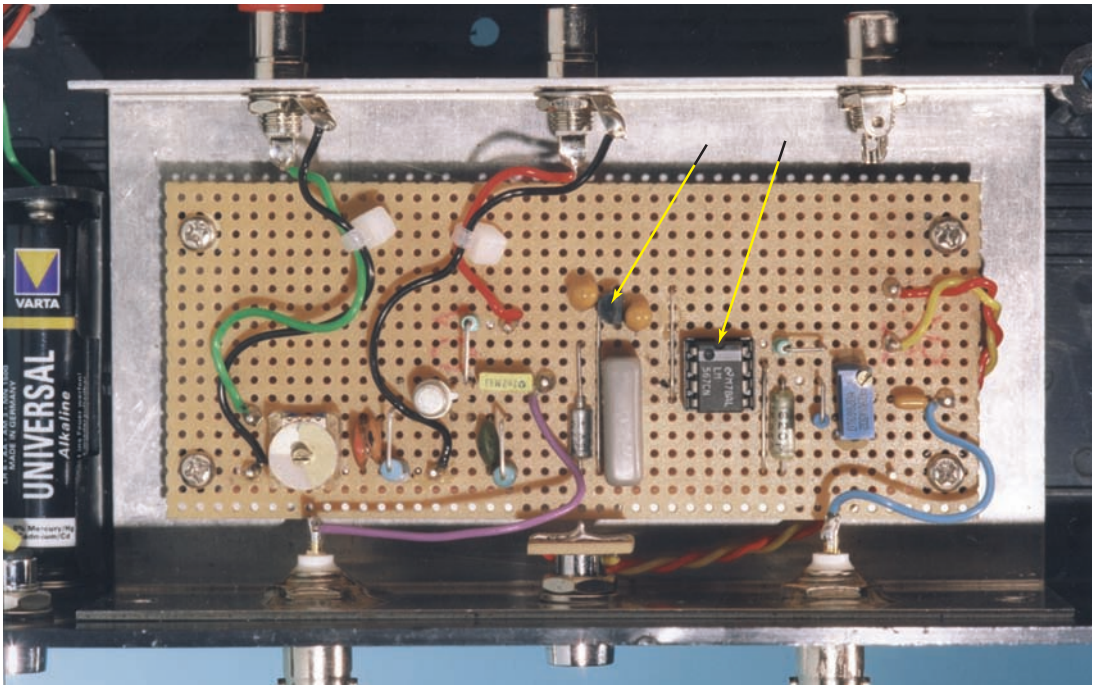
There are some mechanical considerations to bear in mind in order for the frequency reference to function correctly. My prototype unit is shown in the photograph of **Fig. 3** and this general layout should be followed. The ferrite rod antenna should be kept away from the output of the instrument to prevent unwanted coupling, thus causing false readings.

Isolation of the antenna and output is achieved by placing the circuit board containing the active components, sockets and the in-lock indicator inside an aluminium box, which is then fixed inside a plastic enclosure housing the rest of the components.

Before commencing any soldering or wiring it is good idea to prepare the enclosures and circuit board for subsequent mounting. After unwrapping the plastic box, remove the bolts holding the two sections of the enclosure together you will notice two plastic lugs on each half of the box. Chop 'em off!

After unwrapping the aluminium box retain the simple 'U' shaped section and put the other, more complex, half of the enclosure to one side for the time being. The next stage of construction may seem a little complicated but I am sure that with the aid of the photographs things will go smoothly.

● Fig. 3: It's a good idea to follow this general layout when you come to making your own unit. The blue terminal post is for attaching an external long wire antenna.



● Fig. 4: A prototype unit, is shown here to give an idea of how easy it is to build. This general layout should be followed to keep the input and output as far apart as possible. Please note R4 is fitted under the board, and there are differences around the C7/8 area.

1: Take the bottom half of the plastic box and insert one of the panels supplied with the box into the moulded slot. This is the 'front' panel.
2: Take the simpler 'U' shaped section of the aluminium box and place one of the long sides up against the rear of the front panel, ensuring it is placed up in the 'top left' corner of the plastic box.
3: You will see two pre-drilled holes in this 'U' shaped aluminium section. Using these holes as a template make two pencil marks on the the rear of front panel then drill two 6BA clearance holes on these marks.
4: Bolt the aluminium 'U' section and the front panel together; these nuts and bolts will be removed after drilling the holes for Sk1, Sk2 and the bezel fixing for D2.
5: Now draw a line on the front panel between the two bolt heads centres mentioned in para 4 above.
6: Make a pencil mark (for the l.e.d.) in the centre of the line and a pencil mark about 35mm either side (for the sockets) and drill suitable holes through the front panel and aluminium 'U' section.
7: Mount the l.e.d. bezel in the central hole with Sk1 and Sk2 either side. The nuts and bolts holding the 'U' in place can now be removed.

The Circuit Board

Now for the circuit board and one of my prototypes is shown in the photograph of **Fig. 4**. Prepare a piece of strip-board 17 strips x 44 holes long by drilling 4 x 6BA clearance holes, one in each corner, three holes 'in' and 'down' from each corner. Using holes in the circuit board as a template mark out four holes in the middle of the base of the 'U' shaped aluminium section and drill four holes and mount four 10-15mm long metal board spacers using suitable short bolts.

The small number of components can be mounted on the board and termination pins inserted for off-board connections. The flying leads from L1 and the leads for power were taken into the box via 'phono' sockets on the rear wall of the 'U' channel.

The completed circuit board can be mounted on the four metal spacers fitted previously on the 'U' shaped aluminium section; note that two of the spacers provide the earthing for the board.

The ferrite rod assembly is attached to the rear panel of the plastic enclosure with Terry tool clips which are held in place by short bolts and nuts. A screw terminal is mounted on the rear of the plastic box for the external antenna connection (see photographs).

The setting up procedure is best done with the aluminium box completing the screened enclosure. Two holes need to be drilled in the lid of the screened box, depending on the position of C1 and the oscillator tuning preset potentiometer (R7). So, a little care in measuring out is called for here.

After drilling the two adjustment holes the two halves of the metal case can be assembled. Two of the four self-tapping screws supplied with the aluminium box can be now inserted through the back of the metal box. Now two longer self-tapping screws will be required to attach the previously drilled holes in the front panel to the aluminium box within the main plastic enclosure.

System Setting Up

There are two methods to setting up the system. The first method uses an oscilloscope and frequency counter. With your unit completed, connect your oscilloscope, via a short low capacitance screened lead to Sk1 - r.f. monitor output. Then adjust C1 for maximum amplitude, including the modulation, as viewed on the oscilloscope screen.

When this operation is complete you need to disable the r.f. input stage by placing a short circuit across L1 (or disconnecting the plug if this is what you have done) . Now connect the output proper (Sk2) to your frequency counter and adjust R7 until a reading of 198kHz is noted. A couple of kHz in either direction will make little difference.

Reconnect L1 or remove the short circuit from the tuned circuit and the in-lock indicator (D2) should light up, showing that the phase-locked loop is in fact locked to 198kHz. A reliable reading should now be shown on your frequency counter.

Alternative Method

The alternative method of setting up is similar to the one described above, except that instead of using an oscilloscope a high impedance voltmeter and an r.f. probe are used to measure the r.f. output at Sk1. As before adjust C1 for maximum reading on your meter.

If you don't have an r.f. probe now could be the time you constructed one of these useful devices. the very simple circuit is shown in **Fig. 5**. In essence the probe takes an r.f. signal and detects this signal by rectification using a germanium diode. The resultant detected voltage is smoothed to provide a steady d.c. voltage suitable for the input of a high impedance voltmeter (e.g. a digital type).

I managed to squeeze the r.f. probe into an empty Tippex pen barrel. A better choice could be a jumbo size magic marker barrel as there is plenty of space to mount the components. The probe tip was scavenged from an old test probe and attached to the plastic barrel using a blob of epoxy resin after soldering one end of the capacitor.

Power Supply

I've designed the system to run from an internal a 9V battery power supply that consists of six 1.5V cells mounted in two three-bay holders.These holders are mounted to the base of the main enclosure using 6BA nuts and bolts (see photographs).

Power from the battery is taken, via S1, to the circuit board with two lengths of hook-up wire. These leads are dealt with similarly to the antenna winding flying leads, in that I've used a phone plug/socket arrangement. A power on indicator has been incorporated and consists of an l.e.d. and resistor (D1/R1) which are mounted on the front plastic panel.

In order to stabilise the frequency of the voltage controlled oscillator within the LM567, a small regulator (IC1) has been included. It would be perfectly feasible to use a 78L05 type instead, if one is available. This i.c. regulates the main 9V supply rail down to a stable 5V which according to the application notes is a typical operating value for the LM567.

Excellent power supply decoupling for the circuit is provided by C2, C5, C9 and C10. Note C2 is wired directly across the i.c. socket pins on the track side of the circuit board for maximum effect so, ensure a physically small component is used in this position.

Current consumption of the finished frequency reference source is in the region of 20mA and for those who think this is too much of a drain on the battery there is no reason why an outboard 9-12V power should not be used.

The type of coaxial power socket fitted to the plastic box is up to the individual but it will probably be of the standard coaxial variety which will suit most plug-top '9V' adaptors likely to be encountered. An alternative is to feed the unit from the station 12V supply, which will work just as well.

How To Use It?

If you're wondering how you would use the unit, it couldn't be simpler! The Unit is coupled to your digital counter and the reading noted. If you have access to the innards of your counter, then you can adjust the counter's timing crystal trimmer capacitor to give a reading of 198 000Hz.
(*The counter should present a very light loading on the output of the unit, or a simple c.m.o.s. buffer stage may be added to isolate pin 5 of IC2 from the counter.* **Editor**.)

If your counter does not have a calibration capacitor, or if you cannot gain access to the insides then you just have to apply the little calculation, shown below, to every reading that you take with the counter.

$$F_{eal} = F_{count} * \text{factor}$$

Where

F_{real} = Real frequency

F_{count} = Displayed frequency

$$\text{factor} = \frac{\text{count displayed}}{198\,000}$$

The 'factor' term used above is derived from the actual reading the counter shows when reading the 198kHz reference signal divided by 198 000. (*Its value is likely to drift more with temperature, than with time on most of the cheaper digital counters. So, a temperature variation chart could be plotted if you know what the temperature is each time you measure and calculate the 'factor' value!* **Ed**.)

To really put the frequency reference source through its paces it was taken for a holiday to Lizard Point at the far end of Cornwall and reliable results were obtained. So, this would indicate the possible range attainable with the finished instrument.

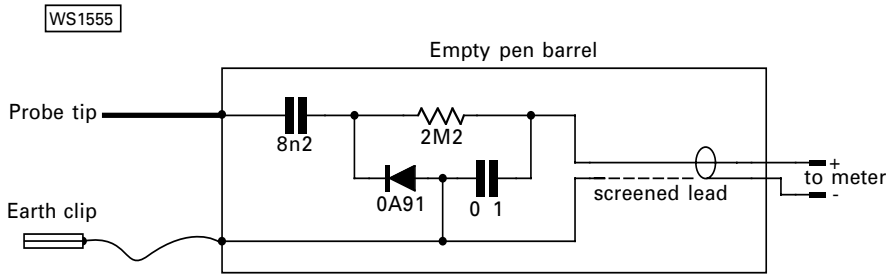


Fig. 5: A simple diode r.f. voltmeter may be used to set up this unit or other simple r.f. tuned circuits.

External Antenna

An input for an long/random wire antenna has been catered for. This is for those who live in a less favourable location with regards to signal strength on 198kHz. The circuit simply consists of a long wire attached to the screw terminal on the back panel. Please note, C1 may possibly need a very slight adjustment to restore maximum output from the r.f. gain stage.

Other Stations

As a bonus, the tuning range of the v.c.o. section of the LM567 covers all of the long wave band so, it's possible to tune to other stations, that are sufficiently accurate, and have a reasonable signal strength. A certain amount of experimentation may be required with regards to the value of the components in the input tuned circuit.

Some long wave transmitters worth trying are:

Atlantic 252 (252kHz - 500/100kW) if you happen to live in the wilds of west Wales or in Ireland.

Luxembourg (234kHz - 2MW),

Radio Monte Carlo (216kHz - 1.4MW)

Saarlouis (183kHz - 2MW)

The above continental transmitters might be worth a try if you are based on the east coast of England or in western or central Europe.

BBC Engineering

May I say a big thank you to the BBC engineering department, where a very helpful lady, whose name I am unsure of, provided me with the information sheet regarding the 198kHz transmitter at Droitwich, to **David Evans** who took some original photographs and who penned the section on the phase-locked loop and to **Rosemary** who turned the selection of words into English.

PW

Shopping List

Resistors

560Ω	1	R5
680Ω	1	R6
1kΩ	1	R1
1.5kΩ	1	R3
2.7kΩ	1	R8
100kΩ	2	R2, R4
Variable (20t Cermet type)		
5kΩ	1	R7

Capacitors

Miniature disc Ceramic		
82pF	1	C4
100pF	1	C3
820pF	1	C13
100nF	5	C2, C6, C7, C10, C14
Miniature Polyester		
2.2nF	1	C8
680nF	1	C12
Electrolytic (tantalum)		
2.2µF	1	C11
10µF	2	C5, C9
Variable (foil trimmer)		
65pF	1	C1

Semiconductors

3N201	1	Tr1 (or similar m.o.s.f.e.t.)
HT7250	1	IC1 (or 78L05 type)
LM567	1	IC2
l.e.d.s	2	type and colour to suit.

Miscellaneous

A ferrite rod (180×10mm), a length of heatshrink sleeving (see text), enamelled copper wire (see text), an ABS plastic box (Maplin BZ76), an aluminium box (Maplin LF08), stripboard, connecting wire, battery holder, plugs and sockets, switches and other small items to suit.

Antenna Workshop

The WBP-1 Portable Mount For Whip Antennas

We sent Ray Fautley G3ASG, out to play at mobile radio with an interesting antenna base. Not wanting to stray too far from a good cup of tea, he ventured out onto his lawn to set up his DXpedition base camp!

Imagine that you've just arrived at a caravan site, or you've just parked the car in a field and set up the tent. You've remembered to bring the mobile h.f. rig – that's the easy bit! Now, what about an antenna? For the antenna, you can always poke about in the car boot looking for that bit of wire and a couple of insulators you packed - you did, didn't you? Then you can search around for somewhere to fix the wire ends to, or the nearest tree is 'miles away'! But what a time-consuming performance! There's got to be a much easier way!

There **is an easier way** and it's called a WBP-1 Mounting Base. The WBP-1 comprises a metal base plate some 290mm square and 10mm thick fitted with four copper spikes protruding from one side. These four spikes are pushed into the ground, creating a good ground for an h.f. mobile whip antenna, screwed directly into a threaded boss on the upper side. To complete the set-up there's about three metres of 50Ω coaxial cable terminated by a plug type PL259.

The antenna base is designed to be used with whip antennas such as the PRO-AM types PFH-10 for 28MHz, PHF-15 for 21MHz, PHF-20 for 14MHz, etc. All of these whip antennas, which are available for each of the amateur bands, **are all nearly the same overall length.** If their lengths have already been adjusted for optimum, the whips will all be about 2.6m long.

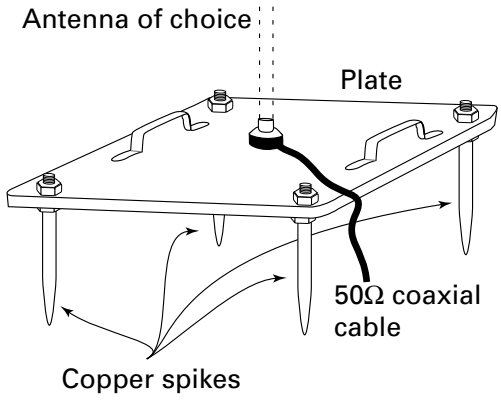
While travelling to your site, you may slide the whip back inside the body of each whip, this reduces the overall length of the antennas to about 1.3m. If you have previously marked the optimum position of the inner parts it will not take long to set them up on site.

Lawn Centre

But back to the plate! I mounted the WBP-1 base at the centre of my back garden lawn. To push the spikes into the ground, I managed by carefully placing my feet on to the flat part of the plate (don't tread on the handles, though!). The spikes sank quite easily until the whole plate was flat to the ground.

Next, I connected the length of 50Ω coaxial cable supplied with the base to an **RF Analyst** type **RF1** made by Autek Research. The antenna load measuring device, has a coaxial socket exactly fitting the coaxial plug type PL259 fitted to the end of the WBP-1 cable. This cable plug will fit the output socket of most modern transceivers.

● A good ground, an h.f. whip and DX.



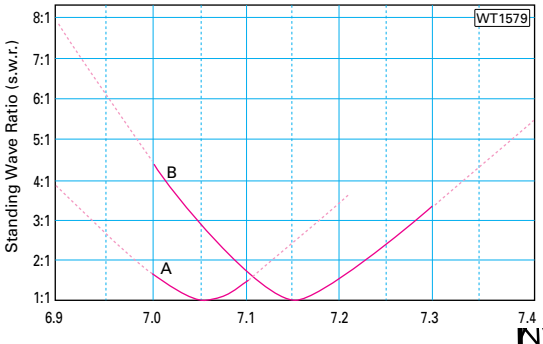
With the base plate fixed to the ground I made some measurements of the s.w.r. when using four different whip antennas. Eight or nine measurements of s.w.r. were made for each band with the appropriate whip antenna screwed into the base.

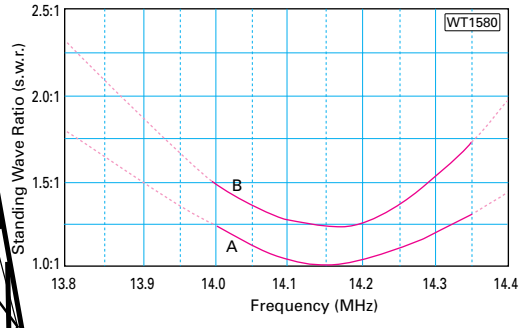
Two sets of measurements were made when using 7MHz whip antennas. This just happened to be the lowest frequency antennas available at the time. I had one whip for the European band of 7.00 to 7.10MHz, and another one set for the American band, 7.00 to 7.30MHz (see **Fig. 1**).

As was to be expected, the antenna for the narrower European band gave a lower average s.w.r.than did the antenna for the three times wider American band. Of the other bands, **Figs. 2**, **3** and **4** show the s.w.r. measured over the 14, 21 and 28MHz bands respectively.

Well Watered

I found, experimentally, that if the ground was well watered first (I just used a watering can) before





● Fig. 1: Curve A is for an antenna cut for the narrower European band of 7-7.1MHz, curve B is for an antenna designed for the wider American Amateur band of 7-7.3MHz.

● Fig. 2 (Far right): Measurements on the 14MHz band. Curve A is after the ground had been watered to help reduce the ground impedance. Curve B is the s.w.r. with the plate mounted on dry ground.

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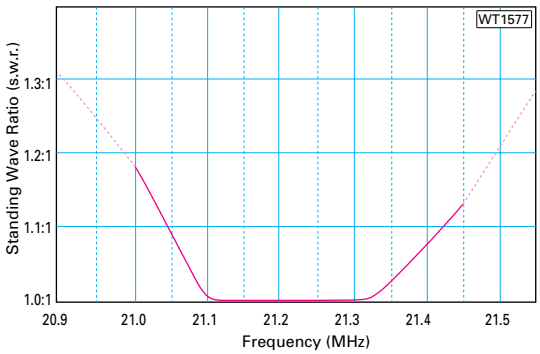
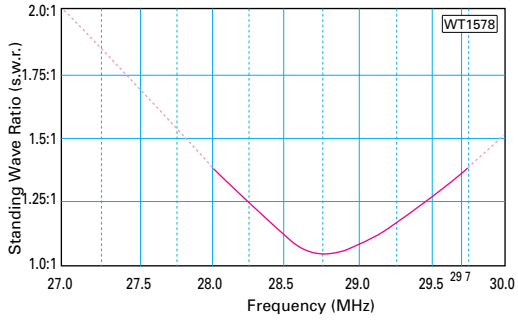




● Fig. 3 (Far left): Most of the 21MHz band is at very acceptably low s.w.r. reading. This would seem to be an ideal base at this frequency (see text).

● Fig. 4: Even on the wide 28MHz band the s.w.r. is still quite good over the whole band.

planting the plate, the s.w.r. was lower at the setting-up frequency. If the ground was very dry it was difficult to find a frequency where the s.w.r. would fall below 1.25. This applied to all the whip antennas.

To show the difference between wet and dry ground, look at the curves in Fig. 2. Curve **A** shows the effect when the ground was wet and curve **B** when it was very dry. The differences between the curves may be applied to all the whip antennas. The curve in Fig. 2 marked **A** is the s.w.r. to be found over wet ground. So, it may well pay off to water it first!

All the supplied whips were given on-air tests. On 7MHz, European stations as well as G stations gave reasonable reports. The 14 and 21MHz bands produced c.w. and 'phone QSOs with continental stations. But when I first tuned up with the 28MHz whip, there wasn't a signal to be found anywhere in the whole band!

A few days later, however, there was a brief period of short skip (E layer) propagation and European stations were contacted on the 28MHz band, using both c.w. and 'phone. It was quite a pleasure not to have to re-tune the antenna when changing frequency from one end of a band to the other as I always have to when using my own tuned antenna system.

Very Simple

My conclusion about this unit is, that the WBP-1 Mounting Plate is very, very simple to use. It's certainly the easiest way to get on the air when holidaying or taking a short break. Whip antennas for the bands of operation will of course also be necessary.

Thanks to **Waters and Stanton** for the loan of the WBP-1 Mounting Base and the various whip antennas. The WPB-1 Mounting Plate, fitted with the 50Ω coaxial cable, is available from Waters and Stanton, **Spa House, 22 Main Road, Hockley, Essex. Tel: (01702) 206835** for **£49.95** (including VAT, and P&P). The h.f. whip antennas that I tested, are also available from the same source.

PW

Carrying On The Practical Way

This month the Rev. George Dobbs G3RJV is struggling to cope with the large amount of postal feed-back with ideas and suggestions from readers regarding the Christmas Crystal Set project featured in the December 2000 issue.

"The expectations of life depend upon diligence; the mechanic that would perfect his work must first sharpen his tools "

Confucius

Postal feed-back

Generally I'm pleased to receive letters from readers of this column because most of them are positive and some them offer fruitful ideas for improving the column. To back this up....my little Christmas article on building crystal sets in December 2000 produced a bumper crop of reader's mail.

The subject seemed surprisingly popular and certainly revived memories for many readers! In amongst the letters were some very useful ideas.

Over the years, I have been pleased to exchange correspondence with **Martyn Lyndars** who lives near Crewkerne in Somerset. Martyn's an avid designer and builder of simple receivers (He used to be the designer behind the famous 'Heard All Continents' (HAC) valved receiver kits which were advertised for so many years in *PW* and introduced a large number of s.w.l.s to our hobby).

Martyn has a fund of ideas based upon years of experience and experimentation. Recently he's been experimenting with the use of fixed chokes in place of home-wound coils in his receivers. He uses axial chokes from the Siemen's range to obtain good results in a variety of receivers.

Axial Chokes

The diagram, **Fig. 1**, shows a crystal radio using axial chokes as suggested by Martyn. This circuit uses inductive coupling from the antenna.

Three 100µH chokes are used in the circuit and L2 and L3 are in series for the tuned circuit giving a total inductance of 200µH. (An inductance of 200µH is a useful value for tuning the medium wave broadcast stations).

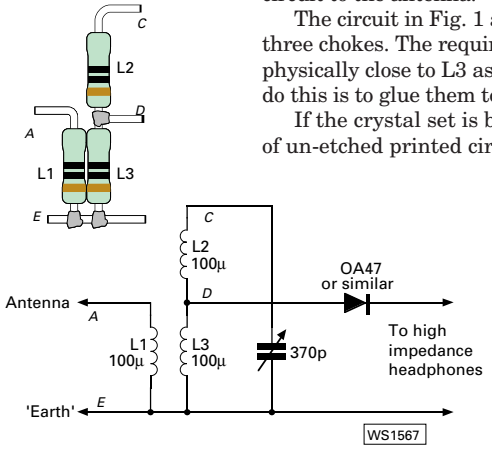
In Martyn's arrangement, the chokes L2 and L3 provide for a centre tapped tuned circuit. A third 100µH choke, L1, inductively couples the tuned circuit to the antenna.

The circuit in Fig. 1 also shows how to mount the three chokes. The requirement is for L1 to be as physically close to L3 as possible. The simplest way to do this is to glue them together as shown.

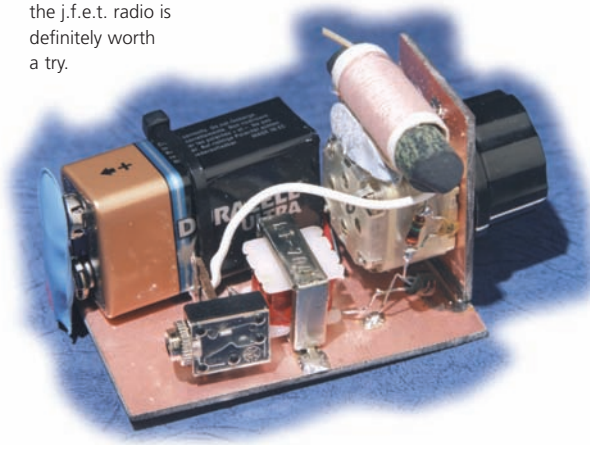
If the crystal set is built 'ugly style' over a piece of un-etched printed circuit board, L1 and L3 can be directly soldered to the board. The inductor L2 can then be attached to the free end of L3, the diode taken from the junction of L3 and L2 and the tuning capacitor from the top of L2.

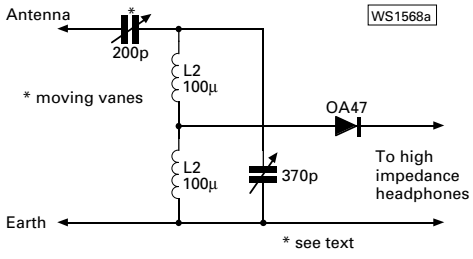
I tried the circuit in Fig. 1, but used the small Toko axial chokes.

● Fig. 1: A crystal radio using axial chokes as suggested by Martyn Lyndars. This circuit employs inductive coupling from the antenna (see text).

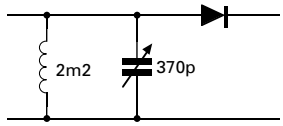


● George G3RJV says the j.f.e.t. radio is definitely worth a try.





● Fig. 2: Martyn Lyndars also suggested this circuit to G3RJV. It uses two 100µH chokes but in this version the antenna has a capacitive coupling to the tuned circuit (see text). The inset circuit being suitable for long wave reception.

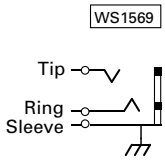


Although I believe them to be quite low 'Q', the circuit performed very well using an outside antenna.

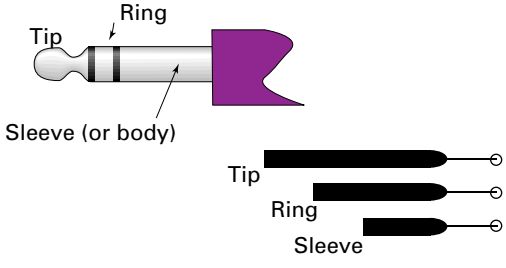
Rochdale where I live, just north of Manchester, is a good crystal set reception area. There are several strong local medium wave broadcasting stations, all powerful enough to drive a crystal set with a modest antenna and without an earth connection. Others constructors, including Martyn Lyndars, are not so fortunate and find the antenna and an earth are critical.

Martyn also suggested the circuit in **Fig. 2**. This uses two 100µH chokes but in this version the antenna has a capacitive coupling to the tuned circuit.

A variable capacitor, or trimmer capacitor, of some 200pF usually works well with a reasonable outside



● Fig. 3: The diagram shows the usual arrangement for a 3.5mm stereo jack socket of the type used with portable cassette player headphones (see text). The plug arrangement is shown along with the rarely seen circuit diagram.



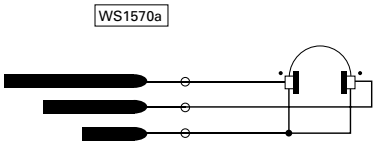


Fig. 4a: Shows how a pair of stereo headphones which are arranged for normal use in a stereo socket. The dot at one end of each coil represents the same end (be it beginning or end) of each coil winding. The stereo phones are in phase with 8Ω per channel (see text).

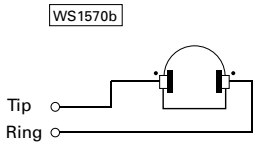


Fig. 4b: Diagram showing how G3RJV connected the headphones in Carrying On The Practical Way in the December 2000 *PW*. The phones are connected in series to give 16Ω impedance, but they are out of phase (see text). To connect the headphones in phase would mean reversing the connections on one of the coils.

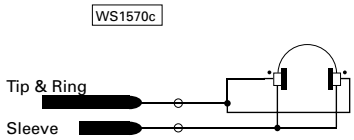


Fig. 4c: A better method of correctly phasing the headphones, where the phones are connected in parallel. This results in the headphones being in phase with an impedance of 4Ω (See text).

antenna and an earth connection. Some experimentation may be required to get the appropriate value of coupling capacitor to suit local conditions.

Germanium Diodes

There are two other little crystal set tips from Martyn's experiments, and the first is that they really require the use of a germanium diode. My sets all used the OA91 because I have them in stock although Martyn claims his best results have been with the OA47 diode.

The final tip, shown in Fig. 2, is how to obtain long wave coverage with an 'off the shelf' axial choke. A choke with a value of 2.2mH is very useful for covering long wave. The BBC Radio Four signal at 198kHz should be obtainable with 2.2mH and a capacitor of some 290pF. I await the 'Test Match Special' with special interest this summer!

George To George!

Another useful correspondence on the subject of crystal sets came from **George Fisk** of Tyne and Wear. George drew my attention to a shortcoming in my suggested circuit for the use of a pair of stereo headphones attached to an output transformer.

In his letter George rightly points out that my method of converting stereo headphones for mono use results in the earphone windings being out of phase. To see why...let's work our way through George's explanation.

The diagram, **Fig. 3**, shows the usual arrangement for a 3.5mm stereo jack socket of the type used with portable cassette player headphones and **Fig. 4a** shows how a pair of stereo headphones are arranged for normal use. The dot at one end of each coil represents the same end (be it beginning or end) of each coil winding. The stereo phones are in phase with 8Ω per channel.

The diagram, **Fig. 4b**, shows how I connected the phones in Carrying On The Practical Way (COTPW) in the December 2000 *PW*. The phones are connected in series to give 16Ω impedance, **but they are out of phase**.

To connect the headphones in phase would mean reversing the connections on one of the coils. A better method is shown in **Fig. 4c**, where the phones are connected in parallel. This results in the headphones being in phase with an impedance of 4Ω.

Another useful outcome of the arrangement in Fig. 4c. is that it's available without modification of the headphones. If the 'tip' and 'ring' of the stereo jack socket are connected together, the result is the circuit in Fig. 4c. The stereo headphones can then be retained for their original use (the diagram, **Fig. 5**, shows the circuit of a crystal set using this arrangement).

An LT700 transformer* (4kΩ, centre-tapped to 8Ω) is used to take the output of the crystal receiver to the stereo socket with the tip and ring connections joined.

*** Available from Maplin, JAB Components**

Another Suggestion

Finally, there's another (a 'sort-of' crystal receiver!) idea to consider. This arose because several readers wrote to me extolling the virtues of a simple junction field effect transistor (j.f.e.t.) receiver. Not really a crystal radio of course, but only one step beyond the simplest of radio receivers.

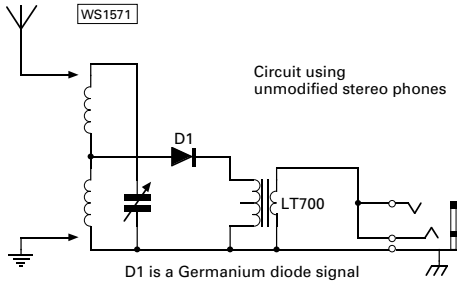
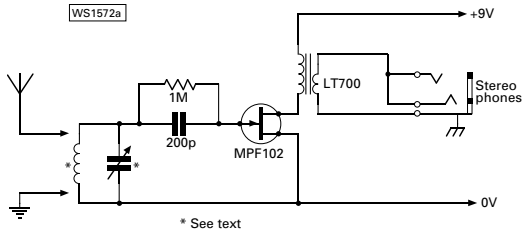


Fig. 5: Shows the circuit of a crystal set using the arrangement shown in Fig. 4c.

The simple j.f.e.t. receiver is shown in **Fig. 6**. This will take some of our valve constructors down memory lane!

If the field effect transistor (f.e.t.) in Fig. 6a was a triode valve, they would called it a grid-leak detector. And, if the f.e.t. in Fig. 6b was a triode they would call it an infinite impedance detector.

My version of the j.f.e.t. radio used the circuit of Fig. 6a. The best feature is this circuit is that it includes detector gain and I used the MPF102 device (because I have plenty of them!).

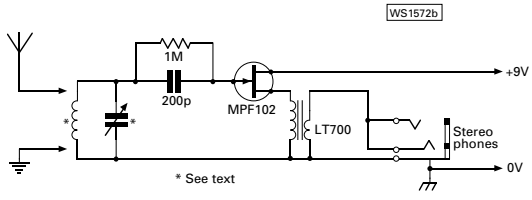


Other, similar f.e.t.s should work just as well, including the common 2N3819. I used the LT700 transformer and stereo headphone circuit (described above) as the output.

Fig. 6: Two versions of a simple j.f.e.t. receiver - and G3RJV says that this will take some of our valved receiver constructors down memory lane! (see text for more details).

I also found a scrap radio and removed the medium wave winding which was on a sleeve over a ferrite rod. I broke off a short length of the rod and put the coil sleeve back on it to provide my tuning coil.

The results were excellent. In fact some of the local medium wave stations overloaded the f.e.t. It such cases it may be a good idea to use the capacitive coupled antenna arrangement in Fig. 2.



The j.f.e.t. radio **is definitely worth a try!** And my thanks go to our readers for providing the ideas for this month's column. It's a pleasure to know how much you enjoy COTPW and it's my pleasure to prepare it for you!

PW

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Valve&Vintage

This month it's Phil Cadman G4JCP who's wearing the brown dust coat while he's looking after the *PW* vintage 'wireless shop'. Phil's offer of the month is an interesting little valved audio amplifier...so let's take a closer look!

Welcome to the shop and my first time on duty in 2001! To start the year off...I'm going back down memory lane. A long, long time ago.... my parents gave me a Fidelity Argyll Minor tape recorder. Originally just a bribe to ensure my good behaviour, it actually triggered my interest in audio and electronics.

However, as I grew older I became aware of the limitations of the Fidelity and so began saving for a better machine. Once acquired, the set became redundant and not knowing any better, I set about dismantling it for parts!

With the components liberated from the Fidelity I built my first audio amplifier. I don't know where I got the circuit from but I do remember that it worked first time. More importantly, I learned an awful lot from building and experimenting with that amplifier - like never to touch earth and the h.t. supply at the same time. Ouch!

Gaining Experience

Seriously though, building a simple audio amplifier is a good way to start gaining experience before tackling more complex projects. When complete (and working), it can be used to amplify the output of regenerative receivers, crystal sets and the like.

The circuit shown in **Fig. 1**, is very similar to the one I built all those years ago. The amplifier and power supply use well-known and easily obtainable valves.

However, you can substitute others for those shown if you have suitable alternatives to hand. It's simply a matter of choosing the correct bias and load resistors for the valves you plan to use. To help a little in this respect, I'll be mentioning a few alternatives and any necessary changes in resistor values.

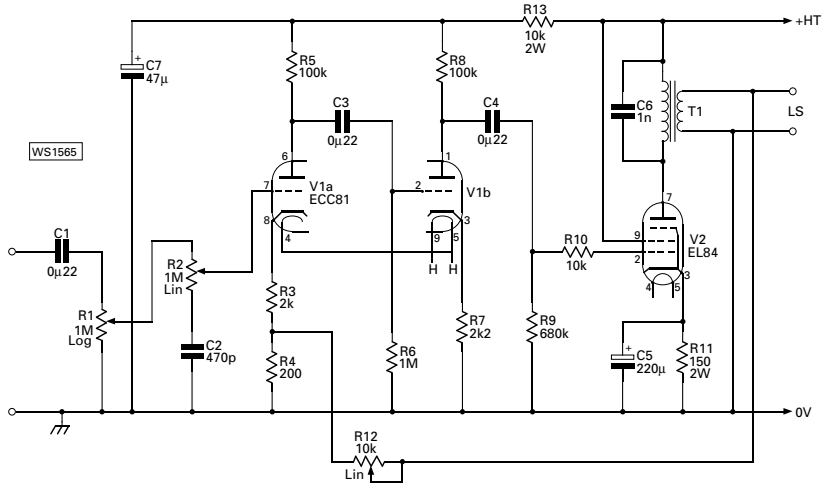
When designing an audio amplifier it's usual to start at the loudspeaker and work backwards. But in our case the rule gets bent a little because of practical considerations, namely: simplicity, low cost and easy-to-get parts.

One output valve fulfilling these requirements is the EL84. It needs 250V h.t., draws around 55mA, and gives an output of 5.7W. That last figure is always (**very**) optimistic because it assumes perfect supply regulation and no losses in the output transformer. If the amplifier produces more than 3W we'll be lucky!

The 6BQ5 and N709 are direct equivalents of the EL84 and can be used without any circuit modifications. All are easy to obtain.

Thinking of Octal-based valves, the 6V6G/GT immediately springs to mind. The only change, apart from the different base and base connections, is the cathode bias resistor (R11) which needs to be increased to 240Ω.

Electrical equivalents to the 6V6G/GT are the 6BW6 (B9A base) and the 6AQ5/EL90/N727. The latter are B7G based.



● Fig. 1: Phil G4JCP says that the circuit shown is very similar to the one he built all those years ago. The amplifier and power supply use well-known and easily obtainable valves (see text).

Output Transformer

Regardless of which valve you use, the output transformer (T1) should present a load of 5kΩ. **Note, that's not the d.c. resistance of the primary winding**. It's the reflected impedance of the loudspeaker when connected to the transformer's secondary.

Be prepared to shop around for T1. Brand new output transformers are available but many are made to a high specification for the hi-fi market. These can cost upwards of £50. But for our lo-fi purposes, a realistic price for T1 would be around £10-12.

Any small surplus output transformers you come across will probably match a 3Ω load. That's because in the heyday of valves, most loudspeaker drive units were 3Ω impedance.

A modern 4Ω loudspeaker will work fine but don't use an 8Ω unit with such a transformer. But of course, two 8Ω units wired in parallel would be okay.

Amplifier Requirements

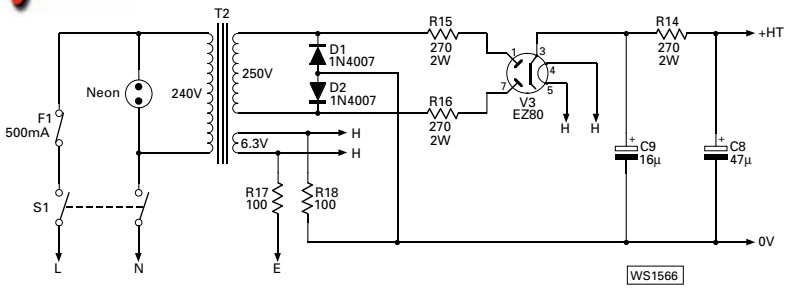
Having settled on the output stage, what about the rest of the amplifier circuitry requirements? Well, the EL84 requires about 5V of signal at its grid for full output (9V for the 6V6-types) so we need a bit of voltage amplification.

Here's where valve data books can help. For instance, the *RCA Receiving Tube Manual* tabulates suggested operating conditions and expected performance details for several popular audio valves.

I've chosen an ECC81/12AT7 for the voltage amplifier stages. It's often found in junk boxes and you get two triodes for the price of one! Incidentally, the 6SL7GT is an Octal based near-equivalent which needs no component changes in this circuit.

Either valve will give sufficient gain to allow some negative feedback (n.f.b.). That's the purpose of R4 and R12 - to feed a little of the amplifier's output back to the

● Fig. 2: A suitable power supply for the G4JCP amplifier project. Please note that if the neon indicator (shown on the mains primary of T2) does not have a series limiter resistor fitted, a suitable value should be used. Alternatives to the EZ80 rectifier are the EZ81 (a beefy EZ80) and the 6X4/EZ90 (B7G base). The 6X5/EZ35 is an Octal-based equivalent of the 6X4 (see text).



input 180° out of phase with the input signal.

Resistor R12 provides what's known as global negative feedback. Global because the feedback is taken from the output of the amplifier all the way back to the first voltage amplifier. The entire amplifier is, therefore, within the feedback loop.

A small amount of local (to an individual stage) n.f.b. is introduced by simply leaving out the ECC81's cathode bypass capacitors. This has the desirable effect of lowering the distortion each stage produces, and it saves on components.

If you get the connections to the secondary of T1 backwards (and Murphy's Law says you will) you'll get positive feedback and the amplifier will probably scream at you. Only connect R12 when you're satisfied that the amplifier is operating correctly. Personally, I'd temporarily use a fixed 10kΩ resistor in place of R12. Tack one end of the resistor to the junction of R3 and R4.

Next, play something through the amplifier and touch the other end of the resistor on to the secondary of T1. If the volume reduces you can go ahead and wire R12 into circuit.

On the other hand, if the volume increases or the amplifier bursts into wild oscillation, disconnect the resistor somewhat smartish. To fix the problem you can either reverse the connections to the primary winding or those to the secondary winding **but not both**.

Negative Feedback

Negative feedback - in moderation - confers significant benefits at the expense of reducing amplifier gain. Unfortunately, too much n.f.b. can cause instability, even oscillation. That's why I've made R12 a variable resistor, so you can experiment with the amount of negative feedback.

Reduce the setting of R12 to **increase** the amount of n.f.b. Without R12 (no global n.f.b.) the output valve will have a high output impedance and the frequency response of the amplifier/loudspeaker combination will be very uneven. The impedance characteristics of the loudspeaker drive unit(s) having a disproportionate influence on the character of the sound you'll hear.

You might think I'm rather labouring this point but I do have a reason. When used with a low-cost drive unit (or, even better, one salvaged from an old radio or TV set) housed in a less-than-rigid box, the sound will be wonderfully mellow. (Just like many old valved radio sets).

Before I get torn to shreds by any audiophiles who may be reading this, **I must say that this project is most definitely not a high-fidelity reproduction amplifier**. But if it sounds nice and brings back memories of warm valves, the Ovaltineys and open fires.... then who cares!

If you decide to use the amplifier without global n.f.b. then you might find there's too much gain for your intended application. In that case, change the ECC81 for an ECC82/12AU7 (same base connections). Alternatively, use a 6SN7GT in place of a 6SL7GT (again, same base connections). Resistor R4 won't be needed so short it out. Other component changes required are: ECC82: R3 and R7 should be 1.5kΩ and R5 and R8 should be 47kΩ. The values for the 6SN7GT are: R5, R8 47kΩ and 1.8kΩ for R3, and R7.

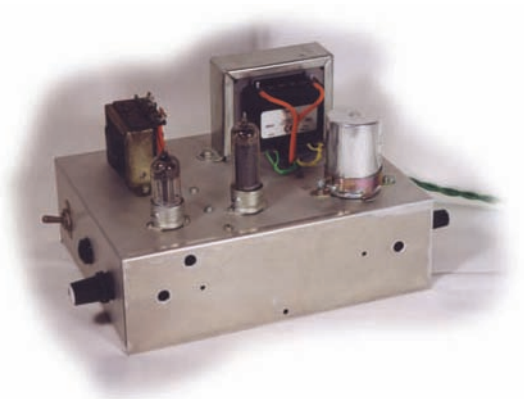
Final Points

Just a few final points on the amplifier: resistor R10 is a parasitic 'stopper' and C6 is there to roll-off ultrasonic frequencies. Variable resistor R2 together with capacitor C2 form an adjustable low-pass filter - a tone control to you and me! They can be left out of circuit and the grid of V1a connected directly to the slider of R1 if you so wish.

All resistors should be 1W types except where marked otherwise. **Capacitors without marked voltages should be rated at 500V** or more with the exception of C2 which only needs to be a 63V type.

You must use known good components for coupling capacitors C3 and, in particular, C4. This is most important because if C4 has any leakage whatsoever then a positive voltage will be developed across resistor R9. This voltage will cause the output valve to draw excessive current and overheat.

If extra current flows through V2, not only will there be extra heat, but the extra current drawn by the output valve may also damage the output transformer and power supply. Fortunately, leaky capacitors which only couple voltage amplifier stages (like C3) may not sound nice but won't be that damaging to an amplifier. So, my advice is that when trying out any old amplifier or radio, always check the final coupling capacitor(s) for leakage.



● Fig. 3: Although the amplifier shown here is not this month's project (It's a similar amplifier built for use with a superhet receiver projects G4JCP is working on) it's shown to illustrate a suggested lay-out.

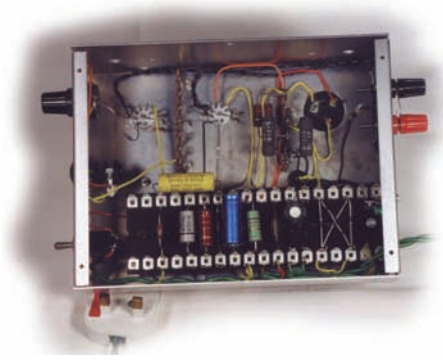
The amplifier ideally needs a 250V h.t. supply, although it'll work quite happily with anything between 200 and 250V. **Going above 260V isn't recommended**. A suitable power supply is shown in **Fig. 2**. Alternatives to the EZ80 rectifier are the EZ81 (a beefy EZ80) and the 6X4/EZ90 (B7G base). The 6X5/EZ35 is an Octal-based equivalent of the 6X4.

Any other rectifier you might want to use **must** have high (450V or more) heater-cathode insulation. If in doubt, stick with the alternatives I've given. On the other hand, if you're lucky enough to find a transformer with a separate rectifier heater winding (usually 5V) then there are many alternative rectifiers to choose from.

Bridge Circuit

Diodes D1 and D2, together with V3, form a bridge circuit. This gives full-wave rectification even if the h.t. winding hasn't got a centre tap. Should you manage get hold of a 250-0-250V transformer, simply miss out D1 and D2 and connect the negative high tension (h.t.) rail to the transformer's 0V tap. In any event, you must increase the value of R14 if the h.t. voltage under load exceeds 250V. Remember to increase the power rating of R14 in proportion to its value.

The h.t. winding of transformer T2 should have an a.c. rating of 100mA and the heater winding ideally needs to be rated close to 2A. Although a bit tight heater current-wise, the Maplin transformer catalogue code **XP27E** is suitable.



● Fig. 4: Underside of the amplifier unit shown in Fig. 3.

Old or surplus mains transformers may have h.t. windings marked with d.c. ratings. Look for one rated at 60mA d.c. or more. The difference in a.c. and d.c. ratings is due to the de-rating required with capacitor input-filter rectifier circuits.

In case you're wondering, R17 and R18 form a virtual centre-tap for the heater winding. This makes the heater supply balanced with respect to earth which helps keep the hum level down.

If your transformer's heater winding already has a centre tap, connect it to negative h.t. and miss out R17 and R18. Don't forget to use tightly twisted-pair wiring for the heaters and, as far as possible, keep it clear of components and wires that carry the audio signal.

Ah, I see my Ovaltine has arrived so I'd better say cheerio until it's my turn 'in the shop' again. In the meantime, for additional notes on this amplifier project please send an s.a.s.e. direct to me (**not** to the *PW* offices) or go to **http://www.valveandvintage.co.uk/pw/**

Don't forget to send your comments and letters to me either via the *PW* offices, via E-mail to **phil@valveandvintage.co.uk** or direct to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.** *PW*

VHF DXER

BY DAVID BUTLER G4ASR

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

Recently I reported that trans-equatorial propagation (t.e.p.) and F2-layer propagation had returned to the 50MHz band enabling worldwide contacts to be made from the UK. During October much of the DX emanated from central and southern Africa with contacts being made with stations in Botswana (A2), Burkina Faso (XT), Djibouti (J28), Eritrea (E30), Ethiopia (9E), Equatorial Guinea (3C), Gabon (TR), Madagascar (5R), Malawi (7Q), Maldives (8Q7), Morocco (5C), Namibia (V5), Nigeria (5N), Reunion Island (FR), South Africa (ZS), Sudan (ST), Togo (5V), Uganda (5X), Zambia (9J) and Zimbabwe (Z2).

There were also far-eastern delights such as Australia (VK), Cambodia (XU), Hong Kong (VR2) and the first smatterings of DX from the Americas in the form of Brazil (PY), Canada (VE), French Guiana (FY), Puerto Rico (WP), Surinam (PZ) and USA (W). Conditions on the 50MHz band during November were equally split between days with auroral and auroral-E (Au-E) propagation and those with F2 propagation. There was also a little t.e.p. and Sporadic-E (Sp-E) thrown in for good measure.

NOTABLE DX STATIONS

Some of the notable DX stations heard or worked on the 50MHz band from the UK in this period included A45ZN (Oman), FG/N0JK (Guadeloupe), HC1BI, HC2FG and HC8N (Ecuador), HL1XF (Korea), HP2CWB (Panama), PY7ZZ (Brazil), SU1SK (Egypt), VK6DIR (Australia), VR2LC and VR2XMT (Hong Kong) and YS1AG (El Salvador). Propagation was particularly good on November 10 with an excellent opening between 1400-1700UTC into central and South America.

Stations mainly in Wales and northern England were able to make contacts with CE3BFZ (Chile), CX1CCC (Uruguay), KP4A (Puerto Rico), LU1ECZ, LU3DCA, LU5VV, LU7FA, LU9AEA (Argentina), VP2MJD and VP2MJJ (Montserrat). The LU9EHF beacon running 15W into a dipole was also heard at good strength.

As we moved into December the shift in propagation from the southerly path to the westerly path was most noticeable. I recorded openings to Africa on 18 days during October, 12 days in November and only 2 in December.

Conversely I recorded openings to North America on 2 days in October, 11 in November and 17 in December. The 50MHz openings in December to Canada (VE1, VE2, VE3, VE9 and VO) and the USA (all call areas except W6, W7 & W0) occurred mainly between 1300-1700UTC.

In addition to the run-of-the-mill VE and W contacts there were some choice DX signals for operators who were prepared to dig them out. Amongst these were the stations of P43MR (Aruba), ZF2NT (Cayman Islands), YB5QZ (Indonesia), YV1DIG (Venezuela) and 9M2TO (Malaya).

Propagation on December 27 was quite unusual insofar that following an F2 opening to North America there was an auroral back-scatter opening. Nothing unusual about that I hear you say. However, on this occasion it enabled a handful of contacts to be made from Northern Ireland and Scotland into Canada and the USA. Between 1615-1620UTC the station of GI0OTC (IO65) worked VE3RM with signals peaking 53A and GM0EWX (IO67) contacted the station of K1MUC. At 1717UTC both W3EP and WB5DNT copied the Lerwick beacon GB3LER peaking around 41A.

much of November and December was generally rather poor. Apart from the Auroral-E opening on November 10 into Finland and Russia (which I mentioned last month) there has been very little to report. Some weak auroral openings were reported by stations in central England on November 26, 27 and 29 and none as far as I'm aware were reported during December.

The expected autumnal tropo failed to materialise this year and there have been no lengthy periods of enhanced tropospheric propagation reported. Conditions were slightly up on December 22-23 enabling stations in the Midlands to make contacts into Scandinavia and Germany.

Reg Woolley G8VHI (IO92) reports that on December 22 he worked OZ7DX (JO66), SK7MW (JO65), SM7WSJ (JO67) and heard SK6HD. He has also a number of contacts with

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF SOME DX ACTIVITY ON THE VHF AND UHF BANDS.

By the time you read this in early February the best DX openings on the 50MHz band will have moved to the Far East with openings to Australia (VK4, VK6, VK8 call areas) and occasionally to Hong Kong and Japan. Assuming that solar activity remains stable contacts should take place on a number of consecutive mornings. So, if you miss the first one make a special effort to be at home the following morning. (You can always blame it on the trains!).

By March the optimum path will move to the south again with openings to southern Africa around midday. So, if you want to work VK on the 50MHz band your only chance will be in the next few weeks. Statistically the paths with the highest maximum usable frequency (m.u.f.) are most likely to be those at which local noon occurs at the midpoint.

In other words look for openings to Australia, Japan and the Far East between 0900-1100UTC, Africa around midday, the Caribbean around 1300UTC and then Canada and the USA in the afternoon and early evening. If in doubt, just point your antenna towards the Sun.

THE 144MHZ BAND

Propagation on the 144MHz band during the station of F4AZF (JN28) over 700km away and reports that he can make an s.s.b. QSO every time he has a schedule.

Reg reports that he is now active on the 430MHz band using an Icom IC-451 transceiver running 100W into a pair of 19-element F9FT Yagis. With this power level the results have been very good with 'flat band' contacts being made with stations up to 600km away.

Recent contacts for Reg G8VHI have included DG1KJG at 626km and DL8OBU at 780km. He is also building a system for the 1.3GHz band and has already erected a 67-element Wimo Yagi on the mast in readiness for the next tropo lift.

The Leonid meteor shower on November 18 didn't quite live up to expectations and at my QTH I only made three s.s.b. contacts on the 144MHz band with the stations of CT1FAK (Portugal), EA3TI (Spain) and I1JTQ (Italy) between 0300-0400UTC before closing down in disgust! Reg G8VHI accomplished better results by making seven s.s.b. meteor scatter (m.s.) contacts with the stations of HA5OV (Hungary), IK2YXK (JN45), OH6MAZ (Finland) at 1861km, S51MQ (Slovenia), S57EA (JN76), 9A2KK (Croatia) and 9A2RD (JN65).

Reg also heard DJ9YE, EA3TI, EW1RZ

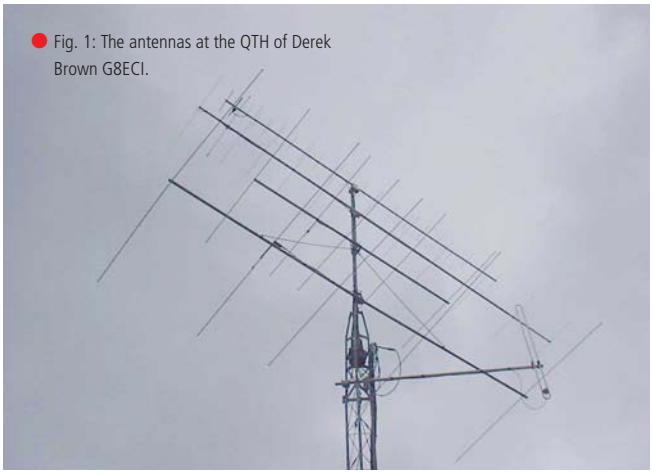

Fig. 1: The antennas at the QTH of Derek Brown G8ECI.

(Belarus Republic), I8MPO, SM7LBN (Sweden) and SP9AI (Poland). During the Quadrantids meteor shower on January 3 he made one random (unscheduled) QSO with the station of OH5LK over a 1954km path. Not bad for only 50W output!

Guy DL8EBW (JO31) reports that at his QTH the peak times for the Leonid meteor shower occurred on November 18 between 0300-0400UTC and 0600-0730UTC. During these times some of the longest bursts were of 80 seconds duration.

However, outside of the peak shower times there were numerous periods when no reflections were heard at all. Guy DL8EBW mentions that it was very difficult to make a correct contact on the m.s. calling frequency 144.200MHz because of the intense QRM caused by many stations operating exactly on the same frequency. A number of stations were using the wrong m.s. procedures, not giving both call signs or calling at the wrong time. Running a Yaesu FT-726R transceiver, a GU74b power amplifier and an 11-element DL6WU Yagi he made a total of 13 s.s.b. contacts the best of which included the stations of RA3LBK (Russia), SV1BTR (Greece) at 1967km and TS7N (Tunisia).

In southern Europe the Spanish station **EA1EBJ** (IN73) found the shower to be quite poor with only short reflections being heard. At his QTH the maximum activity occurred around 0340 and 0700UTC. Although no contacts were made he did mention receiving good bursts of signals from G4ASR!, GM4VVX and LA0BY/P.

OPERATING SKILLS

I recently received an E-mail from **Bernard G6YBY** who mentions that he has a desire to do some DXing on the v.h.f. bands even if it's to work stations at the extremes of our own country. He has done quite a bit of listening but finds it difficult to join in as there are operating practices that he would like knowledge of before he does. He has looked for publications on the subject but there doesn't appear to be anything that provides a focus for the newcomer to v.h.f. DXing.

For example Bernard says he is confused by such things as locators and how they are used. Are they derived from postcodes or map references? He explains that to an experienced DXer all this must sound silly but he has to start somewhere.

Bernard goes on to suggest that I should write a series of articles in *PW*, something along the lines of 'Getting started with v.h.f./u.h.f. DX'. Actually, Bernard this isn't the first time that I've received correspondence like this.

For some considerable time I've concentrated on explaining details of v.h.f. propagation as this is at the heart of all DX chasing. Unless you understand the different ways by which v.h.f. and u.h.f. signals can travel far beyond the horizon, you run the risk of missing the best DX.

However, even if you could predict every single DX opening you won't work much unless you're also a good operator. Operating technique is something which can be developed and practiced, just like any other skill. You always need to match your operating to the needs of the moment and the propagation modes which produce only weak or fleeting signals require some specialised skills. However, before I expand any further I think I'll wait and see what the Editor has to say!

STATION ACTIVITY

Derek Brown G8ECI (JO03) informs me that he is active on the 50, 70, 144 and 430MHz bands. Currently he is working in the Yemen on a month-on, month-off basis so there is a reasonable chance to catch him from this rare locator square in Lincolnshire.

The photograph, **Fig. 1**, shows the antenna system on his 15m Westower. At the bottom is a 144MHz J-pole vertical which is used for local f.m. communication. The lower beams are a 5-element Yagi for the 50MHz band and a 5-element Yagi for the 70MHz band. Both of these are home-made.

Next up is an M2 12-element Yagi for the 144MHz band and a home-made K1FO design long Yagi for the 430MHz band. The shack is shown in **Fig. 2**.

On the top shelf sits the 50MHz amplifier which uses a single 4CX250Bs tetrode. The next shelf down has similar amplifiers using 4CX250B's on the 70, 144 and 430MHz bands.

The transceivers all sit on the operating desk and consist of an Yaesu FT-221R for the 144MHz band, a Yaesu FT-901DM and transverters for the 70 and 430MHz bands and a Yaesu FT-101Z, also used with a transverter for the 50MHz band. Derek also uses a Yaesu FR-101 for general receiving and an Icom IC-706 which normally resides in a Jeep for mobile operation. Below the desk top are high voltage power supplies for the linear amplifiers.

Derek mentions that he is brushing up on his c.w so that he can get the A/B call sign M5ECI very soon. If anyone needs the locator square JO03 and wants a contact with G8ECI you can arrange a schedule via e-mail to **g8eci@arrl.net or alternatively via kelrob@globalnet.co.uk**

DEADLINES

That's it again for another month. Forward any news, views, comments or photographs to the address and by the date given at the top of the column. Thanks for your letters and good luck with the DX. See you again next month.

73, David G4ASR

Fig. 2: The shack of Derek Brown G8ECI.

HF HIGHLIGHTS

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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

Here in South Wales, like the rest of the United Kingdom, we suffered very high winds during December. My Chelcom half-size G5RV took a pounding one night resulting in one side of the antenna snapping clean off. This antenna had served me well and I have worked 230 countries with it over the last five years!

I hastily constructed a full size G5RV fed with some 300Ω feeder supplied by **Brian Parsons GW0KZK** and was able to operate again a few days later. With the new antenna installed, I was pleased to hear plenty of activity on the h.f. bands, especially in the run up to Christmas.

The full size G5RV enabled me to operate on the 3.5MHz band for the first time in quite a while and performed better than expected during the **Original QRP Contest** just before New Years Eve.

There were some very strong signals from QRP stations on the 3.5, 7 and 14MHz bands. It was good to hear many operators participating in the contest taking the time to find out what transmitter and antennas the other station was using. Far better than just passing a signal report and contact number.

Most reports are accurate and enable the operator to get a good idea as to how well his or her equipment is working. I for one was very happy with the reports received running just 800mW from my Ten-Tec Argonaut 2.

DX NEWS

Some DX news for you now starting with **Chris G0TQJ** who will be operating from Prestina, Kosovo from 1 February until 1 June and hopes to sign **YU8/G0TQJ** when he is not working. Operation will be on all bands but he will concentrate mostly on 28MHz s.s.b.

Chris will be happy to change to c.w. if requested. Requests for QSLs for this operation and previous calls DA1VC and VP8CXV should go to **66 Kesteven Road, Stamford PE9 1SU**.

Astronaut **Chuck Brady N4BQW** is now active as **3Y0C** from Bouvet Island and is active on all bands until at least April. His activity so far has been mainly s.s.b. with 700W to a G5RV antenna. All QSLs via WA4FFW.

Gus A92ZE is very active on 1.8 and 7MHz from Bahrain. Look for him at around 1.832 and on 7.003MHz between 0130 and 0400UTC. All QSLs via K4SXT.

Mike DL2OE and **Hans DL7CM** will be active as **C56/home call** from The Gambia between 20 February and 5 March. They will operate 1.8 to 50MHz using c.w., s.s.b. and RTTY. Please QSL via their respective home calls.

There are several stations active in Madagascar. **Albert 5R8O** can be found using c.w. around 14.015MHz after 0200UTC with QSLs going via **Andre 5R8FL** to his CBA. Andre operates s.s.b. and can be found after 0230 between 14.185 and 14.200MHz.

Finally, **Ake 5R8FU** is active on 28MHz using c.w. and s.s.b. around 28.029MHz between 0930 and 1000UTC and 28.422MHz between 1230 and 1400UTC. QSL via SM5DJZ.

In Malawi **Kaz 7Q7KZ** is active on 21.290 and 28.450MHz after 1200 and 1800UTC, QSL via JA2LZF

CARL GW0VSW REPORTS THAT THERE'S BEEN PLENTY OF GOOD DX AROUND ALTHOUGH CONDITIONS HAVE BEEN MIXED THIS MONTH.

PROPAGATION REPORT

Don McLean G3NOF in Yeovil has been able to operate longer this month. Don says "The bands have been opening later and closing much earlier over the past few weeks. The 28MHz band has been open around 0800UTC to Russia most days with the long path to Australia, New Zealand and Japan on occasions.

"North Americans have been heard from 1200 to 1830UTC with strong signals fading to unreadable around 1600 then returning at 1700UTC until the band closed. The 24MHz band has been open from 1000 to 1800UTC with most signals again from North America.

"On 21MHz Australia and New Zealand were heard together with the occasional Asian station from 0830 with very patchy conditions after 1600UTC when a few South Americans were copied. Conditions on 18MHz were much the same. The 14MHz band has been very quiet with very little DX activity. No Pacific stations were heard on any band"!

YOUR REPORTS

Time for your reports now and the log of **Ted Trowell G2HKU** on the Isle of Sheppey, Kent who has found conditions "Worse than summer at times with very heavy QRN". Despite this, on 1.8MHz, Ted worked OY3QN (Faroe Islands) and HB0/DL1RWB (Liechtenstein) at 2100UTC using a Ten-Tec Omni 5 and 70W of c.w. to a HF6 vertical antenna.

THE 7 & 14MHz BANDS

On 7MHz Ted found conditions a little better, working FM/G3TXF (Martinique) at 0600. Later in the evening followed J3A (Grenada), TS7N (Tunisia) on AF-073, A61AJ (United Arab Emirates) and CO2MA (Cuba) between 2000 and 2200UTC.

On 14MHz c.w. provided Ted with HC8N (Galapagos Islands), J75KG (Dominica), HF0POL (Antarctica), 8P9FX (Barbados) and 3DA0NL (Swaziland) between 1000 and 1900UTC.

Robin Trebilcock GW3ZCF in Bishopston near Swansea, found time to work 5C8M (Morocco) with his IC-775 and 100W of s.s.b. to a 40m horizontal loop before jetting off to Zimbabwe for a few weeks work. It was a shame you can't operate while you are there Robin!

Over now to **Brian Parsons GW0KZK** here in Skewen who used his FT-1000MP and 4-element beam and 300W of s.s.b. to work VK6JDW (Australia) at 1545 followed a little later by JW0HR (Svalbard), SH1YI (Sweden), RV3DIJ (European Russia), W7RB (U.S.A.) and 3Z6IEQ (Poland) around 1700UTC.

Using his IC-746 with 50W of c.w. to an indoor G5RV, **Sean Gilbert G4UCJ** in Milton Keynes made contacts with JH4UYB (Japan) at 1113, HV5PUL (Vatican) 1606, R1ANZ (Antarctica) 1854, 4M5X (Venezuela) 2055 and CX5O (Uruguay) at 2219UTC. Sean lists just one s.s.b. contact with SY2A (Mount Athos) at 1810UTC.

THE 18 & 21MHz BANDS

Operating with s.s.b. Don G3NOF made contact with 7K2PMJ (Japan) 0840, EK0TA (Armenia) 0953 and FY5GS (French Guiana) 0940UTC.

Always on the lookout for DX, Ted G2HKU was surprised to 'bag' V31DI (Belize) with c.w. on what appeared to be a 'dead band' at 2000UTC

On 21MHz conditions were much better for Don G3NOF and his log lists many countries including EM1KY (Antarctica) 0831, DU1IEB (Philippines) 0933, BY4BZB (China) 0956 and TI4HWF (Costa Rica) at 1405UTC.

Also enjoying the DX on this band was Sean G4UCJ whose large c.w. log lists

FM/F2JD (Martinique) 1104, XV9SW (Vietnam) 1150, TU2CI (Ivory Coast) 1531, J75KG (Dominica) 1714, HC8N (Galapagos) 1716, 9G5AA (Ghana) 1802 and finally P40E (Aruba) at 1921UTC.

THE 24 & 28MHz BANDS

On the 24MHz band Ted G2HKU found that conditions varied when he was able to operate using c.w. Amongst his list of countries were VU3VLH (India), H2G (Cyprus), JY9NX (Jordan), HZ1AB (Saudi Arabia), PQ2Q (Brazil), ZP5KO (Paraguay) and JX7DFA (Jan Mayen). Nice work Ted!

Working in his loft, Sean G4UCJ has constructed a new dipole for 24MHz, which he states on listening tests "Has shown a marked improvement in most signal strengths received over my HF6V vertical. The dipole is connected to the same feed-point as my 18MHz inverted vee.

Sean continues "The result is that the s.w.r. on 18MHz has now dropped to 1.1:1 and 24MHz to 1.3:1. I am now looking forward to seeing how well it performs on transmit".

Using his vertical Sean reached PJ2/PA0VDV (Netherlands Antilles) 1520, 8P9HT (Barbados) and C56VB (Gambia) at 1611UTC with 50W of c.w. (I hope the new dipole works well Sean).

Many of our reporters this month have been active on 28MHz. One of these is **Leighton Smart GW0LBI** in Trelewis, Mid-Glamorgan who is now being heard on the h.f. bands again.

Leighton uses a President Lincoln transceiver with 20W of s.s.b. to an 11 metre half-wave vertical. "It's not a bad little rig" says Leighton.

"I am limited to the 28MHz band, but it has been like discovering Amateur Radio all over again! The excitement has returned and I am now looking forward to spring when I can then operate portable again".

Leighton worked OD5TE (Lebanon) 1135, PJ5/UA1ACX (St. Maarten Islands), VP5/K9RS (Turks & Caicos) 1130, 3E1DX (Panama) 1326 and KP2/OK5DX (U.S. Virgin Islands). Welcome back Leighton!

An aeronautical mobile station was a highlight for Don G3NOF when he worked KE4IB flying over the North Atlantic at 1617 with s.s.b. 5A1A (Libya) and ZS6Z (South Africa) followed shortly after at 1630UTC.

Finally, **David Hamilton M0BVE** in Filey, Yorkshire has also enjoyed working the 28MHz band. Using 100W of c.w. into a Cushcraft R7000 vertical contacts include UR5LBT (Ukraine), 4Z4SZ (Israel) 1104, EX2A (Kyrgyzstan) and RJ9N (Asiatic Russia) at 1438.

QSL CORNER

If you have worked Boris 4K9C in Azerbaijan after October last year and need a QSL, it should now go via his new manager **Ben PA3EPG, Zwolseweg 57, 8181 AC Heerde, Holland**. Ben is also the QSL manager for Serge 4K5CW.

Here is this month's list of QSL information starting with 3W6LI via IK2DUW, 4D68HBC via JA1HBC, 5C8M via DL6FBL, 5X1GS via WB2YQH, D2EB via I3LLH, FO5RA via KM5M, FY5GS via F6FNU, SI900TKM via SK6NL, SY2A via SV2ASP, T88TU via JK7TKE, TI9JJP via **Jose Pastora, PO Box 2084-2050, Costa Rica**, UK8OM via IK2QPR, V31DE via F5JY and V47SS via DL2MDZ.

SIGNING OFF

Well that about wraps it up for another month. Mixed conditions again, but plenty of good DX has been worked by all our reporters. Many thanks to you all for sending in your logs and also to **Tedd Mirgliotta KB9NW** and the **OPDX Bulletin** for the DX information.

73, Carl GW0VSW

PW LISTENING & OPERATING WATCH LIST. (ALL TIMES UTC)

Sean Gilbert G4UCJ operates: most days around 0700-1100 and 2200-0200 on all bands using an IC-746 and 50W into a half-size G5RV, WARC inverted vee or HF6 vertical.

Rob Mannion G3FXD listens and operates: weekdays and weekends, from home and portable, 1800-1830 on 3.7MHz with 100W s.s.b. and 3.530 or 3.560MHz and 18.105MHz QRP c.w. using an Alinco DX-70 transceiver and a long wire, a 10m high vertical or mobile whips.

Carl Mason GW0VSW listens and operates: on 14060MHz most mornings at 0630 with a Ten Tec Argonaut 2 and inverted G5RV.

Don McLean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz using a Kenwood TS-950 and trapped dipole antenna.

Leighton Smart GW0LBI operates: on some weekdays and Sunday mornings on 28.555MHz s.s.b regardless of conditions, at 1030 using a President Lincoln transceiver with 20W to a 11m half-wave vertical.

Brian Williams GW0GHF operates: most afternoons around 1400. He also simultaneously monitors 70.200MHz s.s.b. and 51.510MHz n.b.f.m at this time and is looking for weekly skeds especially on 70MHz. Contact Brian QTHR.

George Woods G3LPT operates: an open net on 29.630MHz n.b.f.m. 0930 Tuesday to Friday.

John Wheeler G0IUE monitors: 28.600MHz n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 transceiver running 100W and 2-element tri-band beam.

Brian Parsons GW0KZK listens and operates: on 14.250MHz 1000-12000 and 1400-1600 most days using an Yeasu FT-1000MP and 100W into a 4-element Mosely beam.

Ted G2HKU lists VU3VLH (India) among the countries he was able to operate using c.w.

Sean Gilbert G4UCJ lists SY2A (Mount Athos) as an s.s.b. contact this month.

KEYBOARD COMMS

BY ROGER COOKE G3LDI

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PACKET: G3LDI@GB7LDI

THIS TIME ROGER COOKE G3LDI LOOKS AT THE MFSK MODE OF OPERATING.

Are you looking for information on a data program or to download some software or source it for purchase? Then try pointing your browser at **www.packetradio.com**

The site is packed with data-related material. Take your pick, packet, RTTY, PSK31, SSTV, Pactor, MFSK etc,. There's something for everyone!

MULTI-TONE SIGNALLING

The multi-tone signalling mode is gaining in popularity to the extent that it might eventually be more popular than RTTY! I'm not sure that I subscribe to this theory, but yet another Data mode squirms for survival in the narrow data section of the h.f. bands.

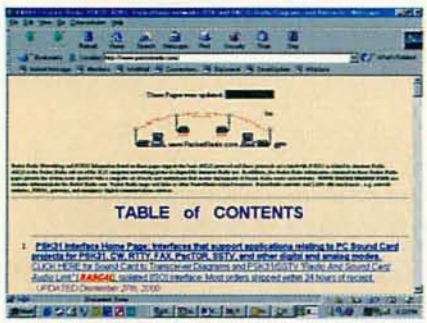
When eventually we are given double the h.f. spectrum we have at present, we should be able to sort out the band plans! However, being the 'half-empty bottle' man that I am, I don't see that happening in my lifetime! Still, it's nice to dream!

Multiple Frequency Shift keying (MFSK) is defined as a technique for transmitting digital data using multiple tones and should not be confused with Minimum Shift Keying (MSK). There are a number of different techniques, for example concurrent (or parallel) tones, sequential tones and combinations of tones. The name is usually applied to two - of - n systems such as DTMF. MT-Hell should best be considered a multi-tone signalling system, rather than MFSK.

Although MFSK is not particularly spectrum efficient it has many advantages. These include immunity to amplitude noise, bit rate higher than baud rate, constant transmitter power and redundancy advantages.

The history of MFSK and Multi-Tone over radio is not well documented. Any information on the subject would be gratefully received!

The earliest known system was developed in about 1935, and reported in *Electrical Communication* by L. Devaux and F. Smets. The LMT (Le Materiel Telephonique) system was a true Multi-Tone direct printing system, similar in many ways to Hellschreiber, since it used the human pattern recognition ability to recognise the text and the transmissions were not encoded.



● Fig. 1: For all things data related look at the www.packetradio.com website.

According to the report, the company Le Materiel Telephonique, about which nothing is known, developed the system. The system was trialled during 1937 on the path from Algiers to Paris, (1300km) on 12.2MHz. It's not known whether the system went into commercial service, but it and the LMT company were probably Second World War casualties.

After the war systems such as Coquelet and Piccolo were developed, and were widely used on diplomatic circuits. They are still in use today to some extent.

DUAL TONE MULTI-FREQUENCY

Probably the most widely known example of MFSK is Dual Tone Multi-Frequency (DTMF) or 'Touch Tone' signalling. The DTMF system was developed by Bell Labs and is widely used in telephony - most people are familiar with the beeping noises that telephones make when the numbers are pressed.

The system of DTMF uses a 'two out of eight' method. This means using pairs of tones, from eight tones in two bands and it is used to signal numbers from 0 - 9, and four control signals A - D.

One low tone and one high tone are transmitted for each code sent. Each pair takes a minimum of 50ms. The combinations are:

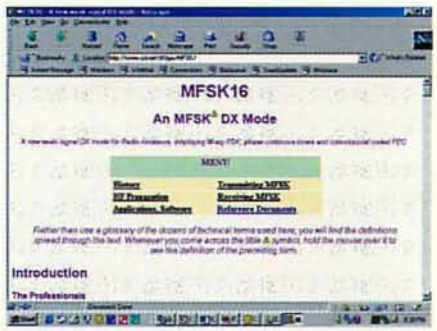
1	2	3	A	697Hz
4	5	6	B	770Hz
7	8	9	C	852Hz
*	0	#	D	941Hz
1209Hz	1336Hz	1477Hz	1633Hz	-

Dual Tone is widely used on telephone circuits for control purposes on v.h.f. and u.h.f. but is little used on h.f. due to problems such as stability and false detection on noise. It is also very popular for Amateur repeater control.

Incidentally this information is based on a fascinating article in *Electrical Communication*, 1937. Grateful thanks to **Jan Smeets** for unearthing this information. The Le Materiel Telephonique (LMT) system used seven concurrent (parallel) tones to send text as a 7 x 5 dot matrix and included a number of innovative techniques. It is a forerunner of modern Concurrent MT-Hell and had many similar advantages.

TRANSMITTER

The LMT system was quite fast (five characters/sec, or 50w.p.m., but only 35 baud). This placed the keying sidebands at 25Hz and the receive filters were 150Hz bandwidth, so allowing reasonable keying shape. Like Feld-Hell, resolution was enhanced by allowing half-sized dots to be used, but only in pairs to restrict stylus speed and reduce bandwidth. In this case the enhancement is horizontal, i.e. row keying.



● Fig. 2: The MFSK mode is gaining in popularity says G3LDI.

The tone frequencies used were spaced 240Hz and used continuously running LC oscillators. The tones were odd multiples of 120Hz from 600 to 2040Hz, carefully avoiding any harmonic problems.

The signal bandwidth was from 500Hz to 2200Hz. Although the tones were generated and demodulated electronically, most of the rest of the transmitter consisted of relays, relay registers, cams, rotary switches and other electro-mechanical wonders.

The transmitter circuit acted like an addressable ROM, with selected character and time as inputs, and horizontal line segments as the contents. The clever transmitter techniques included:

- 39 tone sequences defined partial character shapes as horizontal strokes
- Multiple horizontal strokes could be combined, for example three strokes were used to create the lines in 'E'
- Use of horizontal stroke combinations reduced keying and storage requirements
- Double horizontal resolution without double keying rate
- The tones were timed by 23 cams, which addressed the registers
- There were 46 characters, and 46 character relays, with mostly eight contact sets for eight columns

- Some character relays had fewer column contact sets, where the character was simple, such as punctuation. The character set was not proportionally spaced.
- The keyboard drove a FIFO memory register, to provide five key memory and keyboard interlocking
- The transmitter could also operate from paper tape, translating standard ITA-2 (Baudot) code!

RECEIVER

The receiver of the LMT system was a true direct printing system. The seven incoming audio tones were sent to a specially designed seven peak filter and individual a.g.c. controlled amplifiers drove seven solenoids triggered by the tones.

The AGC system was a peak detector rather like a noise limiter, with 5ms and 500ms time constants and could detect characters reliably at any signal strength, and down to 0dB S/N. The solenoids each operated a lightweight stylus, which pressed on the paper through a carbon ribbon to leave a mark.

Conventional (for the period!) telegram paper strip rolls were used for printout. These were subsequently cut up and glued to a message form.

The system was stop-start, like RTTY and was started at the beginning of each character by a unique sequence (columns 1,3,5,7), decoded by a simple noise-cancelling relay **and** circuit and sent to a special solenoid which released the start-stop cam, so the mechanism rotated once and advanced the paper only during the printing of one character.

The start-stop mechanism included a cam to prevent printing of the character start code. Some of the clever receiving techniques were:

- A constant Q seven peak comb filter
- Individual channel AGC circuits to combat selective fading
- Interrupted 'off' keying rather than "on" keying, to minimise noise and provide AGC
- QRN caused gaps in the characters, not extra dots
- Interrupted keying provided a constant reference for detecting the 'off' state
- Integrating peak detectors for noise rejection
- Dual time constant slicer type detector
- Receive drive motor speed unimportant - it only controlled the character width

The system had excellent rejection of noise, and was able to produce easily readable text at 0dB S/N. It was also reasonably resistant to selective fading, which, if severe, would leave a stripe through the text, which generally remained readable.

The equipment was housed in two 2m high racks, but they were not completely full of gear. In the one known trial, the system was very effective, producing good results with 20dB of selective fading on the Algiers-Paris circuit. The *Electrical Communication* article discusses most of the features familiar to MT-Hell enthusiasts, these are:

- Freedom from timing restraints
- Immunity to selective fading and fading timing problems
- Noise and QRM immunity
- mmunity to false synchronism problems that bedevil RTTY
- No need to print twice to avoid receive phase errors
- Use of the eye and brain to decode the received signal in context

Fig. 3: A different perspective - see text.

Remember this was 1935! The system was Multi-Tone direct printing, but was multi-frequency time domain, not frequency domain. In effect it was a seven tone concurrent ASK system.

It did not use fuzzy decisions or over sampling, but did print on dot arrival, so employed a measure of over-sampling and averaging. The method of building characters from line segments is one of the most unusual aspects of this system. The method was used to minimise the amount of 'storag'" (hard wired relay connections) required for the 46-character font.

BELGIAN ROOSTER

The Belgian Rooster system was developed in the 1950s to provide improved text transmission by attempting to combat the problems that plagued RTTY at the time and still do - selective fading and timing distortion. Little is known of its history.

Belgian, Algerian and French Customs and Police services used the Coquelet system. There are three forms, known as Coquelet 13 or Mk1, Coquelet 8 or Mk 2 and Coquelet 80. All three systems are two-tone systems. They can be summarised as follows:

Name	Type	Tones	Data Rate	Code
Coquelet 8	Sync MFSK	2 of 8	20, 26 baud	ITA-2
Coquelet 13	Async MFSK	2 of 13	13, 20 baud	ITA2
Coquelet 80Sync	MFSK with FEC	2 of 8	20, 26 baud	ITA-2

PICCOLO

Piccolo was developed in 1957 by the British Foreign and Commonwealth Office for the diplomatic service and is still in use today. Current equipment is made by Racal.

Like Coquelet, Piccolo is a two-tone system, although it started life with 32 tones. The two most well known versions can be summarised as follows:

The first serious Amateur Radio MFSK modes

Name	Type	Tones	Data Rate	Code
Piccolo Mk 6	Sync MFSK	2 of 6	20 baud	ITA-2
Piccolo Mk 12	Sync MFSK	2 of 12	40 baud	ITA-5

are now in use. These are MFSK16 (and slower but more robust MFSK8).

Using test software by Nino IZ8BLY, initial QSOs were held on 18 June 2000. The first QSO was from ZL1BPU - IZ8BLY on 18.105MHz, then ZL1AN - ZL1BPU on 3.560MHz.

During the initial tests, rates from 7.8 to 31.25 baud were tested, with from 8 to 32 tones! The MFSK16 specification proved to be the best performing compromise.

Both MFSK8 and MFSK16 are now freely available in the STREAM software by Nino IZ8BLY. Here's what you can expect using these modes:

- On 18MHz, long path signals are normally weak and facing, but good hour-long contacts can be made on a regular basis, with 25W transmitter power and dipole antennas.
- On 14MHz conditions are much more unstable, although signals are stronger and the band open for longer. Copy is good on long path using 25W. Nets are quite feasible.
- 3.5MHz at night is very noisy, with very bad multi-path. Copy is close to 100% on 500mW transmitter power across town, or 10-25W between New Zealand and Australia (3000km), something not generally possible with any other digital mode.

The software is being continually upgraded as a result of feedback from expert testers. These tests build up operating experience and provide feedback to software designers on how best to control and operate the MFSK16 mode.

WISH YOU WERE HERE!

Take a look at **http://antwrp.gsfc.nasa.gov/apod/image/0011/earthlights_dmsp_big.jpgth** for a delightful surprise. This is a smashing view of parts of our planet. Please don't miss this one.

I spent quite some time just looking in wonderment at where we all live, viewed from a different perspective. I did think of printing it out, but thought better of it, as the result would not do it justice. If it were possible to obtain a professional print, it would make a super picture for the shack wall.

TELEDATA NEEDS YOU!

Like most parts of our hobby, The British Amateur Radio and Teledata Group (BARTG) is also suffering from the pressures of modern society, both at home and at work. The committee of BARTG is made up of volunteers, as are most of our hobby specialist interests.

If you are **not** a member of BARTG, then you are missing out! If your prime interest is in Data communications, you should consider joining. Why? Well, here are a few good reasons:

- It only costs £12 a year for UK members - that's just 23p a week!
- You get four issues of *Datacom* magazine sent to you as part of membership.
- You get loads of information in *Datacom* on all Data modes.
- You get deals on BARTG kits and software.
- There's plenty for the beginner.

Check out the Web page, **www.bartg.demon.co.uk** and join today! Then, you can offer your services to help on the committee! A Treasurer is needed, as is an Editor for *Datacom*. You don't have to be a technical genius either.

AND FINALLY...

To paraphrase a past president of the USA: 'Ask not what you can get from out hobby. Rather, ask what can you do for the hobby'.

See you next month.

Roger G3LDI

Trader's Table

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MFJ MFJ-8100K 3.5-22MHz AM,CW,S SB Regenerative Receiver £45

SCANNERS MOBILE/BASE

JIL SX-400 26-520MHz AM,FM,WFM 20Ch. 12V....£225
Realistic Pro-2022 66-960MHz (with gaps) AM,FM 200Ch....£125
Yupiteru MVT-8000 800kHz-1300MHz AM,FM,WFM 200Ch. 12V....£215

SCANNERS HAND HELD

Yupiteru VT-125 II 108-142MHz Airband 20Ch....£99

STATION ACCESSORIES

AEA PK-232 PakRat Multimode Data Controller....£149
BNOS LP50-10-50 6m Linear Amp 10W in , 50W out with Preamp....£125
Bremi BRS-31 13.8V 5A Regulated PSU....£15
Datong ANF CW Automatic Notch Filter....£69
Datong FL-2 Multimode Noise Filter....£49
ICS FAX-1 Weather Fax , NAVTEX , RTTY Decoder....£125
Jim M-100 24-2150MHz Low Noise GaAs FET Preamp....£69
Kantronics KPC-3+ x2 Packet TNC + WEFAX....£109
Lowe FX-1 0.7-250MHz Absorption Wavemeter....£49
Lowe Modemaster Version 1 Software for Receivers....£49
MFJ MFJ-498 Deluxe Morse Keyboard Keyer....£129
MFJ MFJ-1020B 0-30MHz Indoor Active SWL Antenna....£65
MFJ MFJ-1026 All Mode QRM Eliminator with Active Antenna....£99
MFJ MFJ-1278 Multimode 10 mode Data Controller....£175
MFJ MFJ-1610 Theory Tutor (Novice)....£4
MFJ MFJ-1786 10-30MHz Super-Loop Antenna + Controller....£199
Microset PT-105A 12V Stabilized 5A PSU....£25
Opto 2600HA 1MHz-2.6GHz Frequency Counter....£79
Ramsey W9GR DSP Audio Filter....£119
Standard P-335 2m Amp 3W in , 30W out....£39
Yaesu FL-2025 2m clip-on 25W Linear (for FT-290R II)....£99

MISCELLANEOUS

Academy WT-2C Pair of 2Ch. FM CB Hand Held Transceivers....£30
Albrecht AE-2850 40ch 4w CEPT Hand Held....£50
Albrecht AE-5280 40Ch. 4W FM CEPT CB Mobile....£45
Eurosonic KH-104 80Ch. 4W UK CB Hand Helds....£60
Garmin GPS-III 12Ch. 500 Waypoints,BackTrack with MAP....£199

TUNE-IN

BY TOM WALTERS

PO BOX 4440
WALTON
ESSEX CO14 8BX

E-MAIL: tom.walters@aib.org.uk

● The enlarged satellite footprint to be used by NPR worldwide.

TOM WALTERS HAS THOUGHTS OF SUMMER SUN AND SUGGESTS THAT TUNING THE BROADCAST BANDS COULD STOKE UP YOUR WANDER-LUST.

For those of you just emerging from winter hibernation in the UK and northern Europe, the thoughts of summer sun will probably be looming large. And that might include visions of flying away to the golden beaches and wine-dark seas of Greece.

If you want to stoke up your wander-lust, try listening to **The Voice of Greece**. I emphasise try, because radio information from that easy-going country is a bit erratic, to say the least. There's a web site, with the amazingly long URL of **alpha.servicenet.ariadne-t.gr/Docs/eraSeng/Informationeng.htm.** Long or not, **it actually works**, and will yield some scattered information.

As for an actual and real schedule, try this one, but it could be somewhat off-beam. Let me know, if you find a more accurate version. Mind you, with the summer changes imminent, it may not be much better than mine!

The VoG broadcast in no less than 16 languages. For English in Europe try: 0000-0400 & 0600-0800 on 7.430, 7.450, 9.420; 1200-1400 on 9.420, 12.105, 15.175; 1900-1950 on 7.500 and 9.375MHz.

For other parts of the world try: Africa: 1200-1250 on 15.630MHz; 1800-1850 on 12.105 and 15.630MHz; Asia and Pacific: 0600-0800 on 9.775MHz; 2100-2200 on 9.420 and 11.645MHz; Americas: 0000-0400 on 7.430, 7.450, 9.375, 9.420; 1200-1400 on 9.420, 9.690, 15.175, 12.015; 1800-2200 on 9.400; 2300-2350 on 7.450, 9.400 and 11.645MHz.

Some frequency information can be found on the internet, at another long URL: **http://radio.about.com/tvradio/radio/cs/greecewebcasts/index.htm** but look carefully at the dates!

● For thoughts of summer and sun kissed beaches listen out for the Voice of Greece.

Other languages brodcasted from the Voice of Greece are Albanian, Arabic, Bulgarian, French, German, Greek, Italian, Polish, Portuguese, Romanian, Russian, Spanish, Swedish, Serbo-Croat and Turkish. Ambitious, given their eight short wave transmitters (2 x 100kW, 6 x 250kW) at three sites in Greece, plus a couple of medium wave facilities, and relays via Greenville and Delano!

If you want information in writing, the postal address of The Voice of Greece is: **Hellenic Radio-Television, ERA-5, The Voice of Greece, 432 Mesogion Avenue, 153-42 Athens, Greece. Tel: +301 6066308, FAX: +301 6066309, or E-mail: era5@leon.nrcps.ariadne-t.gr**

For more details on the VoG, and all other broadcast stations refer to the *WRTH (World Radio Handbook), Passport to World Band Radio* and the *Global Broadcasting Guide*. All these titles can be ordered from the PW Publishing **Book Store** (page 70) or direct from the publishers.

RESERVED FOR THE WEST

On the subject of those 41 metre band (7MHz) frequencies used by the Voice of Greece, they are correctly in the section of the band reserved for broadcasting. But as Radio Amateurs will be uncomfortably aware, Region 1 listeners (Europe/Middle East/Africa) in their band of 7.000 to 7.100, and Region 2 (Americas) listeners in the band 7.000 to 7.300, can experience interference from broadcasters. The International Amateur Radio Union is very concerned about this problem and aims to raise it at the next ITU global radio conference in 2003.

Up until now, **National Public Radio (NPR Worldwide)** has not been available on short wave, only on satellite, But now some NPR programming can be heard via the **American Forces Network (AFN)**, not on regular broadcast frequencies, but on upper sideband.

The schedule, giving transmitter locations, with daytime/night-time frequencies is: Key West 12.689.5/12.689.5; Puerto Rico 6.458.5/6.458.5; Sicily 4.993/10.940.5; Guam 10.320/4319; Diego Garcia 12.579/4.319 and Hawaii 10.320/6.350MHz. As you can see, the transmitter sites are all closely connected with the US military.

Until the end of March, NPR can be heard on its previous satellite: Astra 11.538GHz, vertical polarisation, audio subcarrier 7.74 mono. But from April, NPR plans to be up there in digital and from then you'll find them in a new home on **Eutelsat Hotbird 5**, 13° East, transponder 94 (Globecast Bouquet) 12.597GHz vertical polarity, symbol rate 27500 FEC 3/4**.**

The postal address for NPR Worldwide is: **635 Massachusetts Avenue, NW, Washington DC 20001 USA. Tel: +1 202 414 2020, E-mail: worldwide@npr.org**

BALTIC TRIP

Now for some news from the Baltic area. Starting with Lithuania where Lithuanian Radio and Television is reported to be some four million dollars in the red, with no help likely from the government. If you've ever listened to **Radio Vilnius** in English at 0030-0100, there is a new frequency to try, 9.735kHz, via Sitkanai in Lithuania, which is parallel to **6.120MHz** via Juelich in Germany. Polish up your Lithuanian on **http://www.lrtv.lt/lt_lr.htm** where Real Audio and M3 can be found.

Latvia, not an English broadcaster, (their programmes being in Latvian only), are cutting back their m.w. strength, notably one of the Riga transmitters (150kW) 945kHz. This particular transmitter may still be on the air, but the phasing out will take place during 2001.

Currently, **Radio Latvia** uses no less than nine m.w. transmitters, on 576, 945kHz, 1.350 (2), 1.422 (2), 1.539 (2) & 1.602MHz, with a combined power approaching 1MW. Which seems a lot for a country measuring 320 x 1160km. (Probably a hangover from the Cold War.)

The Latvians are going to use cheaper f.m. transmitters, so the electricity bill should be a bit less! Take a look at their website at **www.radio.org.lv/**

To round off this Baltic states trip, don't forget the third member of the trio, Estonia. You'll have to be in the country, or hooked up to the Web to listen, though. **Eesti Raadio** is in the capital, Tallinn, on 103.5MHz. Some linguistically challenging information can be found on the Internet at **www.er.ee/uudis**

That wraps it up for another month except to say don't forget to write in with your news of stations of interest. If you have any QSL cards or other illustrations from stations you've logged send them in too!

Tom

DOWN UNDER

BY CHRIS EDMONDSON VK3CE

BOX 123, EAGLE HEIGHTS
QUEENSLAND 4271
AUSTRALIA
TEL: +07 5545 0666 FAX: +07 5545 0622
E-MAIL: editor@radiomag.com

G'Day, and welcome to the 'Aussie Oracle's' quarterly tirade. Here's your opportunity to have a snipe at one of those crude colonials. Your weather is finally starting to get some vague decency about it and perhaps those Spring band conditions will bring a few smiles to the faces around you. I need hardly add that the weather is **always** perfect here in south-eastern VK4!

The last time we met Australia was in the grips of Olympics fever and I was the editor of *Radio and Communications* magazine. Oh dear. It seems **all** that has changed!

Following the mopping-up after the Olympic Games, Sydney's Radio Amateurs have their precious 70cm (430MHz) band back, for the time being, at least, and all seems at peace. However, it's now considered a **fait accompli** that our 30MHz-wide 70cm band (420-450MHz) will be shaved by at least 10MHz when the police in VK6 barge in. Other emergency services around the country are expected to follow suit, as the lure of 10MHz of prime spectrum is simply too good to resist.

IN FOR A TREAT

I recently saw something quite incredible. My computer told me that I was in for a treat, not one but **two** visible passes, at the very same time, of the Mir and ISS Space Stations.

You see, just before sunrise and just after sunset you can sometimes see sunlight reflecting off orbiting spacecraft. As you're really viewing the reflected light, common sense would tell you that the bigger the vehicle, the brighter it would appear. And that's pretty much the case. Both Mir and the ISS are monsters when compared to most orbiting satellites, so they're easily as bright as the brightest stars.

CHRIS VK3CE HAS NEWS OF A SATELLITE TRACKING PROGRAM, THE DEMISE OF *RADIO AND COMMUNICATIONS* MAGAZINE AND INTERNET SERVICES.

What was so unusual on this particular occasion was that we could see both ISS and Mir in the same part of the sky, passing quite close to each other. When illuminated by the sun, these are easily the brightest man-made objects in the sky. As someone whose nose has been pointing upward since childhood, watching all manner of weird things fly past, this was a truly magnificent and inspiring sight.

Okay, so how did I know when and where to look? Simple. I've put a new computer based tracking program on my Apple Macintosh, and this one is far and away the best tracking software I've ever seen. The product of almost four years' nearly full-time effort, *MacDopplerPRO* uses the graphical power of the Mac to its fullest extent.

The author of *MacDopplerPRO*, **Don Agro VE3VRW**, lives in Toronto, Canada. He started work on the program in January 1997, when he found that there was little available in the market to track satellites on his home computer, a Macintosh.

● Chris Vk3CE made contact with Andrew Thomas VK5JAT, an Australian-born astronaut who worked literally thousands of Amateurs whilst aboard the Russian Space Station Mir.

Most publishers use Macs and I am no different. I have quite a collection of them including my very first one, which I bought in May, 1984! In fact, it **still** works as well as on its very first day.

I must also admit here to one of my failings, PCs. Those nasty IBM creations and I simply do **not** get on.

Every time I install software on a PC, the whirring, clanking part of it breaks and every time I lift the hood on it to fix what went wrong, I get a shower of sparks and a cloud of smoke... damn, it does it every time, without fail. So I'm a sworn Macintosh user. You couldn't kill one of them with a stick. At least, I haven't yet…

Don told me the other day that he had put a lot of time into *MacDoppler* and *MacDopplerPRO*, which is now up to version 1.6.1.

You can download a self-expanding archive from Don's site on the Internet at **http://www.dogparksoftware.com/MacDopplerPRO.html** If you like it, you can register it via AMSAT, also via the web.

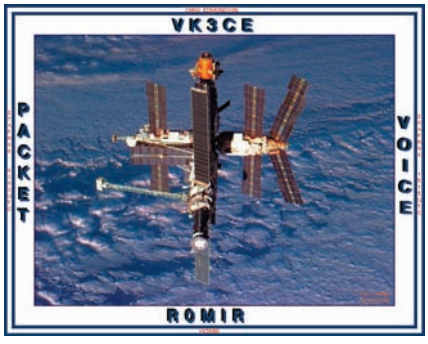
Already set up for Phase3D (AO-40), the new Kenwood TS-2000 and MacOS 9.1, *MacDoppler PRO* has a lot of really clever features. The track for your selected satellites of interest is shown on a high-resolution map of the Earth, which you can switch to a rotating globe complete with greyline and country outlines. But this program not only shows you where the 'birds' are, it can also control your az/el rotators and tune suitable transceivers as well!

These days I use *MacDoppler* to keep track of the ISS, which, as I write, is due to turn on its automatic Packet Radio station (you transmit on 145.99MHz, receive on 145.80MHz, and connect to RZ3DZR-1), as

● *MacDopplerPRO* - a satellite tracking program developed by Don Agro VE3VRW.

well as AO-40 and a number of other amateur and commercial satellites. But it was back a couple of years that I used the original *MacDoppler* to track the Russian Space Station Mir, which was 'home' for 22 weeks to an Australian-born astronaut named **Dr Andrew Thomas**, who, incidentally, is due to go up via the US Space Shuttle to the ISS shortly.

Andy, whose Australian call is **VK5JAT**, delighted and astounded Radio Amateurs around the world by his after-hours devotion to the Amateur station aboard Mir. As VK5MIR, Andy worked literally **thousands** of ordinary people right around the world, and I was one of the lucky ones to work him, not just once but many times during those weeks.



● Chris VK3CE's MIREX award.

Anyone who thinks you need a special station to work something like the ISS should really think again. My most memorable contact with Andy was just after dark one evening (actually during Andy's lunch break, as Mir worked to Moscow time) as I stood agog in the driveway with a stock standard 5W hand-held.

As my young children stood outside with me, they talked to Andy and told him what they saw as Mir went right overhead, a brilliant moving star in the evening twilight.

I recorded all the contacts I had with Andy, later running a major feature story in the magazine built up from those interviews, supported by a few photos of the mission.

Upon Andy's return to Earth, I was fortunate to meet up with this extraordinary individual and recorded another interview with him. It was quite inspiring stuff!

The reason for all this reminiscing is that I have saved the interviews as downloadable Adobe .pdf files, which can be viewed on virtually **any** computer. If you are interested in learning a little about how astronauts eat and sleep when in Earth orbit, you may find the stories of interest. They're free for the taking from my Internet web site, **http://www.radiomag.com**

On the aforementioned site you will find that my 14 years with *Radio and Communications* magazine and its predecessors has come to an end. When its publisher decided to close down Australia's only commercial hobby radio magazine I took matters into my own hands, and now publish a magazine named after my web site, *Radiomag*. I hope you find the site of interest and invite you to E-mail me via the links on the site.

EXTRAORDINARY SERVICES

For those of you with access to the Internet you will have discovered the extraordinary range of services offered there for Radio Amateurs. One kind of service could interest you if your radio conditions aren't all they might be, or if you feel like a bit of radio while sitting at your office desk.

You can work through v.h.f and u.h.f. repeaters all around the world via 'phone repeater links. This month I thought I might tell you about a few audio news bulletins which are published on the Internet.

For example, *QNews,* the weekly news bulletin of the Queensland Division of the Wireless Institute of Australia, is published as high quality audio files as well as in text form on the WIAQ web site **http://wia.org.au/vk4** You may be surprised at how very professional this broadcast sounds, and no wonder! Its presenter is the general manager of a Brisbane commercial radio station and that's exactly where the broadcast comes from. All of the announcers are professional broadcasters who also happen to be Radio Amateurs. So it may be a broadcast to Amateurs, but it's by no means an amateur presentation.

Okay, but why put the broadcast up on the Internet? Well, you can blame the sheer size of this state, which is substantially bigger than the entire UK. I could drive in a relatively straight line for a couple of thousand kilometres and still not be even two-thirds of the way to the top of it. So, rather than reply on noisy h.f. links to bring the news to v.h.f. f.m. repeaters around the state, the broadcast is downloaded as Real Audio files by the local re-broadcasters and put on the air right off local computers.

Why not log on yourself to the VK4 Division's *Qnews* site and see for yourself? You'll also find links there to other audio broadcasts from around the world.

WHAT'S HAPPENING?

What's happening on radio around Australia? Well, I'd tell you if we hadn't already run out of room this month!

Next time, remind me to tell you of the wonderful fun I've been having with Yaesu's latest baby, the FT-100D, in my car - thanks to that EI station for the ego-boosting S9+40 on 20m (14MHz) the other day! - and maybe even the incredible new FT-817 portable. These remarkable new transceivers cover 160m (1.8MHz) to 70cm (430MHz) and receive all the way upto a gHz! Where will it stop?

Please feel very welcome to E-mail or write and if you find yourself in this lovely place, to FAX or 'phone. I **do** so enjoy hearing from you all! Details at the top of the column.

73 Chris VK3CE

● *Radio and Communications* magazine has unfortunately ceased publication but Chris VK3CE has started his own called *Radiomag.*

SEND YOUR ADVERT TO PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

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You should state clearly in your advert whether equipment is professionally built, home-brewed or modified. The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

19 Set MKIII (8 set receiver), rotary p.s.u., headphones, Morse key, output plug connectors. (p.s.u. to set and DC-in plug), variometer, plus additional 19 Set for back-up, £200 the lot. Tel: (01482) 887938.

45ft Altron lattice tower unit with ground post, no rust needs new cable and rotator bearing. Buyer collects, £125. Tel: (01656) 667176.

Alinco DJ-G5E dual-band hand-held, wide-band RX/TX, c.w. DC power lead, boxed as new, £150. TET 2-element h.f tri-band beam, 17, 21, 28MHz, stainless fastenings, good condition , £50. Carl G0AMW, West Midlands.Tel: (01384) 822465.

AOR 5000+3 and SDU 5500 £1200. Lowe HF150, SP150, PR150, £250. Both v.g.c. Tel: 0208 818 0072 daytime or (07979) 574302 eves.

ATU global AT-200, £40. Cirkit Micromatch a.t.u., £35. Both suit s.w.l. or QRP. Freq counter 600MHz, mains eight digit £30. Heathkit power/s.w.r. meter HM-2102 £20. Packard Bell pre-amp, £10. Ben, Worcs. Tel: (01562) 743253 or E-mail: g4bxd@qsl.net

BC221 wavemeters with original charts, power supply, £45 each. Tested, working, one of the finest wavemeters ever produced also ideal for checking xtals. Tel: (01872) 862291.

Bush Type TR91. Supersonic dipper. Mod PRM 149 . Thorens record deck. Mod TD125MkII. Teac tape deck. Mod S10 tuner. Mod TX930 tuner amp. Mod 210S (NP) radiogram. Murphy amplifier, Jennings DOMSR. £offers? Anthony Coleman, Flat 1/3, 61 Keal Ave, Glasgow G15 6NZ. Tel: Glasgow 944 3865.

Cathode ray indicator type 62 (VCR 97 tube) receiver R1355 and r.f. units, modified for 405 line TV as per *Wireless World* July 1948 design in original wooden crates £any offers? Tel: 0141-632 1236.

Classic books list. Mostly valve era. Send s.a.e. (A4) for list to Richard Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA.

Codar AT5 TX with ACPU, £35, postage paid. Qty 2 j.a.n. FT-243 crystals, 7030, £10 the pair. Please write to Richard Marris, 35 Kingswood House, Farnham Road, Slough, Berks SL2 1DA.

Eddystone 1837, **2**, £350. Eddystone 830, 2, £offers. Eddystone 940, £offers. Sommerkamp 277ZD MkIII, £175. Wanted Racal 792. Tel: (01279) 815020.

F1-cord 202 tape recorder c.w mains unit, 12V, leather case, Grampian microphone with tapes. £offers. Drake R4-B manual, ££185. Reslo 510/3 amplifier, one valve, £40 (xtal missing). Comet CFX 514 £35. Tel: 0141-562 4571.

FT-790R1 70cm (430MHz) portable transceiver with accessories £100. BNOS 6m (50MHz) 100W linear, £100. BNOS 2m (144MHz) 100W linear, £100. Yaesu FIF-232C CAT computer interface, mint, £45. Mike G7NBE, Leicestershire. Tel: (01530) 414473.

GEC BRT 402E receiver, good condition plus case, inspect, collect, £50. Tel: (07941) 105189.

Grundig Yacht Boy 400PE, good condition, comes with long wire, p.s.u., manual, etc., £90 o.n.o. Tel: Barnet, 0208 449 7446.

IC-706 MKII, £595. Trio TSH30S a.m. + narrow f.m. filters, £375. IC-28E 2m (144MHz) f.m. mobile, £125. Z-match 1.8-30MHz, £40. Twin meter s.w.r. bridge, 3.5-150MHz, £10. All boxed, good condition. John GW4TQD, Chepstow, South East Wales. Tel: (01291) 621526 days or eves.

Icom BP-170 battery case. Kenwood SMC-33 remote control speaker microphone. MS-107 super compact speaker microphone, throat activated microphone with earphone unit. Kenwood PG-2W DC power cord, plus other leads £offers. Steve G1TOL, Swindon, Wiltshire. Tel: (01793) 873063.

Icom IC-765 base RX/TX, 100W built in a.a.t.u, p.s.u. 0-30 RX , v.g.c., p.w.o. with mic lead and manual, sell for £550 o.n.o or PX for Kenwood 440. Tel: (01329) 319055 or (04037) 78919

Icom IC-R9000 receiver as new, manuals, £2750 o.n.o. Howes AS48 antenna selector and attenuator , £25. Global ATU 1000, manual, £25. Inmarsat 'A' Timestep aerial monitoring system, new £250, sell for ££150. Tel: Warks (01926) 854556.

JRC NRD 90kHz-34MHz with manual, buyer collects £420, mint. Tel: (01782) 396453.

Kenwood 520SE, desk mic, a.t.u., speaker, v.f.o., new o/p valves, £150. Yaesu FC707 a.t.u., £60. All with manuals, call for details. Buyer to collect or pay carriage. Tel: (01983) 0873306 or E-mail: mike@sthelens70.freeserve.co.uk

Kenwood SM220 monitor/scope with Pan adaptor, boxed c/w manual, £180. Urgently required supplements for electronics service manual ESM. David, Norwich. Tel: (01603) 745512.

Kenwood TS-440S h.f., 0-30MHz, 100W, boxed with instructions and manual, mint condition, original mic, £295 o.n.o. Simon, Swindon, Wilts. Tel: (01793) 870811 after 2.30pm.

Kenwood TS-680S h.f. plus 6m (50MHz) and general coverage receiver. Absolutely immac., must be best in UK, £375 inc. Post and packing, no offers. Mike G4MJA, Durham. Tel: 0191-389 2822 or (07980) 137617.

Kenwood VC-HI interactive visual communicator, digital, stills camera. Monitor modulato/demodulator frame-store, control unit and speaker microphone. boxed, manual, as new, £220 o.n.o. Tel: (01584) 872618.

KW equipment, for details call. Tel: Warrington (01925) 659946.

Microwave Modules 10 to 6m (28 - 50MHz) transverter MMT 50/28S, £120. Tel: Scotland (01698) 748616.

Mini beam MΩ2 inc Yagi 1:1 Balun, good condition, £250 o.v.n.o., 2 x R7000 at £150 each. Rob, Somerset. Tel: (01460) 53004.

Navico AMR 1000s 2m (144MHz) f.m. mobile + a.t.u. and handbook, £120. 2 x 88-element Jaybeam antennas 432MHz, £50 each. KLM 14-ele X-Yagi antenna 144MHz includes reversible polarising facility, £70. R107 Second World War receiver plus handbook. Can deliver up to 100miles. Alan, Royston, Herts. Tel: (01763) 262443.

Pair of 807b with ceramic UX5 holder, £12. Pair of metal 6L6B with octal holders, £20. Lafayette 80/40m (3.5/7MHz) v.f.o., £10. Syd Fenwick G3AIO, 28 Gimble Way, Pembury, Kent TN2 4BX. Tel: (01892) 822836.

R1155 unmodified model F receiver. Excellent performance. Mechanical and electrical condition good and clean. New valves, £175. Tel: (01483) 861293.

Radio Constructor bound volumes 11, 12, 13 & 14, 1957-61, good condition. Any reasonable offer considered or w.h.y? John GM4AQO. Tel: (01592) 874719.

Revox R/R/model A77. Revex s.w.r. & power meter. WS20 handie CB tester mod F5117. Grundig SAT1000 (not working). LCR meter Escort mod. ELC 131D frequency meter. Mid MS300 TX/RX output tester. Mod IF 106SH (Marconi). £offers? Anthony Coleman, Flat 1/3, 61 Keal Ave, Glasgow G15 6NZ. Tel: Glasgow 944 3865.

Shack clearance. Home-brewed QY4-400 h.f. linear including 4000V p.s.u. Tektronix 535DB 'scope. Codar AT5 160m (1.8MHz) TX + p.s.u. AVO valve tester. a.t.u., components. *Wireless Telegraphy* text book (1919). Sterling R1260A radio headphones. Roger. Tel: (01670) 505003 or E-mail: rogerjnapper@btinternet.com

Sony ICF-SW77 f.m stereo l.w./m.w./s.w. world-band receiver, 162 presets, station name tuning, u.s.b. l.s.b., superb portable radio, mint condition, current RRP £330 sell for £180.

Spectrum ZX 48K+, includes Alphacom printer, interface one, packet radio modem, cassette, microdrive, lots of games,

software, books and manuals. All boxed in excellent condition, £50 the lot or v.n.o. Steve G1TOL, Swindon, Wiltshire. Tel: (01793) 873063.

Telescopic mast/aerial ex WS58 collect or pay carriage. height 28ft, £20. Tel: Leeds 0113-265 4644.

Textronix 2235 oscilloscope 100MHz with probes and manual, £300. Tel: 0208 8953 4994.

Trio 9130 144MHz multi-mode boxed with manual, mobile bracket, mic, £175. Tel: (01268) 453574 or E-mail: davenairn@blueyonder.co.uk

Trio h.f. comms RX and manual. 100kHz to 30MHz, v.g.c., £215 o.n.o. Tel: (01246) 566040.

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Yaesu FTR-80C h.f. transceiver 500kcs- 30Mcs, 100W CAT system (for optional computer control), with Yaesu FP757HD heavy duty p.s.u., £395 the pair. Tel: (01482) 887938.

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Our Rob is never lost for words, this time he has news of some encouraging feedback

rob mannion signs-off

Rob G3XFD rounds off this month's issue and provides a sneak preview of what's in store and coming soon!

I'm sure that many of you - like myself - will be pleased to see the end of the very wet dark and gloomy winter we've had in 2000/2001. The flooding has been so bad here in Dorset that the children at my wife, Carol's, Montessori Nursery School have been in wellies every day they've been out in the garden at playtime. However, despite the gloom suddenly there's several really sunny spots appearing through the clouds and in Amateur Radio terms and for *PW* readers I'm pleased to say we've got some encouraging news, much of which has come from you...the ever supportive readers.

Since my request addressed to you all regarding construction articles the response has been very good indeed. We've had some really nice ideas come in and these will be appearing as soon as possible.

Additionally, I've received E-mails and letters from readers with basic ideas for articles, asking for advice and wondering whether we're interested. In reply, I offer guidance and steer them in the direction needed for *PW*. **So, please don't hesitate in suggesting an idea for an article** - we'll help and guide you as much as possible. Fresh ideas are always welcome.

For those of you who have ideas but really don't want to have a go - although you'll be encouraged in that direction! - I ask you to still contact us. If you can't be persuaded to research, prepare and write the article...we'll look for someone who can.

In correspondence, especially E-mails, I often get notes and comments typed either in all lower case with no punctuation, or all in lower case, from people who've obviously rarely or never written letters. Replying to their suggestions for articles and reluctance to try writing, I always point out that they've made the first step by typing a note to me. So, if you're in this category I encourage you to **have a go**.

Writing is just like building and you'll be proud to have created something. You make it...and we'll give it a final polish for you.

Young Blood

To further brighten the outlook I'm pleased to tell you that within 24 hours I received two E-mails telling me about two very keen youngsters who are now very active in the hobby. Cynics may say "Only two" – but in reality the two in mind are only the **tip of the iceberg** in my opinion!

One youngster, a young lady, was encouraged to have a go herself after seeing another teenager of the same age in *PW*, obviously enjoying herself. So, perhaps we should all consider drawing attention to our hobby to family, friends and local youngsters?

If youngsters see what fun this hobby can be - there's a cryptic clue here with the word **fun** - they may like to join in too. I'm planning to let you know what the cryptic clue is very soon but I'm sure you'll be delighted with the articles when they appear in *PW*. Watch this space!

The S-Phone

The tribute to the late **Alfred (Al) Gross W8PAL** in the news pages and the S-phone led to an interesting series of E-mails between myself and **Ben Nock G4BXD**, our Valve & Vintage military equipment specialist author. As readers will know...Ben has an enormous collection of vintage radio gear.

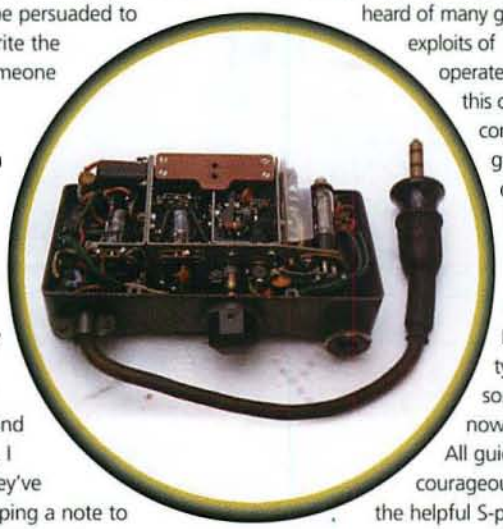
Ben really does have an interesting and diverse collection and I wasn't surprised to find that he has an S-Phone! It's a fascinating piece of kit and I've heard of many gripping stories of the exploits of those brave souls who operated them in the field and in this case field is very much the correct term as one Lysander, guided down to land to collect agents to be flown back to Bedfordshire...got stuck in mud!

Not only were smaller aircraft like the Lysander used for this type of work but they sometimes used what's now known as the Dakota. All guided and helped by the courageous resistance fighters and the helpful S-phone.

So, very soon we plan to publish an article from Ben on the S-phone. I'm looking forward to preparing it for you...and if the response from readers on the S-Phone article is as positive as it was for Prelude To Radar...everyone (including the *PW* team) will be very pleased!

Cheerio until next month...I hope you enjoy this issue. If it gets the accolades we received for the February issue we'll be delighted!

Rob G3XFD



● Look out for an article in *PW* very soon on the fascinating S-Phone*.

(Photo courtesy of Ben Nock G4BXD)

next month

Looking forward to the next issue of *Practical Wireless*? Take a look at what's on offer!

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IT'S A CLASSIC!

* **Richard Newton G0RSN** takes a look at Icom's IC-202S transceiver.

ANTENNA WORKSHOP

* **Joe Carr K4IPV** describes an inverted-L antenna for low-band DX.

TOPICAL TIPS

* More useful tips and ideas from **Tex Swann G1TEX**

FEATURE

* **Billy Williamson GM8MMA** recalls the Decca Navigator system.

FIRST FOR DIGITAL

* **Denzil Roden G3KXF** looks at a digital receiver front-end with the part no AF 20010401.

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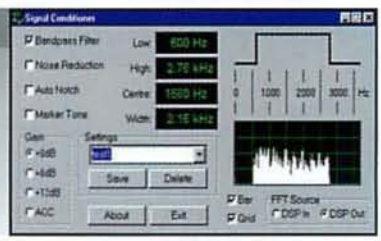

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Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning step size	100 Hz (5 Hz BFO)	100 Hz (1 Hz for SSB and CW)	100 Hz (1 Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	3-8 cards (pse ask)
Dynamic range	65 dB	65 dB	85dB
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DSP in hardware	no - use optional DS software		YES (ISA card ONLY)
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Today's Premier class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics saves you precious seconds in a DX or contest pile-up. Yaesu HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. IDBT: Interlocked Digital Bandwidth Tracking System

The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system monitors the settings of the SHIFT and WIDTH controls, and automatically sets the DSP bandwidth to match the user settings within the net bandwidth of the Analogue IF Filtering.


IDBT: A Breakthrough in Selectivity!


10-pole Collins® Mechanical SSB Filter

II. VRF: Variable RF Front-End Filter

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.


VRF Features Large, High-Q Coils and High-Quality Relays


VRF Typical Bandpass Response (3.5 MHz)

III. 200 Watts of Transmitter Power Output

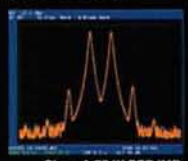
Utilising two Philips® BLF 147 Power MOSFETs in a 30 V push-pull configuration the MARK-V's Transmitter generates up to 200 Watts of the cleanest RF Power output available thanks to the conservative design of the PA Section.


Philips Power MOSFETs


High-Speed Automatic Antenna Tuner

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!


Class A 75 W PEP IMD

V. Multi-Function Shuttle Jog Tuning / Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

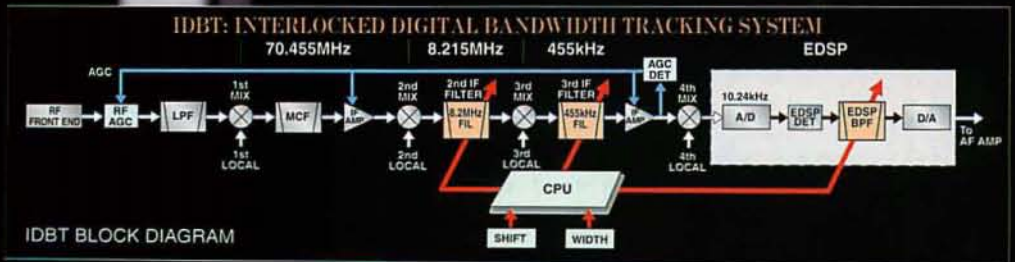

Access VRF and IDBT Features via Shuttle Jog Dial

DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8x Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

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