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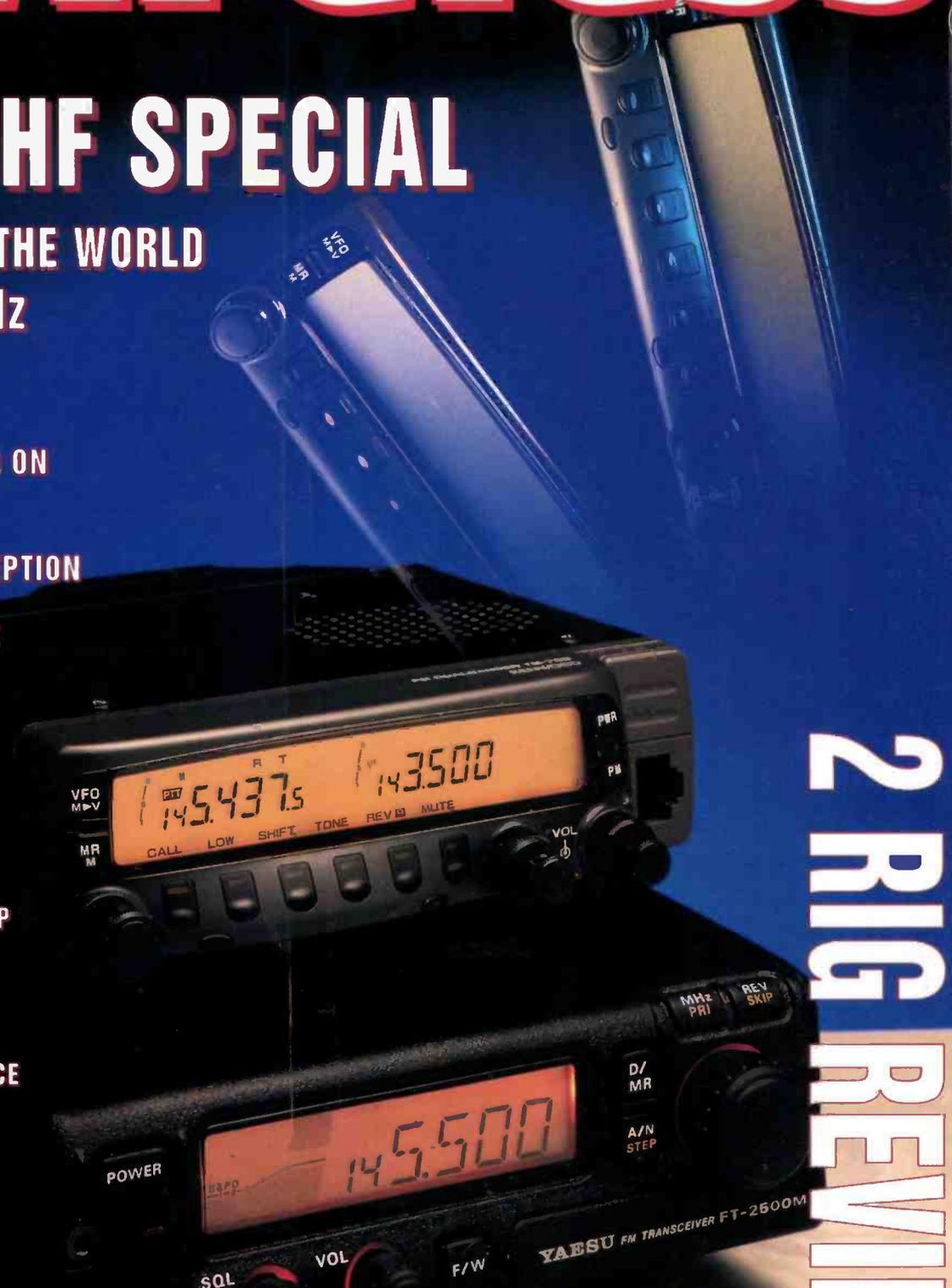
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2 RIG REVIEWS

KENWOOD TM-733E

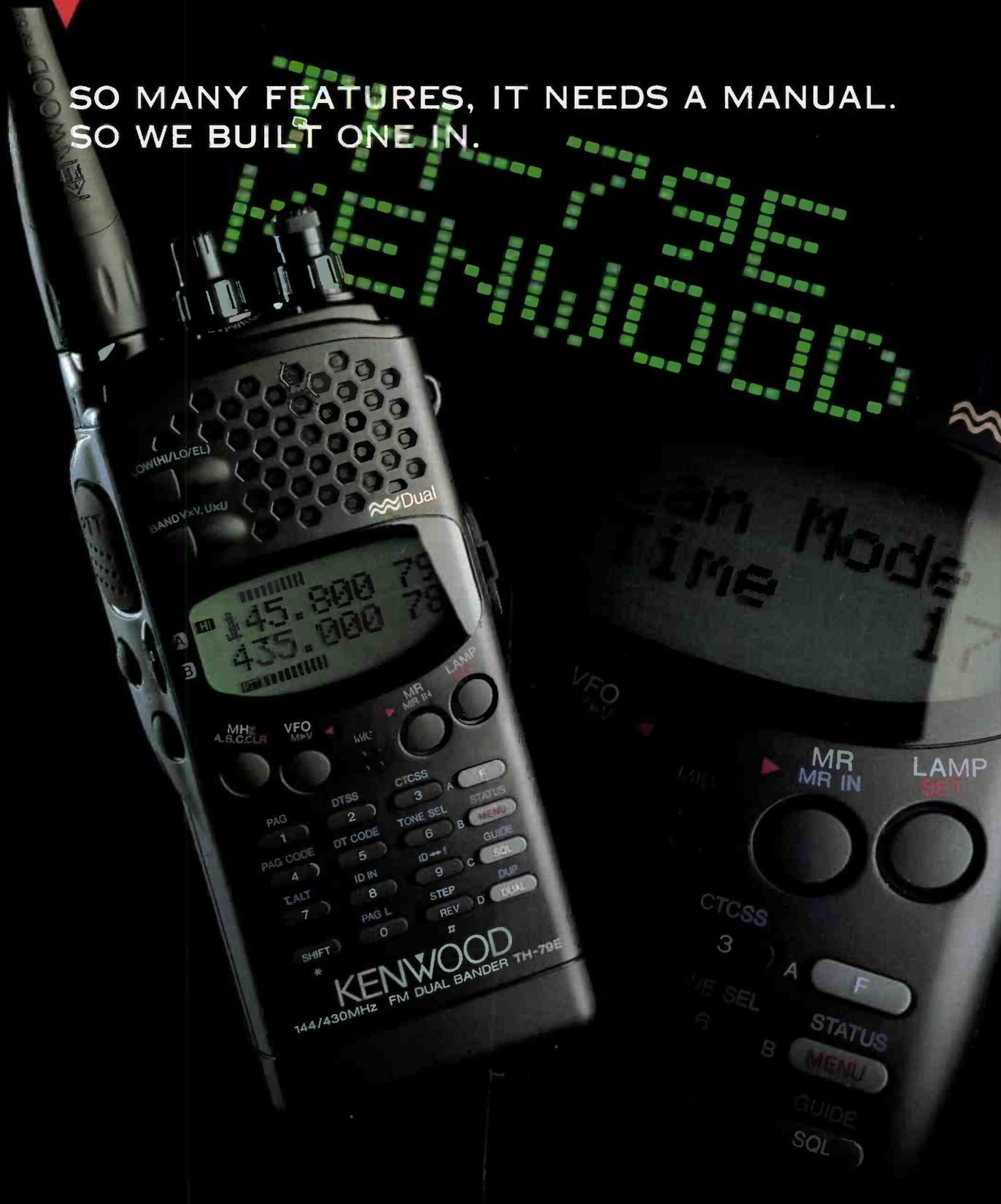
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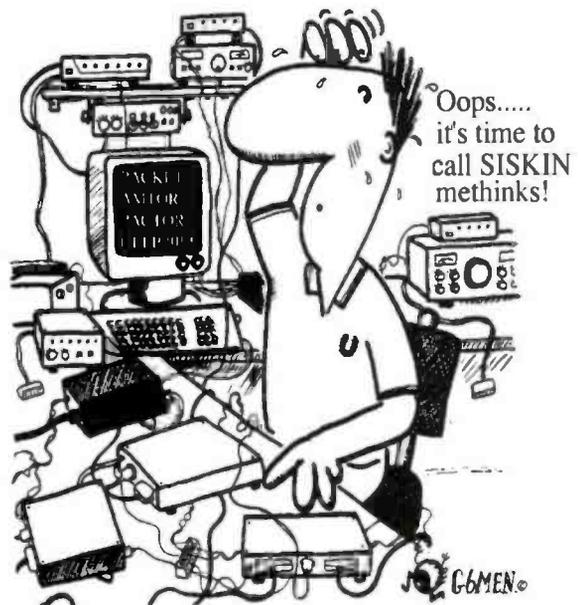
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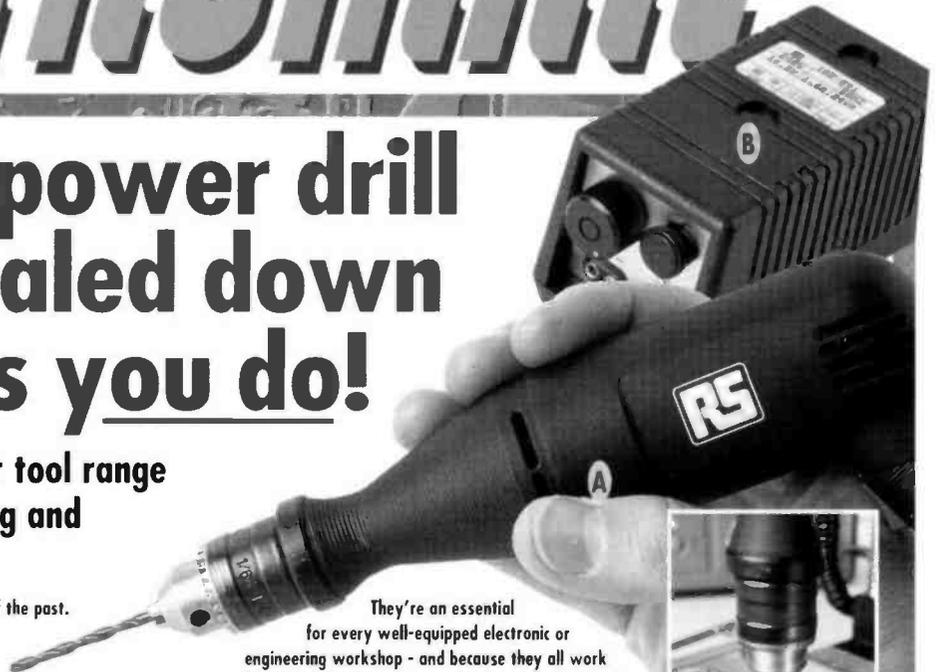
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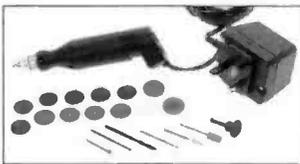
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V182-578	£35.74	£33.00

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Drive Shaft Diameter 2.4mm Nominal

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Drive Shaft Diameter 2.4mm Nominal.

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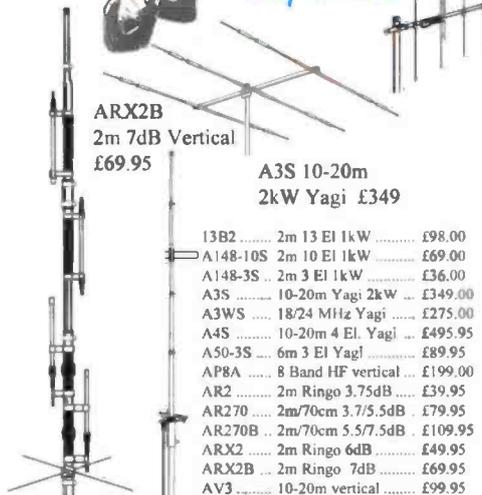
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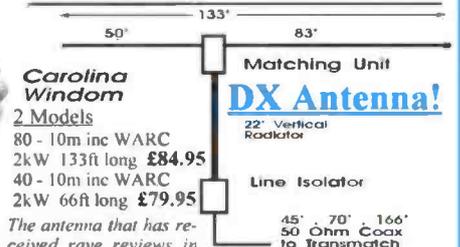
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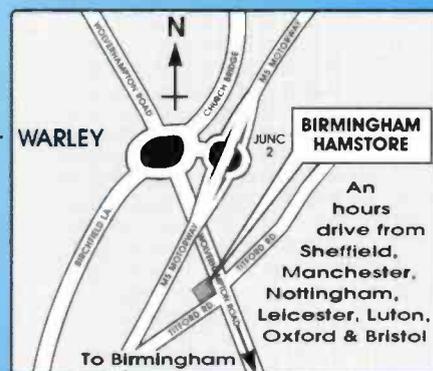


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GUEST Keylines

Once again, Rob Mannion G3XFD has given someone the opportunity to 'Guest' in the 'famous' Keylines chair, that someone being me.

Firstly, let me introduce myself. My name is Zoë Shortland and I am the Editorial Assistant for *Practical Wireless*, *Short Wave Magazine* and *Practical Motorist*, although I am more closely involved with the 'goings on' for *Practical Wireless*.

I have been working at PW Publishing Ltd., for just over a year and thoroughly enjoy being part of the team, especially a team that works so well as PW's does!

I am responsible for opening and sorting the vast amount of the mail that you send into PW. (thank God the Reader's Questionnaires have stopped coming in. I was beginning to open them in my sleep!). I also open the mail for *Short Wave Magazine* and *Practical Motorist* too. You can imagine what my desk looks like if I have a day's holiday - post everywhere!

When sending letters into PW, it's often difficult for us to distinguish whether a letter is for publication or not. It helps us if you mark clearly on the envelope (or the letter itself) so we know one way or the other.

When articles are sent in for possible publication, we try and send out a confirmation letter to you as quickly as we can, just to let you know that it has arrived safely. After that, it has to go through 'The System' so to speak. This takes a bit of time as it has to be considered by the Editorial team, and we have quite a backlog of articles to sort through. So, if you've sent an article into us recently and have received only the confirmation letter but nothing else, please be patient, we'll try and write back to you as quickly as we can.

I am also responsible for keying in your 'Bargain Basement' adverts. Whilst on this subject I would like to ask

all of you who place adverts to **PLEASE** write your adverts as clearly as possible, preferably by writing in block capitals. It makes my job a lot easier and it also helps to keep mistakes at bay, especially in contact 'phone numbers and prices of items!

As well as doing Bargain Basement in *Practical Wireless*, I also do 'Trading Post' for *Short Wave Magazine*, and the same rule applies - please write your adverts clearly for me!

If you read Rob's 'Keylines' last month, you will have read that starting with this issue, the 'Club News' list is no longer going to be in the magazine. As Rob mentioned, the 'Club News' list will still be available to readers from the PW Editorial Offices on publication day.

Instead, Donna (Toad) Vincent and myself hope to make these pages as interesting as possible, featuring everything from Special Event Stations to funny and amusing stories that you might have to tell. We hope to gather as much information, stories and photos as possible, so that you'll really enjoy reading these pages and seeing what other clubs are getting up to! You may even pick up a few ideas.

Like Donna, I too have a nickname, this being 'Little Miss Fast Fingers'. As I type fast, Rob seems to think that sometimes my fingers are on fire. (lucky that my fiancé is a fireman don't you think!). As well as my nickname, the rest of the team often tease me about my vast collection of earrings, as I wear a different pair each day. Rob thought that a pair of hoops that I once wore could have formed resonant loops, and that I mustn't go anywhere near a transmitter! I wonder what he meant by that?

Well, I've enjoyed my chance at writing 'Keylines' for *Practical Wireless*, and feel very privileged to have been asked by Rob to do so.

Cheerio for now.

Zoë

COMPETITION CORNER Spot The Difference



Our guest Keylines editorial writer Zoë Shortland has set fire to her typewriter again because she types so fast! No wonder she is known as 'Little Miss Fast Fingers'. But there's no need to worry though, Zoë's fiancé Ian, a local fireman, is more than willing to rescue her!

There are 12 differences to mark on the bottom version of the cartoon this month, good luck.

FIRST PRIZE: A year's subscription to *Practical Wireless* or a £20 book voucher.

SECOND PRIZE: A six month subscription to *Practical Wireless* or a £10 book voucher.

SUBSCRIPTION

VOUCHER

Send your entry (photocopies acceptable with corner flash) to: **Spot The Difference Competition, September 1994, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.** Editor's decision on the winner is final and no correspondence will be entered into.

Entries to reach us by Friday 23 September 1994.

Name

Address

Send your letters to the editorial offices in Broadstone. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*.

RECEIVING *You*

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.

Kits And EMC - A Reply From The Radiocommunications Agency

Dear Sir

I refer to Derek Pearson G3ZOM's letter in your August issue in which he raises the issue of electronic kits and Electromagnetic Compatibility (EMC).

Mr Pearson is right in saying that, with some exceptions, electronic kits do come within the scope of the 1992 EMC Regulations. These will become mandatory for manufacturers from 1 January 1996, although they can already voluntarily have their products assessed for compliance through the appropriate route.

The EMC Regulations are being enacted in response to an EC Directive which is intended to clean up the electromagnetic environment. The Regulations effectively cover all electrical goods, both with respect to their ability to cause interference to other goods and their effectiveness in withstanding interference. They are aimed at the supply and taking into service of goods and equipment and this gives the clue to why kits are covered.

According to the Regulations, 'electrical apparatus' consists of a product with an intrinsic function intended for the end-user and is supplied or intended for supply or taken into service or intended to be taken into service as a single commercial unit. These products include electrical and electronic appliances and systems. The latter is defined as an item of equipment or a combination of items of equipment containing either electrical or electronic components or both and specific-

ly includes kits.

The EMC conformity for the kit buyer therefore means that they are buying something in the confidence that it meets a standard within which it should not cause interference or be interfered with. While this does indeed put the burden on kit manufacturers like Mr Pearson, it will surely be a plus point for them to show conformity and be comforting to those such as Novice radio amateurs who might otherwise be unsure about the interference potential of what they are buying.

The position is indeed different for those who make their own equipment, other than from kits, whether it be from published circuits or their own designs. And this includes amateur radio transmitters which are specifically exempt from the Regulations. The challenge for them is to use their own mechanical and electronic design skills to build in appropriate immunity. But there are sanctions even for home constructors.

Amateurs will of course know that their licence prohibits them from causing undue interference to any wireless telegraphy and the Wireless Telegraphy Act 1949 makes it an offence to deliberately interfere with any wireless telegraphy whether using radio equipment or anything else.

Mr Pearson makes the point correctly that Trading Standards Officers will enforce the Regulations. They are the

proper enforcement authority for goods at the point of sale. Mr Pearson fails to say though that the Regulations also permit the Secretary of State to enforce them and this, especially with respect to radio equipment, is a power delegated to the Radio Investigation Service, which we would use in appropriate circumstances.

Finally, anyone wanting more information about the EMC Regulations, is welcome to contact me at: **The Radio Communications Agency, Waterloo Bridge House, London SE1 8UA. Tel: 071-215 2084** with respect specifically to radio equipment. More generally the Department of Trade and Industry's EMC helpline 061-954 0954 can provide all DTI EMC documents and details of training courses and other sources of help and advice as well as directing people to their local EMC club.

Colin Richards
Radio Investigation Service
Radiocommunications Agency

Editor's comment: I hope that readers with any worries or specific queries will take the opportunity of contacting Mr Richards, as the European Community's EMC directive is of prime importance to our hobby. I think we will hear a great deal more on this subject in the future as many anomalies and misinterpretations are raised and discussed.

SSL - No Problem!

Dear Sir

With respect to the topic of subscription services I would like to request that you publish the following letter in 'Receiving You' as I find, up to date, a somewhat biased approach, the letter is as follows: The Subscription Services Ltd - No problem!

I wish to air my views on subscription services. As a resident of another European country (Brussels in Belgium) and the holder of a British callsign G0JIA, I was somewhat worried by all the stories of missing payments, papers, expiring etc. However, I received my renewal notice five

weeks before the end of my licence expiry.

Me being me, I sent a cheque five days before the expiry of my licence. The cheque was a Eurocheque which was written out for sterling. Because it was a foreign cheque it was cleared by the bank in two hours! One week after the expiry date I have received my new licence validation which incidentally are not posted until the day of expiry of the licence.

Maybe, as I notice, a lot has to do with the British banking system which I am sorry to say I find prehistoric! Five days for cheques, it's a joke, and direct debits ...

Just for information, I can put a British cheque in my bank here and it is cleared the same day!

With any new service, there will always be teething problems, but I wonder just how many are internal and how many are external.

I must say I feel sorry for people with problems but I find 'Subscription Services' efficient and when I telephone them for enquiries, very helpful and polite.

P.S. Never missed a copy of *PW* since I became interested in 1978.

A. W. Sharp
G0JIA/ON9CAS
Belgium

Packet Panorama

Dear Sir

I noted several items on July's *PW* relating to the change to 'Packet Panorama'. Firstly, changing Packet Panorama to bi-monthly, based on feedback from readers wasn't really a mistake. You were trying to respond to comments from your readers and that is just one (!) of the pleasant tasks of any Editor.

Secondly, to have left Packet Panorama as a bi-monthly column after receiving comments from myself and others would have been a mistake. It was a mistake which you chose not to make and I applaud the reversal of your decision.

Thirdly, I reckon that readers who commented against Packet Panorama going bi-monthly did so for two reasons. The obvious reason was that they wanted their packet column every month. The less obvious reason was that they felt their comments to you would be heard. Put another way, they felt you'd listen to, and respond to, their comments. That second reason speaks volumes for the high regard with which *PW*'s readers regard both the

★ ★ ★ ★ STAR LETTER ★ ★ ★ ★

Drawing Pin Field Strength Meter

Dear Sir

I've just finished reading the article by G4RAW in the July issue. Although I haven't built it because I already have both an f.s.m. and an absorption wavemeter, the 'Drawing Pin Field Strength Meter' seems to be a very worthwhile project.

I would like to clarify one item that could cause confusion to the newcomer. At the centre of page 44, reference is made to the fact that the FCC requires the 'first harmonic' to be 40dB down on the fundamental. Two paragraphs later, reference is made to checking the transmitter harmonics ("especially the second"). In view of the reference to the "first harmonic", I'm confused by the later reference to the "second harmonic".

It is generally accepted that the 'first harmonic' of a fundamental frequency is the fundamental frequency itself, and the term 'first harmonic' is, therefore, never used. Probably the simplest explanation of the relationship is in the RSGB's *Radio Communication Handbook*. There, the fundamental is described as 'f', the second harmonic as '2f' etc. It is usually the odd-numbered harmonics that cause the most problems.

Apart from this minor clarification, Steve G4RAW is to be congratulated on an excellent article.

Dave Word N4DYR/G4YYW
N. Yorks

Guest Keylines Editorial

Dear Sir

It has been pleasant to see different fingers moving the symbols in Keylines of late and yes, good to see the option given to Ian Suart GM4AUP, RSGB President 1994. He did make some quite valid points, in particular the real need for amateurs to support their representative body.

I can be classed as a fallen wayside member and my reasoning for this was the feeling at the time that management was not as it should have been or

that the accountability was all it should have been. Personally in dropping out the only loss I suffered was 'Technical Topics' in *Radcom*.

I do, however, have to question some of GM4AUP's reasons given. Primarily as a confirmed class B holder, h.f. holds no interests. There are more leading edges in this hobby in upper frequency areas. Publications concern me for I find that wise shopping can usually equal if not at times better member prices. QSL handling is of no interest.

What I do find seriously lacking with RSGB however is the apparent total lack of public relations. By this I do not mean communicating with the converted!

Public relations can repay its effort in so many ways. It does not need to involve any great cost for it depends more on a state of mind than expenditure. Only too often the RSGB seems to suffer from being thought of as being run by amateurs in a professional world.
David Turtle G1OLZ
Kent
London

Dear Sir

Your guest 'Keylines' for

June 1994 was an interesting read and I quite enjoyed it! I had an enjoyable chat with Ian GM4AUP at Picketts Lock on the same theme (membership of the RSGB). While I can appreciate Ian's ideas on generating membership with this free trial scheme, it still reverts back to the same full price at the end if it is taken up or not, nothing ventured, nothing gained. I suggested there ought to be a scheme for those who are unemployable by age or disability. His response was how to verify the claim for the reduced subscription?

It could be managed quite easily by certification or verification of the documents applicable, ie. disability pension book cover (copy of) or UB40 and Income Support/Unemployment Benefit Office cheque again copies as required for supporting application in the first instance.

I am at present a 'Professional Jobseeker' and quite frankly could not afford the subscription rate to the RSGB, a scheme based on the above would, I am sure, not only benefit the RSGB by way of members, it would ensure that those who would like, but cannot afford

Valved Linears And 'Satellite Scene'

Dear Sir

There is a lot of interest in valves these days, and I fancy building a valve project.

Valve linears for 144MHz based on a 4CX250 need about 2kV. A costly power supply to build, if you can find the bits and a pretty dangerous voltage. The 4CX250 valves are not cheap and easily blown up. There can be problems with safety protection and bias control.

How about a simple design that can be run on about 300V and using less exotic valves?

I don't think most operators are looking for 'full legal power' but something more than the 2.5W from a 290. An output of 50 to 100W would be popular I'm sure.

I was also very sorry to see the demise of G3IOR's 'Satellite Scene' column. I am a keen satellite user and keep up with the news, launches etc., but always found something of interest in Pat's articles.

The inclusion of satellite in the v.h.f. section is better than nothing but taking out the satellite section reduces the depth of coverage and the amount of factual information available to the reader. I understand that we are all in a commercial world but as setting up a new satellite station seems to involve the purchase of quite a bit of kit, albeit over an extended time period in my case, I wonder how *PW* advertisers view the reduction in coverage.

I recall from a survey (can't remember the source) that something like 30% of amateurs in the survey were interested in satellite even though they were not yet active.

I recently gave a satellite lecture at two local radio societies and there was a good level of interest. The secretary of Leicester Radio Society told me that the satellite topic had been requested by members.

Could I suggest that you create a small section of the magazine to give useful contact information for beginners in satellite and other specialised modes. On satellite I would suggest: AMSAT UK net frequencies and times v.h.f. and 3.5MHz These nets are full of information and can put listeners in touch with other amateurs who are willing to help a beginner, the AMSAT UK office address with 'send A4 s.a.e. for info pack' and the Remote Imaging Group contact address.

John Heath G7HIA
Leicestershire

Editor's reply: Firstly, the editorial team would be interested in what other readers think of a possible v.h.f. linear amplifier project. Secondly, John's letter is the only one received so far on regarding the cessation of 'Satellite Scene'. Finally, we hope that G7HIA and other keen (and potential) satellite users will find David Butler G4ASR's special article on the subject of interest this month.

to, to join.

Well Ian, you asked me for my thoughts on the subject, there they are, an it was a pleasant surprise to find that you are an RSARS man like myself (also RAFARS but don't tell 'em).

John Maunder
G0PKU

Editor's reply: Reader response to the 'Guest' editorial spot has been very favourable and we've had many interesting comments. I hope in future to provide the chance for other 'guests' to voice their opinions in 'Keylines' and this month's editorial is from an important member of the *PW* team....Zoë Shortland.

magazine and its Editor. Well done.

Lastly, I did complete and return the *PW* questionnaire. You're right though, in that many packet users will not have left their keyboards in order to send you their thoughts via the questionnaire!

Ian Brothwell
G4EAN
Secretary, BARTG,
Nottingham

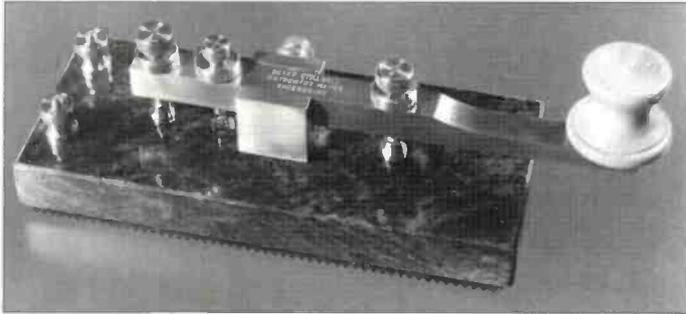
Editor's comment:
Thank you Ian. I do (sometimes!) stop talking long enough to listen. Reader's comments are essential...keep writing please.

NEWS '94

Send in your news, photographs and product information to Donna Vincent at the editorial offices in Broadstone.

Straight Stillwell

Derek Stillwell, an instrument maker who is based in Shropshire has recently announced the introduction of a new straight Morse key to his range. Derek produces his keys in limited quantities and all the parts are individually made, personally hand finished and assembled. This means that all the keys produced could possibly become collectors items.



The straight key has a heavy polished marble base, a solid brass keying arm, bearing block and fully adjustable ball and cone bearings. The ball and cone bearings enable the user to set the contact gap to a fine adjustment as is required.

Each key is engraved with the makers name, serial number and if required the customer's callsign. The underside of the base has a non-slip ribbed rubber mat that's designed to reduce noise and enhance the key's feel.

Full details and a colour photograph of Derek's straight key are available from **Derek Stillwell, Instrument Maker, 27 Lesley Owen Way, Shrewsbury, Shropshire SY1 4RP**. Please enclose a 4 x 8.5in s.a.s.e.(UK), 2 IRCs (overseas) with your enquiry.

2 01743-354119

Repeater Overhaul

The Orkney & Caithness Repeater **GB30C** is to undergo a thorough overhaul. As a result of this GB30C will be taken off air on August 5 1994 and will remain closed until the overhaul is finished. It is estimated that the work will take about two months.

Compact Transceiver

Hot off the press and straight onto the *PW* Newsdesk are details of Yaesu's newest transceiver. The FT-900 h.f. all-mode compact transceiver has just been announced by Yaesu UK Ltd.

The Yaesu FT-900 is described as a high performance compact h.f. all-mode transceiver and features a detachable front sub-panel that allows it to be mounted away from the main unit. Yaesu claim that this makes the FT-900 ideal for mobile or marine operation.

Other major features include: the provision of 100W power output on the h.f. amateur bands in c.w., s.s.b. and f.m. modes and up to 25W carrier in a.m., general coverage reception of 100kHz to 30MHz, multi function display and three-mode bargraph meter with a 'peak-hold' facility. There is also a version of the FT-900, the FT-900AT, available with a built-in antenna tuner that has its own microprocessor and 31 memories. This allows the storage of the most recently used matching settings for quick recall.

First UK shipments of the FT-900 were expected by the end of

July. Prices will be around £1300 for the FT-900 and £1500 for the FT-900AT. More details of the FT-900 can be obtained from any Yaesu approved dealer.



Important - Licence Changes

The Radiocommunications Agency have made some changes to the Radio Amateurs and Novice Licences.

1 Holders of the 'A' licence are now permitted to use 26dBW(400W) on the whole of the sub-band 1.81 to 1.85MHz, thus removing the power restriction on 1.81 to 1.83MHz. The power limit for 1.85 to 2MHz remains at 15dBW.

2 Holders of 'A' and 'B' licences can now use 26dBW between 50 and 51MHz. The maximum power permitted between 51 and 52MHz is still 20dBW. The ERP and antenna height restrictions have been removed from the whole of the 50 to 52MHz band, which allows the use of any antenna. Maritime Mobile is now allowed on 50MHz.

3 Holders of all types of licence are now required to notify their local Radio Investigation Service office of unattended digital operation. This restriction has been necessary following a number of problems with unattended operation.

4 The final change also effects all types of licence and concerns logs which are kept on a computer. At the main address the licensee must be able to provide a print-out of the log on demand. When not at the main address, it must be possible to provide a copy on disk, followed later by a print-out.

All of the changes are effective immediately.

The SWL-100 Award

A new award, called the SWL-100 Award has been devised by **Joe Mikuckis K3CHP** from the USA, which is intended to create a demand for s.w.l. QSLs among radio amateurs. Joe hopes that this will result in a greater QSL card exchange, as well as an increased interest among short wave listeners to become radio amateurs.



The SWL-100 Award represents the reception of unsolicited s.w.l. QSLs/reports from different countries in 25, 50, 75 and 100 country increments. To apply for the award send your s.w.l. QSL cards indicating your call, date, time, frequency, reception report and a sample of the transmission data to **Joe Mikuckis K3CHP, 6913 Furman Pkwy, Riverdale, MD 20737-3016, USA**

When applying for the award you need to enclose the appropriate amount to cover the postage costs, e.g., in the USA send an amount equal to four times the price of 1st Class postage. If you want your QSL cards returned please enclose return postage.

Radio Amateurs Examination Course News

As the *PW* Newsdesk has been swamped with news of all the Radio Amateurs Examination courses that are due to start in the coming weeks, we've kept the details brief to enable us to publish as many as possible. Don't despair if you don't see details of your course here, any that start later in the year will be published in the October issue.

Venue	Course Details	Start Date	Enrolment	Time/Day	Contact
Arnold & Carlton College of Further Education, Digby Avenue, Mapperley, Nottingham	RAE, 30 week course RAE, 12 week course Morse	Sept 14 Sept 15 Sept 14		Weds, 6.30 - 9.15pm Thurs, 6.30 - 9.15pm Weds, 7 - 9pm	Alan Lake G4DWW Tel: (0606) 382509
Audley & Halmerend Adult Centre, Audley Nr, Newcastle-under-Lyme, Staffs	RAE	20th Sept	13 Sept, 7pm Audley Centre or 15th Sept, 7pm Thomas Boughey School, Halmerend	Tues, 7 - 9pm	Doug G8BAA, QTHR Tel: (0782) 717347
Avondale Adult Education Centre, Heathbank Road, Cheadle Heath, Stockport	RAE		13th Sept	Tues, 7 - 9pm	Rik Whittaker G4WAU Tel: 061-427 4730
Brentford College, Clifton Road	Morse RAE	28th Sept 28th Sept	15th Sept, 6pm 15th Sept, 6pm	7pm 7pm	Frank Coles G3PZC Tel: 081-977 5343
Kingston College, Kingston Hall Road, Kingston upon Thames, Surrey KT 2AQ	RAE Novice		5th Sept 5th Sept		Kingston College Tel: 081-546 2151 Ext. 2066
Lee Valley Leisure Centre, Edmonton, London	RAE, 30 week course				Steve White G3ZVW Tel: 081-882 5125
Merton College, Morden Park, London Road Morden, Surrey	RAE			Weds, 7 - 9.30pm	Tel: 081-640 3001
Midland ARS, 60 Regent Place, Caroline Street, Hockley, Birmingham	RAE & Morse	21st Sept		7.30pm	John Badger Tel: 021-353 9326
Newbury College	RAE	14th Sept		Weds, 7 - 9pm	Tel: (0635) 37000/35353
Newstead Woods School, Avebury Road, Orpington, Kent	RAE	22nd Sept	2wks prior, by post to Bromley Adult Ed, Church Lane, Bromley BR2 8LD. Tel: 081-462 9184	Thurs, 7.30 - 9.30pm	Alan Betts G0HIQ (0689) 831123
North Trafford College, Talbot Road Centre Stretford, Manchester	RAE Theory Computing for RA Electronics Servicing Morse (intermediate) Morse (Beginners)		31st Aug, 1st/2nd Sept	Mon Eve or Weds Morn Tues Morning Tues Afternoon Tues Evening Weds Afternoon	North Trafford College Tel: 061-872 3731
Reddish Vale Evening Centre, Reddish Vale Road Reddish, Stockport SK5 7HD	RAE Morse	28th Sept 28th Sept	12/13/15th Sept, 7 - 8pm	Mon, 7 - 9pm Mon, 7 - 9pm	Dave Wood G4UJD Tel: 061-430 6246
Sony Broadcast ARTG, Jays Close, Basingstoke	RAE	5th Sept		Mon, 7 - 9pm	Tel: (0256) 483103
Trowbridge ARC, Southwick Village Hall, Nr. Trowbridge, Wiltshire	RAE	Sept			Chris Parnell G0HFV Tel: (0225) 764874
West Nottinghamshire College of Further Ed Derby Road, Mansfield	RAE	12th Sept		Mon, 7 - 9 pm	Alan Lake G4DWW Tel: (0602) 382509
Widnes & Runcorn ARS, Egerton Arms, Runcorn	RAE	2nd Sept			Dave Wilson G70WB Tel: (0270) 761608
Wombourne Adult Ed Centre, Church Road, Wombourne, Wolverhampton	RAE Morse	19th Sept 22nd Sept	12/13th Sept Wombourne Adult Ed	Mon, 7 - 9pm Mon, 7 - 9pm	Roger Price Tel: (0902) 895198
Wrexham College of Further Ed Bersham Road, Wrexham	Novice				David Wright GW1MVL Tel: (0978) 645858

Howes 'Junior Operator'

A new medium wave and 'Top Band' receiver kit has been added to the **C. M. Howes** range of home construction kits. The Howes MW1 has been designed with the 'Junior Operator' in mind, as Howes say it's simple enough for a first project but still gives a respectable level of performance.

The MW1 kit allows the constructor to explore the technicalities and includes an extra component so that

the frequency coverage can be altered. The kit is supplied with fully illustrated instructions and all the parts needed to build the project. The complete kit costs £29.90 plus £4 P&P.

Further details on the MW1 are available from **C. M. Howes Communications, Eydon, Daventry, Northants NN11 3PT. Tel: (0327) 60178.** If writing please send an s.a.e.



Prize Draw

Waters & Stanton Electronics recently donated an MFJ-249 antenna analyser worth £229, as a prize in a competition that was run in the G-QRP Club's magazine, *Sprat*.

Dick Pascoe G0BPS of the G-QRP club is pictured here with **Kathy Moore, PW's** Subscription Manager drawing the winning ticket at the Longleat Rally, which was held on June 26. The lucky winner of the MFJ-249 was **L. C. Ellison G0PNK** from **Onchan, Isle of Man.**



NOVICE *Natter*

As we are coming to the end of the summer and beginning of autumn, now is the time when you often see the magic words 'Junk Sale' on your local radio club's programme of events. If you are suitably armed and prepared this can be a worthwhile event, so here's a few pointers from **Michael Stott GONEE**.

1: Look out your old junk, you know, all the bits of kit you don't want and have no further use for - after all, one man's junk is another man's treasure. You should start this process some weeks before the junk sale as this gives you time to (a) find lots of junk and (b) reflect on the bits you are getting rid of to make sure they really are junk and that you are sure you don't need them any more.

2: Most importantly let your wife/girlfriend/mother, etc., know that you are getting rid of junk - this will probably make their day (at least until you bring another load back into the house after the sale!).

3: Get to the sale early and have a good look around. Make a list of the lot numbers you are interested in, try and find out who's selling them and ask them if it works, are all the bits there, etc. Some people take crystals out of test gear and make a perfectly good bit of test equipment into a box of real junk.

4: Put a maximum price on your list, bid up to that and **stop!** It's very easy to get carried away with the sale, things can go for more than the new price just because the auctioneer had the bids going thick and fast.

5: Get into a position so that the auctioneer can see you easily so you don't have to stand up and wave your arms about to be noticed - very embarrassing!

6: Don't be too keen! If you are jumping about and waving your arms like a windmill at every step of the bid, others start to think

Elaine Richards G4LFM has some tips on buying from Junk Sales, information on static charges and launches the Novice Natter PW 'Elmer' Award.

**Elaine Richards G4LFM, PO Box 1863,
Ringwood, Hants BH24 3XD.**

they're missing out and up goes the price. Of course, if it's your piece of junk under the hammer and you want to help get the bidding off to a good start, well.....

7: At many club auctions there is no reserve price and it is up to you, the owner, to bid out the price. This means that you have to bid for your own things until it reaches a price you are prepared to accept. This isn't always as easy as it sounds, so you have to have your wits about you.

Also make a note of who made the highest, yet unacceptable bid as you may decide to accept his offer after all rather than cart the junk home again. You can always try to push his price up in a private deal at the end if you fancy your chances too.

8: If your bid isn't acceptable and the lot returns to its original owner, make a note of who it is. You could always try waving the cash under his nose and remind him of the fact that he has to take it back home again and what will his wife/mother, etc., say when he brings it back. Who knows you may be able to clinch the deal at the end of the day. It's worth a try.

9: Getting it home. Well, now you have made your bids, did you think about how to get it home. A 1945 valved ship's receiver was fine on the HMS *Ark Royal*, but it will take a bit

of getting back to the car park and into your Mini!

Then, what happens when you get it home! You could always try the excuse that it isn't yours, but you're testing it for a friend in the radio club! Hopefully, it's become part of the shack before you're asked about giving it back!

If any clubs have got Junk Sales coming in their autumn/winter programme and could do with a wider audience of participants, drop me a line and I'll mention it next month.

Timely Reminder

Eileen Mainwaring 2W1BPS dropped me a line with a timely reminder for those hot summer days. Her local group of Novices and their instructor were erecting a vertical sleeve dipole for the 50MHz band at the instructor's QTH.

They'd just got the UR67 coaxial cable threaded through the ten GRP tubes that were to support it vertically, with the PL259 peeping out if the lower end just clear of the ground, when they noticed a dark cloud coming into view on the western horizon about a mile away. They decided that they could complete the work before any rain came (quite right). What they had not reckoned on was the static charge that preceded the cloud formation!

When their most junior and very enthusiastic

Novice stooped to connect the coaxial lead to the FT-690 he had a nasty surprise, such was the voltage build up. A short earth spike close to the mast with a lead to a large croc-clip over the shell of the PL259 disposed of any more sudden lessons in basic physics!

Actually this is a good opportunity to offer some tips on how to avoid damage to your valuable radio equipment during the summer thunderstorm season. Although there are lots of static discharge devices on the market, by far the safest and cheapest option is to disconnect all your antenna leads and ground them.

The easiest way to do this is to wire up a number of SO239 sockets with the centre pin and outer joined together and cabled to a good earth spike. When doing this it's important to make sure all the wiring is as short and direct as possible.

You also need to make sure that the disconnected antenna leads do not rest on or touch any radio equipment. Of course, for this system to be effective you have to remember to disconnect the antennas every time you leave the shack - the one time you forget will be the time you get hit!

Worked All Britain Awards

I've heard from **Dennis Sartin GW6JNE**, who's the Shortwave Liaison Officer for the Worked All Britain Awards (WAB) Group. He says that all the WAB Awards are open to Novices, whether they are members of the group or not.

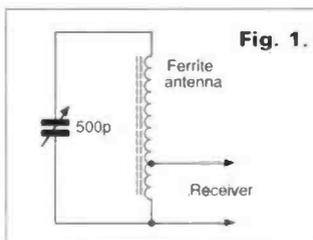
The WAB were founded in 1969 to promote a greater amateur radio interest in Great Britain, Northern Ireland, Isle of Man and the Channel islands through an award scheme. The awards are available world-wide to all radio amateurs and short wave listeners. Dennis tells me that QSL cards are not

required for any of the awards.

There are several awards you can try for, the best way to get the details of them is to send an s.a.e. to **Dennis Sartin GW6JNE, 7 Penrhos Crescent, Rumney, Cardiff CF3 8PR.**

Teaser Answer

In order to solve last month's little teaser (see Fig. 1) you first need to work out a few of the unknown values like the inductance of the ferrite rod coil and the minimum capacitance of the main



tuning capacitor. The inductance is simply calculated by employing the known capacitance of 500pF and the resonant frequency of 500kHz.

Substituting these values in the formula $L = 1/4\pi^2 f^2 C$ shows the inductance to be 202μH. Knowing that the highest resonance occurred at 1.6MHz you can use the formula $C = 1/4\pi^2 f^2 L$ to find the minimum capacitance which is 49pF.

So how are you going to make the circuit tune from 550kHz to 1.5MHz? There are two changes that have to be made. The first is to reduce the value of the inductor so that the resonant frequency at maximum capacitance rises. The calculated value is 167μH but this is often best achieved by sliding the coil along the rod.

At the other end of the scale you need to increase

the minimum capacitance by about 14pF to 63pF. The best way to achieve this is to add an adjustable trimmer capacitor of around 30pF. To set this final circuit up you will need to alternately adjust the coil position and the trimmer until you have perfect scale alignment.

Due to deadline dates, I'm writing the answer before you have seen the question! So, I'll announce the winners next month.

The Novice Natter Elmer Award

So, who's fault is it that you took up radio as a hobby? We're starting the 1994 search for the PW 'Elmer' Award. I want to hear about the person that started you off in the hobby, perhaps they gave you lots of technical help, perhaps they inspired you with their enthusiasm or

perhaps they just encouraged you to learn for yourself.

Anyway, I want to hear about them. The first fifty entries will win a Kenwood station logbook just for entering the competition and the overall winner will receive their prize of a **hand-held transceiver kindly donated by Yaesu (UK) Ltd.**, at the Leicester Amateur Radio Show in October.

You haven't got much time to nominate your 'Elmers' so get writing now. Anyone could win, so drop me a line telling how they got you started in the hobby and what help or encouragement they gave or just tell me why you are blaming them for getting you involved. Send your entries to the address at the top of the column - Good Luck.

Elaine G4LFM

***August 14:** Flight Refuelling ARS Hamfest will take place at the Flight Refuelling Sports Ground, Merley, Wimborne. The event will run from 10am to 5pm and will include the usual mix of traders, Bring & Buy, car boot sale and field events. **Richard Hogan G4VCQ** on (0202) 691021.

August 14: The Derby and District Amateur Radio Society will be holding its annual radio rally at the usual venue, Littleover Community School, Pastures Hill, Littleover, Derby. The venue for the Rally is on the A5250, just north of its junction with the A38, on the southern outskirts of Derby. There will be the usual attractions, including the famous monster junk sale. **Martin Shardlow G3SZJ, QTHR** on (0332) 556875 or packet **G3SZJ @ GB7LTN**

August 21: The Southend and District Radio Society are holding their rally at the Rocheway Centre, Rochford, Essex. Doors open at 10am with ample parking for all. Weather permitting, there will be a boot sale for computer, radio, and electronic equipment on the sports ground to the rear of the centre. Further details from **The Rally Organiser, PO Box 88, Rayleigh, Essex SS6 8NZ.**

August 21: The West Manchester Radio Clubs 'Red Rose Rally' will be held at the usual venue of the Bolton Sports & Exhibition Centre, Silverwell St., Bolton (town centre). All the usual trade stands (over 75), societies, Bring & Buy, etc., all at pavement level, with facilities for disabled visitors. Refreshments available all day plus bar. Doors open 10.30am for disabled visitors, 11.00am for general public. Admission £1, children free. **Dave G1100** on (0204) 24104 evenings only.

RADIO Diary

* Practical Wireless & Short Wave Magazine in attendance

If you're travelling a long distance to a rally, it could be worth phoning the contact number to check all is well, before setting off. The Editorial staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct.

August 21: King's Lynn Amateur Radio Club are holding their 5th Great Eastern Rally at the Cattle Market, Hardwick Narrows, King's Lynn (off A10/A47 roundabout). Doors open at 10am (9.45am for disabled visitors). Attractions include a spacious indoor area with major international exhibitors, outdoor car boot area, Bring & Buy, Talk-in on S22, easy access for disabled, all one level, free parking, refreshments available. Entry £1. **G0BMS** on (0553) 765614.

August 27, 28 & 29: A Computer Fair including a Radio Rally and Electronics Fair is being held on the site of what used to be Walsall Airport, and is situated off the main A434 Aldridge to Walsall Road and is approx four miles from the A5, or five miles for Junction 7 of the M6 motorway. **Mr A. Wood** on (0543) 372807 after 5pm or anytime weekends.

August 28: The Fourth Gloucester Radio Rally is being held at Naas Lane, Quedgeley, Gloucester (off the old Bristol road). Doors open at 9am to 4pm. There will be a Bring & Buy, car boot sale and flea market stalls. For more details phone **Mike** on (0452) 503786.

August 28: The Galashiels Club are holding their Open Day at the Focus Centre, Livingstone Place, Galashiels, Scotland. Doors open at 11am till 4.30pm. There will be a Bring & Buy, traders, club stalls, a raffle and refreshments. **J. G. Campbell** on (0835) 822686.

August 28: The East Coast Amateur Radio & Computer Rally will be held at the Clacton Leisure Centre, Vista Road, Clacton-on-Sea, Essex. Doors open at 10am to 4pm. There will be a Bring & Buy, and a bar and cafeteria available

from 11am. Free car park and talk-in on S22 and SU22 (GBOCR). For further information contact (0473) 272002.

August 28: The 30th Torbay Rally will be held at Clenon Valley Leisure Centre, Paignton, Devon. Doors open at 10am. There will be trade stands, Bring & Buy, special interest displays, use of leisure facilities, restaurant and bar. Only four minutes walk away there is a beach, boating lake, steam railway and a flume water park. **John G3YCH, QTHR** on (0803) 842178.

August 29: The Huntingdonshire Amateur Radio Society are holding their Rally at St. Germain Street, Huntingdonshire. Admission is £1 per person and the car parking is free. There will be hot and cold refreshments available, and a talk-in on S22. Doors open at 10am. Further details from **David Leech G7DIU** on (0480) 431333.

***August 29:** Scarborough Amateur Radio Society will hold their radio electronics and computer rally at the Spa, South Foreshore, Scarborough. Doors open at 11am. Many traders, Bring & Buy, refreshments and a bar. **Ross Neilson** on (0723) 514767.

***September 4:** The 9th Bristol Radio Rally and Bristol Computer and Electronics Market will be held at the Brunel Centre, Temple Meads Railway Station, Bristol. 10.30am to 5pm (disabled visitors 10.15am), £1 admission, accompanied children under 14 free, 40 plus traders, large Bring & Buy, raffle, refreshments, ample under cover parking at £1. Talk-in on S22. **Muriel Baker G4Y2R** on (0275) 834282.

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LIVE '94

In September, Icom UK, Lowe Electronics, Martin Lynch, PW Publishing, The Radio Society of Great Britain, Trio-Kenwood, Waters & Stanton and Yaesu are all co-operating on a joint stand at a show where traders are not allowed to sell anything! Puzzled? Roger Hall G4TNT explains why.....

September 1993 saw the launch of the first Consumer Electronics Show - Live '93. It was such an immediate success that it has already outgrown its original venue, the Olympia Exhibition Centre, which is why this year's show will be held at Earls Court.

The 1994 event will run for six days from September 20 - 25, and promises to be even bigger and better than before. Last year almost 180 000 people visited the show.

News International, the organisers, think that this year the increased size of the show, the better venue, more exhibitors and extra promotion will result in a quarter of a million visitors!

Almost every aspect of consumer electronics will be at Live '94. There'll be, hi-fi, TV, video, computer games, camcorders, in-car entertainment, musical instruments, cameras, telecoms, satellite, home automation and much more.

Numerous big name companies will be represented. There'll also be several special interest stands such as Capital Radio (both FM and Gold) broadcasting live, Dolby Home Cinema Promenade, Real Hi-Fi Village, TV Time Live television studio, Games, Arena, Computer Shopper PC Village and many others.

Amateur Radio Village

One stand that should be of particular interest to readers of this magazine is the Amateur Radio Village. This is an unusual joint venture between Icom UK, Lowe Electronics, Martin Lynch, PW Publishing, the RSGB, Trio-Kenwood, Waters & Stanton and Yaesu.

The idea of the 'village' came about because the RSGB exhibited at the show last year. They received so many enquiries from people wanting to know more about the hobby that they approached the trade to see if a joint venture would be possible for this year.

And, even though dealers,

importers and publishers often complain about having too many shows and rallies to attend every year, the Live '94 idea appealed to them.

A complaint often heard is that our hobby is dying because there aren't enough newcomers, especially youngsters coming into radio. Unfortunately, there didn't appear to be a way to reach them to let them know just how much fun amateur radio can be.

Well, it could be that Live '94 will go some way towards solving the problem of publicising amateur radio. This is why *Practical Wireless* and *Short Wave Magazine*, the dealers, importers and the RSGB have all spent a lot of time, money and effort setting up a special pavilion at the show to demonstrate the hobby to everyone there.

The group believe this show will attract the sort of person who has an interest in electronics. And a visit to the Amateur Radio Village may well be enough to arouse an interest in the hobby.

No Pressure

Live '94 is not the usual sort of show where dealers go to push their own particular brand, there will be no pressure to buy. In fact, there won't be any radios for sale!

Instead, the major importers will have their range of equipment on show along with several working stations. There will also be literature and expert advice available for anyone who wants to know about amateur radio or short-wave listening.

Visitors will be able to watch the special event stations chatting to amateurs on the other side of the world or just a few miles away, using 'phone, c.w. and data.

There will be every type of radio on show, from massive h.f. transceivers to tiny scanners. The show will be ideal opportunity for someone who has perhaps thought about becoming an amateur or a listener but doesn't know what it

involves, what equipment is available and how much it will cost. Live '94 will be the place to find out!

The September show is probably the first time that dealers, importers, magazines and the RSGB have co-operated to such an extent. And I think it's nice to see the profit motive being abandoned in favour of promoting amateur radio. I hope you agree and will do what you can to help the group to help our hobby.

So, if you know anyone who has expressed even a passing interest in amateur radio or shortwave listening, suggest they visit Live '94. If you know anyone who is going to the show, ask them to call in at our stand. If you hear one of the special event stations on the air, try to work them.

Prizes And Free Tickets

You could win a major prize and free tickets! The exhibitors in the Amateur Radio Village want to encourage visitors to the stand and to keep the stations busy. So, they're giving away some major prizes in two competitions.

Visitors who leave their QSL cards with us will be entered into a free draw and anyone who works one of our stations will be sent a special numbered QSL card which will go into another free draw. There will be some wonderful prizes to be won - more details in next month's PW. It's on sale on September 8 - don't miss it

And don't forget - the PW team are looking forward to seeing you at Live '94 between September 20 and 25th.

PW

Practical Wireless has 20 pairs of adult weekday tickets to give away in an easy to enter free competition. All you have to do is put your name and address on a postcard, attach the corner flash from the bottom of this page and send it to Practical Wireless September, Live '94, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Entries must be received by September 8 1994 when 20 postcards will be drawn from the Editor's biscuit barrel.



Don't forget, a full 'Club News' listing is available from the PW Editorial Offices for a stamped, self addressed envelope, marked 'Club News' Sheet.

CLUB Spotlight

*Moved into a new club room ? Won a contest? Got a funny story or news of a special event?
Send your information to the 'Club Spotlight' newshounds Donna Vincent and Zoë Shortland
at the PW Editorial Offices.*

New Premises And Award

The **Sheffield Amateur Radio Club** presently have 40 members, but are hoping to increase this number now that they have moved to new premises.

Over previous years, the Sheffield club have been responsible for helping amateurs get through the Radio Amateurs Examination (RAE) and the Novice exams or by helping them on the air, or sorting out equipment. Despite their youngest Novice trainee being only seven years old, they hope to get all their current prospective Radio Amateurs through the exam and on the air by this summer!

The club also have their own award called 'The Sheffield Award' which is issued to people outside of the Sheffield area. To obtain this award, you must make contact with 15

stations in five districts for a Bronze award, 30 stations in ten districts for a Silver, and for the Gold award, you have to make contact with 45 stations in 15 districts.

If you fancy joining the club and meeting the members or even contributing to their talks, the club meets every Monday at 7.30pm at **Club 197, Brook Hill, Sheffield, Nr. Sheffield University**.

A couple of events coming up that might be of interest to you are the club's expedition to Skegness, a family day out on August 19. On August 22, you can go and talk about any radio problems you might be experiencing, and put forward your queries to the club's panel of great brains on all radio amateur aspects. For more information you can ring their Secretary **David Briggs G0JJR** on **(0742) 446282**.



Just a few of the Sheffield ARC Club members (back row L to R) Margaret G0ILX (Chairperson), Ron G4UMQ, (Treasurer), Rick G7DSD. (front row L to R) Roy G0NRM, David G0JJR (Secretary), Irene G0SFH, Mick G0TKO, Colin G0CVT and Barbara G0KBD.

All Change

The **Alridge & Barr Beacon Amateur Radio Club** have recently changed their meeting place. The new venue is the **Aldridge Central Community Centre, Middlemore Lane, Aldridge, Walsall WS9 8AN**. Club nights have also been changed to the first and third Mondays of the month (not on Bank Holidays), with meetings commencing at 7.30pm for two hours.

The events that are coming up in the following year include talks by various speakers, construction nights as well as a summer and Christmas party to help raise money for the Aldridge & Barr Beacon ARC. The club also run special event stations in connection with local events.

If you would like to find out more about the Aldridge & Barr Beacon ARC **Charles Baker GONOL, 19 Elizabeth Road, Walsall, West Midlands WS5 3PF. Tel: (0922) 36162** would be pleased to hear from you.

New Bridgend Club

Practical Wireless has recently received news that **Roger GW3XJC** and **Tom GW0TOM** would like to invite people who are interested in Amateur radio to help form a new club in the Bridgend area. The idea of the club will be to encourage enthusiasts to improve their radio knowledge by construction, modifications and club talks etc.

Roger and Tom already have three amateurs involved who are registered as Novice instructors and several others who are qualified to teach Morse. It is intended initially to hold club meetings once or twice a month.

If you are interested in joining please ring **Roger GW3XJC** on **(0656) 733729** or **Tom GW0TOM** on **(0656) 736954**.

Poole Rally Reminder

Poole Radio Society would like to remind members, locals, enthusiasts and traders that they will be holding a club stand at the Flight Refuelling ARS Hamfest on August 14 1994. Anyone who is going along to help run the stand is welcome to take along any 'junk' they that wish to try and sell.

The club is also hoping that they can encourage new members to join. If you're interested in finding out more about the Poole Radio Society's activities go along on the 14th and have a chat.

Contacts for the Poole Radio Society are **Vernon Cotton G3BCI** on **(0202) 760231** or **Phil Mayer (0202) 700903**.



Operation 'Golf Balls'

The **Scarborough Special Events Group** will be on air as GB30FYD during the weekend of September 17 & 18th 1994 to celebrate the 30th Anniversary of RAF Fylingdales. Operation will be on the h.f. bands around 3.725 and 7.055MHz. There will also be activity on the 144MHz bands.

The famous 'Golf Balls' which have been perched amid the bleak North Yorkshire Moors since September of 1964 have almost been dismantled. They are being replaced by a solid state Phased Array Pyramid. This is the most sophisticated radar in the world-wide chain of Ballistic Missile Early Warning Stations.

The first ever amateur radio operation, from inside the base at Fylingdales will take place over the weekend and the station will be on the air from 0900 to 1800 on both days. A full colour QSL card has been produced for the event, showing the 'Golf Balls' and the new Phased Array Pyramid. Further information on GB30FYD can be obtained from **Roy Clayton G4SSH, 9 Green Island, Irton, Scarborough YO12 4RN.**

Help For Wood Green Animal Shelters

Hoddesdon Radio Club was formed in 1992, and has carried out a policy of helping charities and causes in the community. In doing so, they hope that amateur radio will be seen in the best possible light by everyone.

COMPSIG	DATE	TIME	MODE	YEAR	UTC	SRG	REP	MODE
TS 490 SAT								
TCVH FT280 RB								
QSL VIA BURC								

TS 490 SAT PWR 100/25W WINDOM HARI
TCVH FT280 RB ANT TELE YAGI
QSL VIA BURC 775 WAR SQ TL21

The QSL card that will be sent out to all stations who are contacted during Hoddesdon Radio Club's sponsored special event.

On August 27/28/29 1994, the Hoddesdon Radio Club will be operating a Special Event Station under the call-signs GB1 & GB2WAS to raise funds for Wood Green Animal Shelters at Godmanchester. The station will be operating on 3.5 to 28MHz h.f. and on 144MHz v.h.f., f.m., s.s.b. and packet radio. The Special Event Station will be on air from 0001 on August 27 until 1800 on Monday 29th. The club expects over 10,000 people to attend over the two days, and they have even had a letter of support from the Prime Minister the Rt. Hon. John Major MP!

If you require any further information, you can contact the club's secretary **John Rudd G7OCI, 23 Grange Gardens, Ware, Hertfordshire SG12 9NE. Tel: (0920) 466639.**

Solent Club Repeater

The **Solent Club for Amateur Radio & Televison (SCART)** is currently involved in the design, construction and installation of a television repeater in the 1300MHz band, GB3AT.

The SCART club meets on the first Tuesday of every month at the **Royal British Legion Club, 366 Brook Lane, Park**

Gate, Southampton SO3 6DP. Anyone who is interested in becoming a member is welcome to go along to club meetings.

For more information on SCART contact **Ian G6HNJ, Ravenswood, The Shires, Hedge End, Hampshire SO3 4BA. Tel: (0703) 556564.**

Poldhu Honorary Member

Following a recent visit to the **Poldhu Amateur Radio Club GB2GM**, Rob Mannion G3XFD was made an honorary member of the club. Rob, accompanied by Donna Vincent and Ailsa Turbett from *PW*, attended the club where he gave one of his 'famous' talks on the history of *Practical Wireless* and chaired a question - and - answer section with the club members.

To commemorate Rob's honorary membership he was presented with a card welcoming him

to the club, a large Saffron cake and a Cornish flag. The evening went very well with about 40 members attending to welcome G3XFD to the Poldhu ARC.

Poldhu's club house is situated on the Lizard Peninsula which overlooks Poldhu cove. From the club house you can see the Marconi Memorial, which marks the spot where Guglielmo Marconi proved in 1900 that it was possible to communicate across the Atlantic by wireless.

Club nights are Tuesdays and Fridays at 7.30pm with a h.f. net on

Wednesdays. For more information contact **Eric White GORJH on (0326) 290638.**



Isle Of Man Newsletter

The 'Club Newsdesk' recently received a copy of the QSP Newsletter from The Isle Of Man Amateur Radio Society.

The club meets at The Royal Naval Association, Regent Street, Douglas at 8.30pm on Mondays, and on Thursdays at The Manx Legion, Douglas Street, Peel at 9pm.

Membership fees are £8, £12 for families, £4 for students, £4 for pensioners and for overseas members the fee is also £4.

The club announce that any contributions to the QSP Newsletter are always welcome. Small ads, stories of your mishaps, questions or even news are required.

If you wish to contact the club to find out more, you can telephone their Secretary **Mr Chris Wood GD6TWF on (0624) 611507.**



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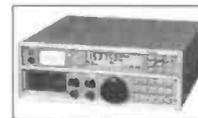
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Amateur Radio in Orbit

- Getting Started on Satellites

Regular PW 'VHF Report' author David Butler G4ASR first poses the question 'What is an amateur radio satellite?' Then he sets out to answer it in his article for budding satellite users.

An amateur radio satellite is a man-made object launched into orbit around the earth. The satellite is equipped with receivers, transmitters, antennas and remote control electronics.

Power to the satellite is supplied by batteries. These are normally charged by solar cells.

Signals are received by the satellite from one amateur band and are re-transmitted in a part of another amateur band. This system arrangement is called a transponder.

Unlike ground based repeaters, satellite transponders cover a wide frequency band. The transponders typically have a bandwidth of 200kHz or more. Far more than one terrestrial f.m. telephony channel!

Satellite transponders are also linear translators. This means that any type of narrow-band signal could be used. I say 'could' because some transmission modes such as c.w. or s.s.b. are preferred because of their low duty cycle. Modulation systems such as f.m. or a.m. for example are power hungry.

Amateur radio satellites are sometimes called OSCARs. The acronym OSCAR stands for Orbital Satellite Carrying Amateur Radio.

Russian satellites use RS as an identification. The acronym RS stands for Radio-Sport, the Russian description for amateur radio.

Every satellite in orbit is given a name. For example, AMSAT OSCAR-10, UOSAT OSCAR-11 or LUSAT OSCAR-19. They are generally named after the organisation or country that fund them. Incidentally, AMSAT stands for the Amateur Satellite Organisation.

In common usage, the satellite names are generally shortened to UO-11, AO-13 or LO-19. The Russian satellites are identified as RS-10 or RS-12, etc.

Three Generations

Three generations of amateur radio satellites have been built since OSCAR-1 was launched on December 12 1961. The first generation, Phase I, were low power packages launched with other

Government satellites.

The aim was to prove that radio amateurs could build a satellite. The next objective was to prove that useful communications could be achieved with OSCARs. Thus Phase II commenced with the launching of OSCAR-6 on October 15 1972.

The OSCAR-6 satellite carried a 1W output, 145 to 29MHz transponder. Many tens of thousands of QSOs were made during its five year life. Phase II satellites were in low earth orbit (l.e.o.) with limited communication time.

What was needed were satellites in a much higher elliptical orbit. This would increase the available communication time dramatically. So the Phase III programme was started.

Unfortunately the first in the series, OSCAR Phase III-A, was dumped in the Atlantic minutes after launch in 1980. The second Phase III satellite, OSCAR-10, was successfully launched on June 16 1983.

The OSCAR-10 satellite was placed in an elliptical orbit allowing contacts over 16000km to be made. Will there be a Phase IV generation of OSCARs in geostationary orbit? The answer to this is maybe - but I don't think it will happen in our lifetime.

The idea of reliable communications 24 hours a day is great but it will also cost an enormous sum of money. Certainly in excess of £15 million pounds.

There would also be the need to have three dedicated command stations (and hot stand-by facilities) to maintain control of the spacecraft. In the meantime, a complex Phase III-D satellite is being constructed. (You can read more about it in the March 1994 issue of *PW*).

Many Satellites

There are many OSCAR or RS satellites presently in orbit. In fact, including MIR, the Russian Space Station, there are now 18 orbiting the earth.

The majority of satellites are for communications purposes. This is normally via c.w. or s.s.b. However, some satellites even allow conventional f.m. operation.



Fig. 1: Freddy de Guchteneire ON6UG with his 2.4GHz satellite-band antenna system.

Increasingly, a number of OSCARs are being built for packet radio operation. These PACSATs, as they are called, allow store and forward message handling for packet operators.

Some satellites even have CCD (charge coupled devices) video cameras on board. With this facility, digitised pictures can be beamed down to your shack.

Many satellites have beacons to indicate their presence. Most have channels of telemetry data and this can be decoded to give information about the satellite.

The University of Surrey have built a number of satellites specifically for hardware and software development. One of these is UOSAT OSCAR-11. It too sends down data about the satellite and its experimental packages.

Many Attractions

There are many attractions to amateur radio working via satellites. One is that v.h.f. operators can work world-wide DX without the need to pass a Morse test.

Many Class-A operators also prefer to work satellite of course. You can contact the same operators regularly without any regard for the vagaries of ionospheric propagation.

Just imagine - you could have a regular net with friends in USA, Japan and UK all

at the same time! Those that just want to make QSOs can do so in the knowledge that the bands never normally close providing the satellites are okay!

Antenna systems for satellite operating can be small yet effective (and perhaps more importantly!) socially acceptable. And you'll probably won't need to worry about who's knocking on your door to complain about TVI!

But satellite operating goes much further than that. There's a lack of bad operating practices. Maybe it's because some element of expertise is required to get an efficient working system.

Certainly some aspects of satellite working are technically challenging. However, I think the good operating practices is because satellite operators are intrinsically a nice bunch of people!

Satellite Service

Many amateur allocations have sub-bands allocated to the Amateur Satellite Service. Your amateur radio licence regulations booklet (BR68) gives full details of these.

The most popular bands at the current time are 29, 145, 435 and 1269MHz. Most satellites, but not all, operate with dedicated up-link and down-link bands. These transponder combinations are referred to as the operating mode.

Table 1, gives details of the current modes of operation. Newer generation of satellites will possibly carry a number of separate receiver-transmitter units.

The separate units will be interconnected by a diode matrix to allow transponder cross-strapping. **Table 2**, gives details of the new terminology.

In the new system the first letter will denote the up-link. The second letter will denote the down-link from the satellite. Therefore, Mode S, 435MHz up and 2.4GHz down, will become Mode US.

I'm not intending that this short introduction to satellite operating to provide frequency details of every OSCAR or RS satellite in current usage. However, I can provide, on receipt of an s.a.e. (please!), an up-to-date listing.

Two Types

There are two types of satellite orbit commonly associated with OSCARs. These are polar and elliptical orbits. The geostationary orbit, used extensively for satellite TV and international communications, has not as yet been used.

Polar orbiting satellites, as the name implies, are in a circular low earth orbit (l.e.o.) between the north and south poles. The time period taken for a polar satellite to orbit the earth depends on its altitude.

At 130km, for example, it takes 87 minutes. The RS-10 polar orbiting satellite is 1000km high. This produces a period of 105 minutes.

Table 1: Satellite band Modes

Mode A	145MHz up-link	29MHz down-link
Mode B	435MHz up-link	145MHz down-link
Mode J	145MHz up-link	435MHz down-link
Mode K	21MHz up-link	29MHz down-link
Mode L	1269MHz up-link	435MHz down-link
Mode S	435MHz up-link	2400MHz down-link
Mode T	21MHz up-link	145MHz down-link

During each period the earth is also rotating. The amount of the earth's motion during one orbit is called the increment.

Using RS-10 as an example it can be seen that the satellite will appear to move 26° further west every orbit. Every 24 hours RS-10 completes nearly 14 orbits of the earth.

Stations in the UK will be in range for approximately nine of these orbits. One of the problems associated with satellites in l.e.o. is availability of communication time. Typically it's around 20 minutes or so.

Elliptical Orbit

The second type of satellite orbit is the elliptical type. The first use of this orbit was by the Russians. Their name for it is molniya and this type of elliptical orbit is sometimes referred to by that name.

To be strictly accurate, a satellite in a molniya orbit has to have a very specific orbital inclination. Most satellites in elliptical orbit don't normally possess this characteristic. The AO-13 satellite is in an elliptical orbit.

The satellite can be visualised as prescribing an ellipse around the earth. The nearest point to earth (perigee) is about 2500km. The furthest point from earth (apogee) is around 36000km.

At times, AO-13 will accelerate towards perigee. This part of the orbit will have similar characteristics to a low earth orbiting satellite.

Having partly orbited the earth AO-13 will head out towards apogee. It will then appear to hang in the sky for up to 10 hours before moving back to perigee. During this time your antennas need very little re-pointing and you can work world-wide DX.

Initial Step

The initial step in using any particular satellite is to know where it is. There are two reasons for this and the first is because it moves!

Some satellites appear to move exceedingly fast and some a bit more leisurely. And, as most satellite communications require directional antennas, you'll need to know where to point them.

Secondly, it's pointless trying to communicate via an OSCAR if it's below your horizon at certain times. Therefore, to track a satellite you need the following information: Where are you located? What's the time? What are the

characteristics of the satellite orbit?

Next, you'll need a device to provide the tracking information from the three items mentioned. But before I turn you completely off satellites as being too complicated, I'll let you into a secret. You only need to know the time to enable you to work some of the low earth orbiting satellites! (More of this later).

Tracking Information

The device to provide the required satellite tracking information can either be in a manual graphical form or a computer program. Nowadays however, it's so easy to go for the computer option.

Despite the computer option, the graphical method is inexpensive compared to the PC and it doesn't make any noise! It also gives you a real feel for the nature of orbits and your knowledge will expand.

The graphical tracking method basically consists of a map centred on the North Pole. A number of clear overlays allow the map to be used for changing orbits or different locations on earth.

In use, the overlays will determine the satellite track and its range from your location. It will also provide azimuth and elevation beam headings.

One of the easiest methods to use is the OSCALATOR available from AMSAT-UK. But (and it's a **big** but!) you'll also need details of the satellites equatorial crossing (EQX) times. These are also available from AMSAT-UK but it's best to become a member first!

Those of you with a computer will have no problem in obtaining tracking information. There's a wealth of software available for almost every machine on the market.

Once the program is installed it will then only be necessary to update the characteristics of the satellites orbit. These characteristics are called keplerian elements, or keplers for short.

The keplerian elements are available weekly on the packet radio network or from specialist groups such as AMSAT-UK. The PC will then churn out real-time data of azimuth and elevation headings.

With more software, interfacing and az/el rotators your entire system can be automated. The computer controls the antennas leaving you to work the DX.

All Shapes

As I've already mentioned OSCARs come in all shapes and sizes. So, the equipment you'll need will be dictated by what you want to do.

Fortunately however, it all boils down to the following basic requirements. An up-link transmitter, a down-link receiver and an antenna for each band.

Let's first consider a polar orbiting satellite operating in Mode A. This could

be worked with a 145MHz transmitter running between 10-20W, a 29MHz receiver and two dipoles.

The transmitter, a multi-mode is ideal, should be capable of running c.w. and/or s.s.b. And, as I've already mentioned, the use of a.m. or f.m. is not recommended.

The 29MHz receiver should possess good sensitivity. Antennas for Mode A can be quite simple. Almost any piece of resonant wire will give some sort of results at 29MHz.

A dipole or better still two dipoles at right angles should be quite adequate for most contacts. At v.h.f. a similar antenna system could be employed.

But if you're thinking of using a vertical whip antenna - forget it! It will give poor results.

Much more successful is the horizontal dipole. It does have blind spots off the tips of the dipole though. The antenna will work even better if a second dipole is set in the horizontal plane at 90° to the first dipole (this is the popular crossed dipole).

At extreme range, where the DX is, a small horizontally polarised Yagi antenna could be used. It need have no more than 5-elements. Despite this, the fixed dipole approach is useful for a newcomer to satellites because you don't need to track the satellite.

More Sophisticated

If you want to work via an OSCAR in elliptical orbit (AO-13 in Mode B for example) you'll need something a little more sophisticated. A 435MHz transmitter running 25W into a beam will give marginal results.

If you increase your power to 50W the results will become more consistent. Then you'll need a good 145MHz receiver, maybe even a low noise amplifier.

You'll also need a pair of small beam antennas, and 10-elements for each band should be sufficient. However, at these frequencies you might want to allow for Faraday rotation.

Faraday rotation is the effect whereby the signal's plane of polarisation is rotated as it passes through the ionosphere. It may therefore be useful to invest in a pair of crossed-Yagis. These could be configured to operate with circular polarisation.

Having said that, whilst circular polarisation may be desirable it's not essential. It may be simpler to bring separate coaxial feeds from the crossed Yagis into the shack.

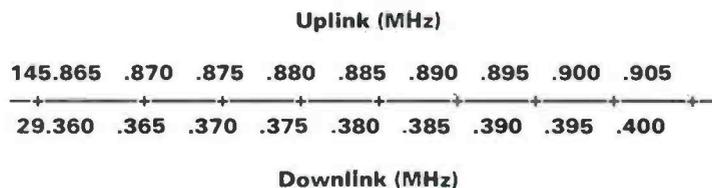
You could then select whichever of the linear polarisations gives the strongest signal. Of course, if you're using Yagis then it's important to track the satellite.

An antenna rotator and some method of elevating the antennas is necessary. A combined azimuth/elevation rotator is a neat, but expensive solution.

Table 2: New band terminology

Mode V	145MHz band
Mode U	435MHz band
Mode L	1.2GHz band
Mode S	2.4GHz band
Mode C	5.6GHz band
Mode X	10GHz band

Fig. 2: RS-10 frequency plan



Microwave Mode

Perhaps you're a microwave enthusiast and want to work AO-13 in Mode S. Again you'll need about 50W to a small Yagi for the 435MHz up-link.

On receive you could use a small dish with helix feed. A low noise amplifier will be essential. This could then feed a 2.4GHz down-converter with, typically, an i.f. output at 144MHz.

The photograph, **Fig. 1**, shows **Freddy de Guchteneire ON6UG** with his Mode S receive system. At the time of the photograph we were attending the IARU Conference in Belgium.

Although the dish was very small (500mm) the received signals from North American stations were very strong. It was most impressive.

Where you start is up to you and if you want to make a satellite contact as soon as you've read this article then do it via RS-10. If you want to have an unhurried QSO with a station at some distance then you'll have to go away and build up the system properly.

Some operators advocate that you build up your system first. In their opinion you may get fed up with all the hustle and bustle of working low orbit satellites. Far better to build a 'proper' system and make some real contacts!

First QSO

Assuming you have the equipment, this is how I suggest you make your first QSO via the RS-10 satellite. And, the first thing you have to do is to listen to its beacon frequency on 29.358MHz.

When you eventually hear the RS-10 beacon, make a note of the time. This satellite has an orbital period of about 100 minutes. It is therefore easy to calculate when the next pass will be.

The RS-10 satellite completes just over 13 orbits a day. About nine or 10 of these should be audible to stations located above latitude 52°.

Now look at the frequency plan, shown in **Fig. 2**, and then listen to a clear

frequency, say 29.370MHz. Now move your transmitter to 145.875MHz.

Theoretically, you should hear yourself coming back. However, in practice your down-link will be up to 3kHz off frequency due to Doppler shift.

Once you hear yourself, it may be useful to experiment before having a live contact. It's most important that when you

begin calling that you compare the strength of your signal to that of the beacon.

You should adjust your transmitter power so that your return signal does not exceed that of the beacon. The satellite transmit power is shared by all signals within the transponder.

Adjusting your up-link

ensures a fair share for all.

In QSO it's conventional practice to alter your transmitter to eliminate Doppler shift on receive. So, your first practical test could be to see how much you have to alter your transmitter to keep yourself in the passband of your receiver.

Once you have confidence in your system you can call CQ and hopefully make your first OSCAR contact. Then if you wish you can progress to bigger and better satellites.

Phase III-D

The Phase III-D satellite, due to be launched in 1996, is a physically large and complex satellite. It will have receivers on a multitude of bands right up to 10GHz.

Similarly, down-link transmitters will extend all the way to the 24GHz band. A programmable i.f. matrix will be capable of selecting any desired combination of bands.

Transmitter powers will be enormous compared to previous packages. For example, 300W on both the 145 and 435MHz bands. Both to antennas with more than 11dB gain!

On 2.4GHz it's planned to run 160W into a 20dB gain antenna. The potential for working DX with a small antenna system will become reality.

Of course, all this doesn't come for free! It costs over £3.25 million to design and develop the Phase III-D satellite.

All AMSAT groups around the world have launched an appeal to provide funds. The membership of AMSAT-UK have donated over £110,000 so far.

But it won't stop there. Funding is still required for this exciting project. Hopefully this article has prompted you to take some interest in satellite communications.

If so, take the next very important step. Join AMSAT-UK. Telephone Ron Broadbent G3AAJ on 081-989 6741 for details. Alternatively send a s.a.s.e. plus a 36 pence stamp to AMSAT-UK, London E12 5EQ for an information pack.

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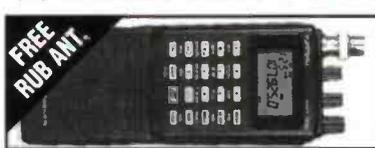
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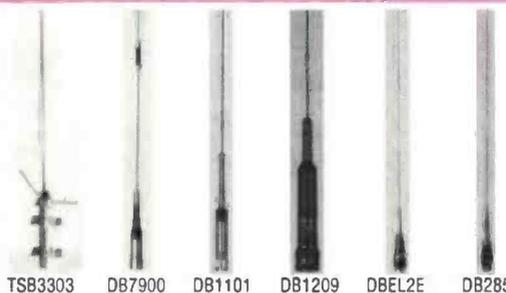
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Making A Gutter Mount Antenna Bracket

Keen mobile operator and homer-brewer Kevin James G6VNT describes his simple idea for a gutter mount antenna bracket.

This is a simple DIY project for a very compact bracket. The finished project can be used on most cars fitted with rain gutters.

The main body of the bracket is literally a piece of 5/8in diameter aluminium tubing, flattened on one end, as shown in the diagram Fig. 1. A small plate with a hole drilled in it (shown in Fig. 2) clamps the tube to the car gutter by means of a screw and wing nut.

Making The Tube

When making the tube, I took a 200mm length of the aluminium. I then hammered it flat on an improvised anvil.

The flattened end can then be held in a vice and bent to the angle shown in Fig. 3, or that which is most suited to your own vehicle. The angle shown suits my Volvo 340 car which was in use at the time.

When building the prototype I then cut the tube to length with a standard plumber's pipe cutter. You can use a hacksaw, but it does not give such a clean cut as the rotary type pipe-cutter.

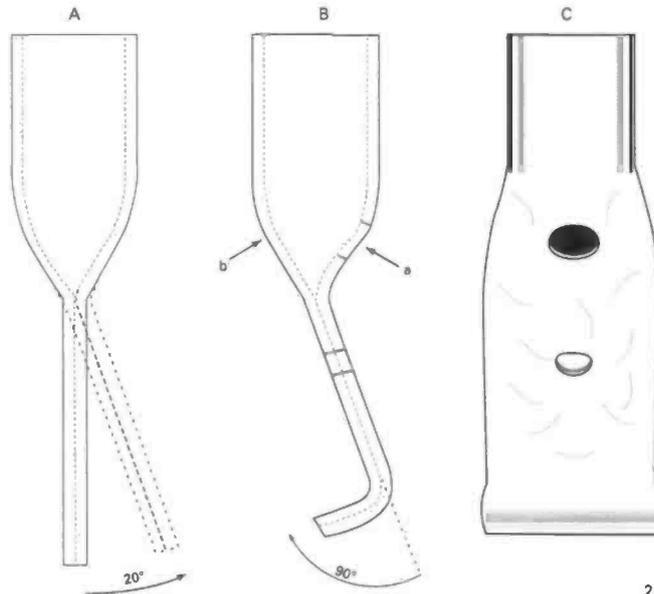


Fig. 1: The various stages in preparing the gutter mounting antenna bracket described by G6VNT (see text). Position b is an alternative cable entry hole.

Chassis Mounting Socket

You will find a SO239 chassis mounting socket fits snugly in the open end of the tube. I've illustrated this in the main assembly diagram, Fig. 3.

Next, a four metre length of RG58 coaxial cable is soldered to the rear of the socket. Then, it can fitted into the end of the tube and cemented into place with an epoxy resin adhesive (Araldite Rapid or similar).

The tube has a 10mm hole drilled in it below the socket. The hole then has a rubber grommet inserted in it, to take the RG58 coaxial cable.

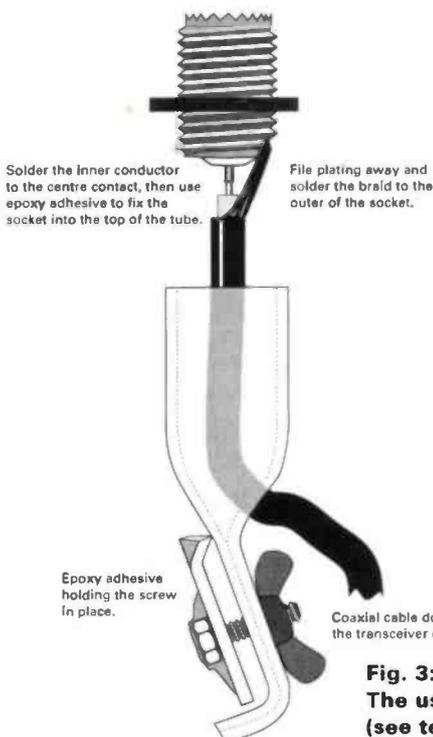
When the epoxy resin adhesive has gone off or 'set', (I used the 10 minute variety) surplus material can be trimmed off. You use a Stanley knife or scalpel before it sets too hard.

You can then spray the assembly with matt black paint obtained from your local car accessory dealer. Actually, I baked my prototype hard with my wife's hairdryer!

The Antenna

To make your own antenna, just solder a 480mm length of stiff wire into the back of a PL259 plug. Then trim it for best v.s.w.r.

However, I bought one for £4.95 at the



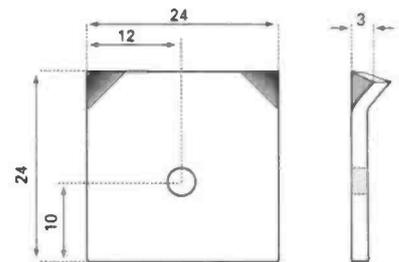
Solder the inner conductor to the centre contact, then use epoxy adhesive to fix the socket into the top of the tube.

File plating away and solder the braid to the outer of the socket.

Epoxy adhesive holding the screw in place.

Coaxial cable down to the transceiver or receiver.

Fig. 2: The small clamping plate, all dimensions in millimetres (see text).



time, so I didn't think it was worth the hassle despite the fact that I'm a keen home-brewer!

Now, it's time for a safety tip. If you make your own antenna, make sure you fit a cap, or bend the end of the end of the antenna over.

Worked Well

My prototype bracket worked well and introduced very little v.s.w.r. into the line. I didn't try it on 430MHz, so no tests have been done to see how well it performs.

There doesn't seem to be any logical reason, why the bracket should not work equally well on 430, as it does on 144MHz. But you should remember that there'll obviously be more loss on 430MHz, as opposed to 144MHz.

Have fun building the bracket, you should find it easy to make. You'll also save quite a bit of money!

PW

Fig. 3: The completed gutter mounting antenna bracket in the final stages of assembly. The use of quick-setting epoxy resin adhesive provides a strong joint and waterproofing (see text).



The Kenwood TM-733E Dual-Band Mobile Transceiver

Modern cars have a big problem when it comes to mounting amateur radio equipment. There's never a lot of room unless you've got a really big vehicle (but even heavy lorries seem to be cramped for space nowadays!).

I've often commented in *PW* on the problems operating mobile amateur radio with modern cars. However, as Editor of the magazine, I know that the manufacturers read and seem to take note of my comments and criticisms.

It's not that I claim to have a superior or even a better informed opinion. In fact, my personal opinion probably carries little weight, but the manufacturers know that my thoughts as Editor of *PW* are guided and made up with a great deal of input, comment and feed-back gathered from our readers.

Whenever I mention something in 'Keylines' or in one of my reviews, I bear in mind what other amateurs have said to me at rallies and shows throughout the year. And when it comes to problems, especially with mobile equipment security, I had much information to base my editorial comments on.

In the past I criticised the Icom IC-737 h.f. transceiver design for not having a fully controllable r.f. gain control. As a result, with I've no doubt many other comments from around the world, Icom have now modified their design to incorporate a full gain control.

I'm also pleased to say that the Kenwood TM-733E 144/430MHz f.m. dual-band transceiver has come my way directly due to the adverse comments I've made in the past regarding the security of equipment. Kenwood (UK) told me that they thought they'd gone a long way towards solving the problems of security and installation with the TM-733E and so I agreed to try the rig out.

Smart And Small

The first thing that struck me when I first saw the TM-733E was that it was very smart and very small! And, even bearing in mind that the transceiver can be operated remotely by detaching the control panel, I still regard it as being amazingly small.

Appearances can be very deceiving though, this transceiver packs quite a punch. On 144MHz it offers 50W output while up on 430MHz it produces a healthy 35W.

The TM-733E has 72 memories, DTSS, built in and pager functions. Other features include automatic band change, selectable frequency steps, incremental MHz key, repeater reverse and offset switch and panel dimmer controls.

Rob Mannion G3XFD has tried out a dual-band 144/430MHz f.m. mobile transceiver from Kenwood which he thinks could prove useful to anyone with limited operating space in their car, while improving security against theft at the same time.



However, I think that the reason why anyone will buy this transceiver is that it's so versatile. And let's face it, if you are going to pay as much as you'll have to for this TM-733E, it has to offer you versatility, value for money and an improvement in security against theft.

So, just what else do you get for your money with the TM-733E? Well, basically speaking you get two transceivers, one for 144 and the other for 430MHz and the ability to literally place it anywhere in your vehicle, for convenience and security.

The Kenwood TM-733E offers far more than I've just described, but in my opinion the small size and remote operating facilities are the most attractive features. So, with this in mind, let's look at how I got on with the rig in my car.

Easy To Fit

It was easy to fit the Kenwood TM-733E transceiver into my car. Although the Citroën BX19 diesel estate car doesn't have a great deal of space for amateur radio equipment, I soon found a large number of locations where it could mount the transceiver control panel and the unit itself.

For the purpose of the review I mounted the transceiver main unit between the driving and passenger seats. The detachable control panel could then literally be mounted anywhere in the car.

I chose to locate the detachable control panel just in front of the gear lever, above the car radio, attaching it with the supplied 'sticky-backed' pads below the heating/ventilation controls. I fed the power supply from the 'cigar lighter' socket and this system proved more than adequate in supplying the current demands of the transceiver.

At this point, I must 'ram home' how small the detachable control panel is. It's so tiny that it can easily be hidden in a shirt or jacket pocket!

Despite being so small, the display on the TM-733E's dual tuning display is excellent. The black figures (on a yellow background) are clear and easy to read, even in the exceedingly bright sunlight we've had in the south of England recently!

The main unit, complete with speaker (mounted under the top panel of the transceiver casing) is small enough to fit comfortably between car seats. You could even place it in one of seat back pockets found in some cars, provided the airflow for the heat-sinking and the in-built fan is not obstructed.

Audio input and control of the unit on air is via the fist-microphone, which in the case of the transceiver on test, was done from the main unit next to my seat.

Once the transceiver was installed (it took me just five minutes) I was ready to go on the air.

On Air Testing

On air testing of the TM-733E coincided with a busy weekend. I was attending an amateur radio event in the north west of England, so I had a lot of driving to do.

Audio output of the Kenwood transceiver was more than adequate for my purposes. The noise generated in my car (and I regard it as being fairly subdued for a diesel) is such that I need good, clear audio from a radio.

The audio output from the transceiver was crisp and clear and provided very easy listening. I spent many hours talking to other amateurs on 144 and 430MHz as I headed from Staffordshire to Dorset. I also received complimentary reports on the transmitted audio quality.

Normally, I have a quarter wave whip antenna for 144MHz fitted to the car. However, for the purposes of the review, Sandpiper Communications loaned me their dual-band 144/430MHz whip. This was a low profile whip, mounted in same socket as I use for my own antenna.

On 430MHz I found the receiver sensitivity to be excellent. In fact I had the longest 430MHz vehicle-to-vehicle simplex QSO I've ever had as I drove down the M40. I was in QSO with the same station for over an hour as he drove to Birmingham and I travelled south to Oxford.

Perhaps the u.h.f. conditions on the day I was on the M40 provided a bit of 'motorway ducting'? But, even taking into account the possibilities of u.h.f. ducting while working mobile on u.h.f., I thought the results were impressive.

It's not often I get chance to operate with a dual-band transceiver. But I should have read the manual first, before operating the TM-733E, because my embarrassing little mistake would not have happened!

The moral is: 'Read the manual first'. If I'd read it, I would have quickly realised why I could only get the TM-733E going on 430MHz (I had forgotten there were **two** squelch controls, and that the control for 144MHz was 'hard on'!).

However, it's a credit to the transceiver that I was able to get on the air without the manual. Despite this, the manual is extremely comprehensive and despite my own mistake, it's always best to read the manual first!

Many Facilities

There are many facilities on the TM-733E. And bearing in mind my reluctance to read the (excellent) manual, they were all very easy to use.

I've only got one criticism to make on the rig, and that's linked directly with its



Fig. 1: The extremely compact detachable front panel on the Kenwood TM-733E enables the transceiver to be fitted literally anywhere in a vehicle.

Manufacturer's Specifications

General

Frequency range	144 to 146 and 430 to 440MHz
Mode	F3E (f.m.)
Power supply	13.8V d.c. $\pm 15\%$ (11.7 to 15.8V) negative ground.
Current (transmit)	11.5A or less (144MHz), 10A or less (430MHz)
Receive (no signal)	1.2A or less
Antenna impedance	50 Ω
Frequency stability	Within ± 10 ppm
Useable temperature range	-20° to +60°C
Dimensions	141 x 42 x 165mm (projections included)
Weight	1.1kg

Receiver

Type	Double conversion superhet
Intermediate frequencies 144MHz	45.05Mhz/455kHz
Intermediate frequencies 430MHz	58.525MHz/455kHz
Sensitivity	0.16 μ V (for 12dB SINAD)
Selectivity	12kHz (-6dB)
Selectivity	28kHz (-60dB)
Squelch sensitivity	0.1 μ V
Audio output	2W or higher (8 Ω , 5% distortion)
Audio output impedance	8 Ω

Transmitter

Power output 144MHz	50W (High), 10W (Mid), 5W (Low)
Power output 430MHz	35W (High), 10W (Mid), 5W (Low)
Modulation type	Reactance
Maximum frequency deviation	± 5 kHz
Microphone impedance	600 Ω

compact size. The control buttons on the detachable front panel are very small and I found them to be difficult to use.

However, other members of the PW team reminded me that the five fingers I still have...are all rather large! So, perhaps this is one criticism which may not be valid.

Most of my contacts were via simplex, but the TM-733E soon proved easy to use on repeaters. I should perhaps mention that it was the extra power output (50W) on 144MHz which enabled me to work more simplex. However, once contact was established, I often ran the rig at the 5W level and this, coupled with the excellent sensitivity of the 144MHz receiver provided many QSOs.

The transceiver has a total of 70 memory channels for storing frequencies and other data. However, I'm not going to go into full details...as I've not got enough space!

I can only say that the facilities offered on the transceiver are extremely useful. Intending purchasers should read the 118 page manual thoroughly - it's the only way to appreciate all the facilities on offer.

Summing Up

In summing up my thoughts on the Kenwood TM-733E, I must say that I liked it very much indeed. In my opinion the transceiver is expensive, but if you decide to buy one, you get access to two amateur

My thanks also go to **Sandpiper Communications of Unit 5, Enterprise House, Cwmbach Industrial Estate, Aberdare, Mid Glamorgan CF44 0AE. Tel: (0685) 870425, FAX: (0685) 876104**, for the loan of their 'Sandpiper 2 & 70' 144/430MHz whip antenna. The antenna costs £14 including VAT, plus £2 P&P and is available in either 'on glass' or body mounting forms.

bands and an extremely versatile radio.

If I were to buy a TM-733E (and I'm very tempted) I could fully justify my purchase. This is because I would then be able to leave all the necessary wiring and the detachable front panel in my car, transferring the main 'business end' of the rig in and out to my shack as needed.

To help, Kenwood provide a full range of cable extenders and a quickmounting kit, so I would end up with two rigs for the price of one and improve the security situation at the same time. With that in mind, perhaps the 'expensive' dual band transceivers aren't so expensive after all...especially when they're so versatile!

My thanks for the loan of the TM-733E (which is available from dealers at around £729) go to Kenwood (UK) at Dwight Road, Watford, Hertfordshire WD1 8EB. Tel: (0923) 816444. PW

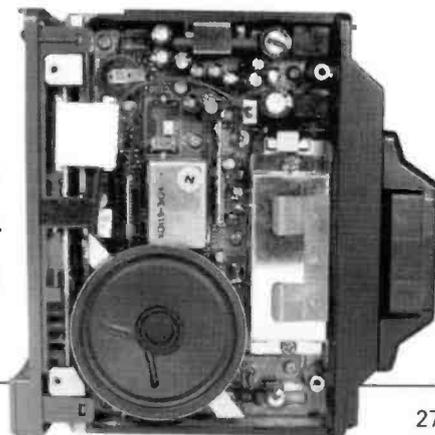


Fig. 2: An inside view of a Kenwood TM-733E 144/430MHz f.m. transceiver. The r.f. input/ output is via a single coaxial cable mounted socket.

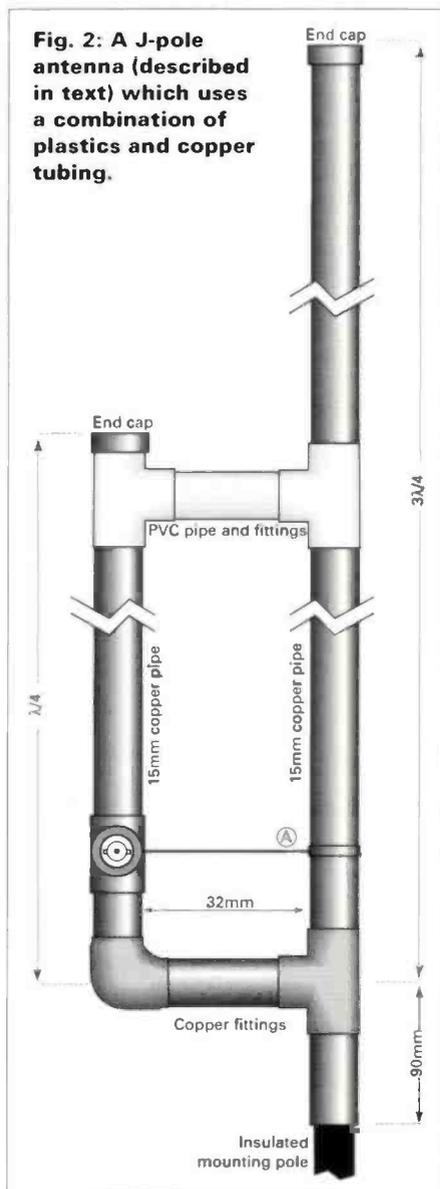
VHF Antenna Ideas For The Novice

In the second of his articles on antenna ideas for the 'novice' builder, Dick Pascoe G0BPS describes suitable projects for the v.h.f. bands.

When you're out and about, try looking into any amateur radio shop or at any rally for v.h.f. antennas. You'll find that there are many to be had, in varying shapes, sizes, gain quoted and physical size. Unfortunately though, most, but not all manufacturers give no reference point for their gain in dB (decibels).

Often, you'll hear the comment "Oh yes, it has at least 5dB of gain, it must be better than what your using now"! But just what is this 5dB? Could it be 5dB with reference to a length of wet string? Or is it perhaps with reference to a dustbin lid?

Fig. 2: A J-pole antenna (described in text) which uses a combination of plastics and copper tubing.



Gain Reference

To make any sense, any 'gain' must be quoted in comparison to a particular reference. For example: 5dBi, means a gain of 5dB with reference to an isotropic antenna. (An isotropic antenna is a totally fictitious, theoretical antenna which would radiate equally in all directions if it could be made!).

In practice, radio amateurs normally refer to the dipole antenna. So the above antenna with a gain of 5dBi will have a gain of about 3.8dBd (the 'd' indicates that the gain is compared to that of a dipole).

Of the following ideas I'm about to describe, two have a gain over a dipole while the other has none. I'll let you decide which is which!

Simple Mobile Antenna

The idea for a simple 144 or 430MHz mobile antenna idea came to me via a friend in the USA. He has tried it out with great success.

All that's required for the simple antenna is a length of strong plastics tubing. You'll also need a strong end cap, a length of fine threaded rod, and some bolts.

The idea is very simple (as are all good ideas!). To start, the coaxial cable from your v.h.f. rig is fed to the back of the car and a good length left.

Now refer to the diagram, **Fig. 1**. From this, you'll see that the length of plastics tubing is not critical, as long as it's of sufficient length to house the lower leg. In practice, it's preferable that the feeder joins the tubing at the mid section as shown.

The inset diagram on **Fig. 1**, shows the method of fixing the upper part of the antenna. The end cap of the tubing should be drilled and the threaded rod fitted with a solder tag inside the cap with two nuts on the outside and the inside. The extra nuts are for locking purposes.

The length of threaded rod should be cut to quarter wavelength for the band selected. The lower section is a length of stiff wire also cut to the same length. The antenna is tuned by trimming the length of each leg 10mm or so at a time until a point where a low v.s.w.r. is found.

The base of the mobile antenna can then be bolted to the back bumper of the

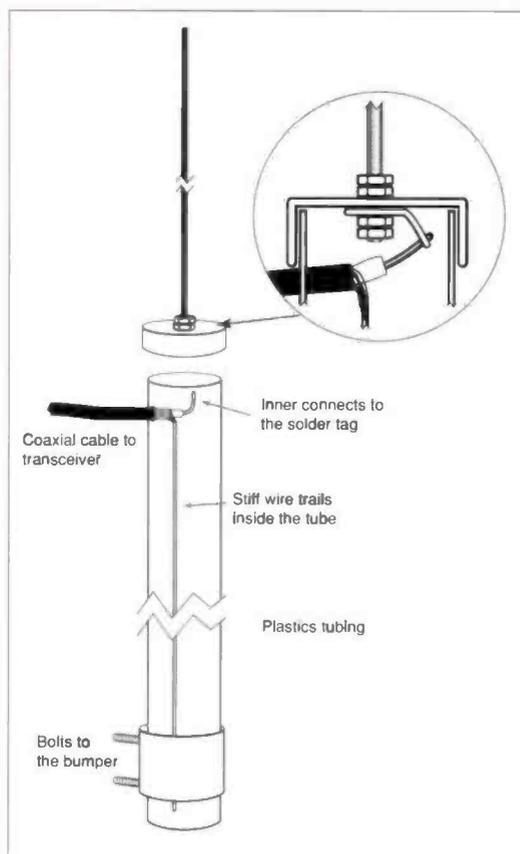


Fig. 1: The simple mobile antenna idea, described by G0BPS in the text. Also shown is a close-up diagram of the method used to secure the radiating element rod on the simple mobile antenna (see text).

car. However, the mounting of the base may be done in any way that is suitable to you or your vehicle! There's another bonus, as this idea can be used for any band, the only restriction is the physical length of the whole system.

The J Pole

The 'J' pole antenna has been around for many years in various shapes and forms. This version is ideal for a base antenna and could, in certain circumstances, be used mobile.

The diagram, **Fig. 2**, shows the complete layout of the J pole antenna with a breakdown of the component parts.

Note that some parts are made from plastics and some from copper.

In the next diagram, **Fig. 3**, I've provided a close-up view of the J pole feed point. The antenna is fed by drilling a

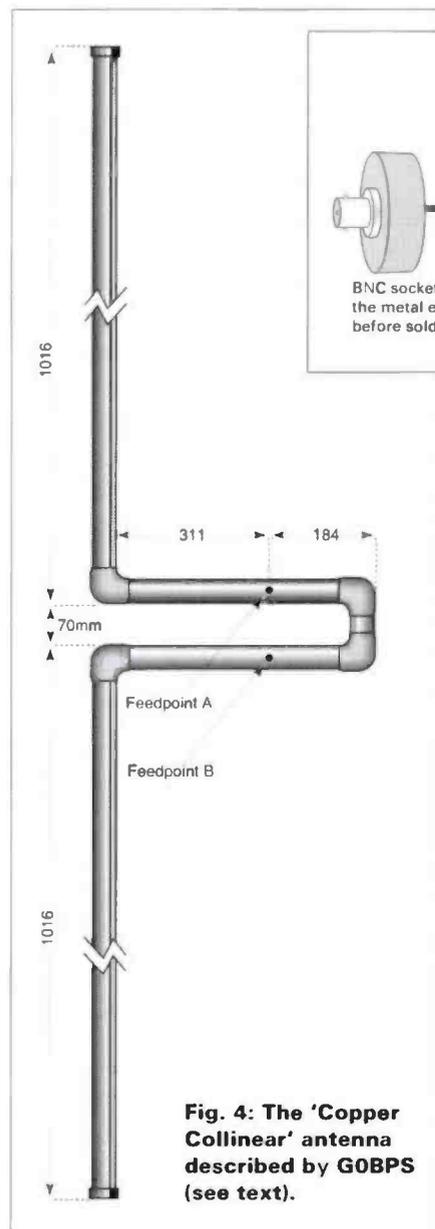


Fig. 4: The 'Copper Collinear' antenna described by GOBPS (see text).

hole in a blank end cap and fitting a bolt-in BNC plug.

A small hole is then drilled in the side of this T piece and a length of 1.5mm 16 - 18s.w.g. insulated wire soldered to the BNC plug. This is then passed through the small hole and soldered to the lug (A) on the large leg.

The upper plastics parts are there purely to hold the two copper legs in place. They perform no other function.

The antenna is tuned very simply! It's done by sliding the two connectors up or down the main legs until resonance is found.

The J pole antenna uses standard 15mm copper pipe, and any plastics pipe joints that will slide over it. Make sure that the plastics components are cemented (glued) in place once the tune-up is completed.

As it's a very simple antenna, the J pole works well on many different bands. The main leg is simply a three quarter wavelength and the small leg is a quarter wavelength on the band in use. It's very simple to build and will provide years of use.

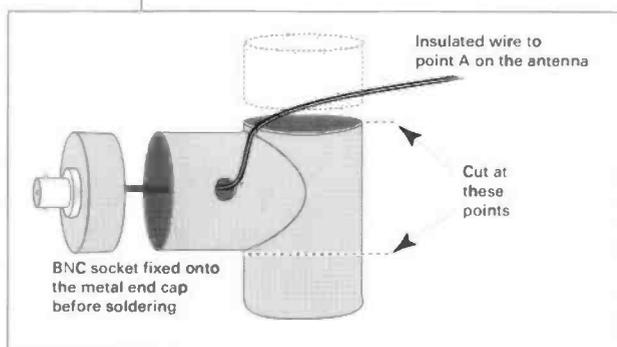


Fig. 3: Close-up detail of method used to connect a BNC plug to the J-pole antenna (see text).

Copper Collinear

Another idea on the theme of simple home-made antennas, is for a base station collinear. Home base operators may like to consider building a slightly less stable (physically) collinear type of 144MHz antenna.

The diagram, Fig. 4, says it all really! Resonance on this antenna is found by sliding the feed points, Fig. 5, along the legs until the v.s.w.r. drops to an acceptable degree.

The only difficulty is cutting the $\frac{1}{4}$ wave stub to feed the upper section. I don't know of this one being adopted for other bands but I think it should work satisfactorily.

The beauty of the three antennas I've described is that they will cost pence compared to the pounds that the manufacturers want. You can also have great fun building and trying them all out. Happy building!

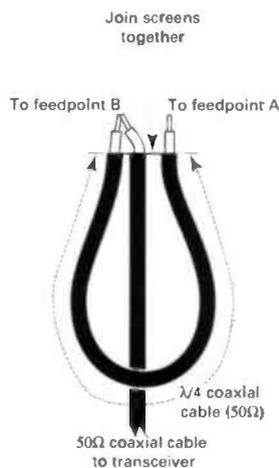


Fig. 5: Diagram illustrating the phasing line used in the 'Copper Collinear' antenna (see text). The $\lambda/4$ length of line is 66% of the 'normal' free space quarter wave due to the velocity factor of the line. On 144MHz this will be about 340mm and about 115mm on 430MHz.

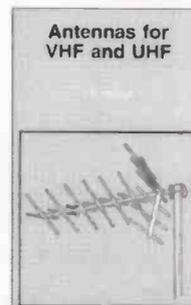
FURTHER READING

There are many books covering antenna topics, but we've picked out two at two different levels.

The first of these books is Ian Poole's *Antennas for VHF and UHF*. This pocket-sized book is ideal for both the beginner and someone looking for other ideas, or to fill in gaps in their knowledge.

In the 100+ pages are sections on antenna and general basics, getting energy to and from the antenna, dipoles, Yagis, cubical quads, vertical and wide band antennas. There's also a test and measurement section and a section on siting an antenna for best results. A short appendix of channels and frequencies in the bands completes the book.

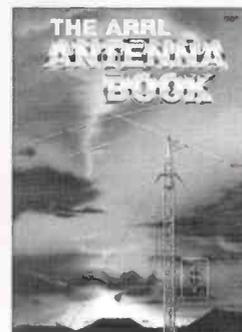
***Antennas for VHF and UHF* by Ian Poole BP301 priced £4.95 + P&P.**



Second Choice

The second choice of further reading is the *THE ARRL ANTENNA HANDBOOK*. This has become a standard reference book and can be considered a 'must' for your bookshelf. This book contains information about antennas in general, including information and designs for all bands.

There are 28 sections to this book dealing with topics covering the whole range of antenna basics, h.f. antennas and associated topics. There is one section labelled 'VHF and UHF Antenna Systems', but other sections cover the topic as well.



***THE ARRL ANTENNA HANDBOOK* priced £14.95 + P&P.**

Both books are available, along with other related publications, from the PW Book service. For more information have a look at the ANTENNAS (AERIALS) section of the book service pages.

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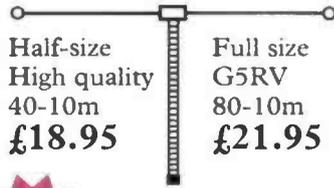


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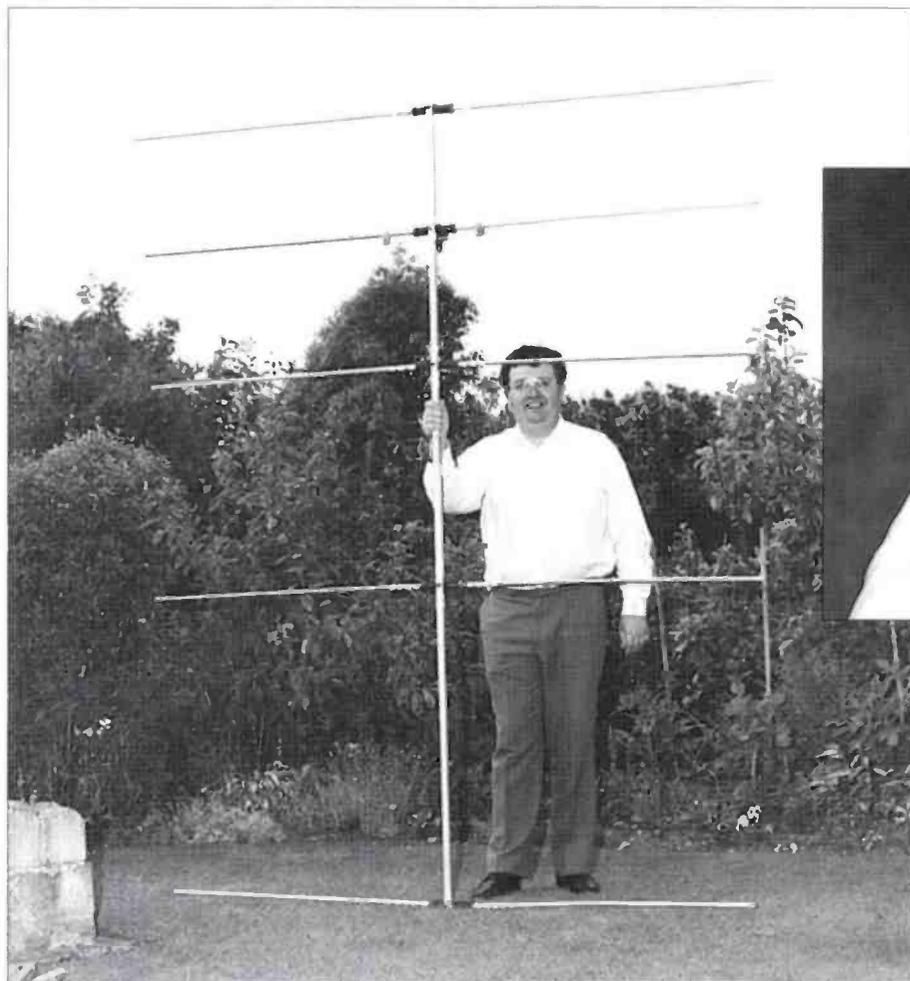
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A52 on the Derby side of the town. Just turn onto the
Estate and follow the signs for the sale



A Five Element Beam Antenna For 70MHz

Keen v.h.f. operator Colin Redwood G6MXL describes an interesting 70MHz beam that he made from a Tonna antenna originally designed for the 50MHz band.



Above: The interesting clamp design used on the Tonna antenna (see text).

Left: Colin Redwood G6MXL needed a lightweight beam antenna for 70MHz. He came up with the idea of adapting a Tonna 50MHz beam which was finished in time for a mini DXpedition to the Channel Island of Jersey.

I had been using a fairly old commercially made 3-element Yagi on 70MHz ever since access to the band was granted to Class B licence holders several years ago. During that time I had a number of QSOs, many of them during contests.

Unfortunately, I could often hear stations better than they could hear me. So, I tackled that aspect of my station last year with a small linear amplifier. Nevertheless, I still felt that there was scope for improvement.

During 1993 when I lowered the antenna mast for its 'Spring Clean' (greasing and checking connections), I discovered problems. I found that my existing antenna had taken a bit of a battering during the winter storms and mechanically it was getting near the time to draw its pension!

So, I looked around at the commercial antennas on the market for a replacement.

Unfortunately, there was not a great choice.

I'm active on several v.h.f. bands, and as I have just a single un-guyed mast, I have to choose fairly lightweight antennas. Having looked through the catalogues, those few that were on offer were too heavy.

However, on the 50MHz band I have a 5-element beam from Tonna for a couple of years with some success, and it certainly met the weight requirements. If only Tonna made a 70MHz antenna!

I scoured the Tonna catalogue. No 70MHz Tonna antenna (hardly surprising for a French company with no local 70MHz allocation!).

Old Copies

It was about this point that I started to browse through some old copies of *PW* in the cupboard. I always knew that they

would come in handy some day!

I came across an article written by the late Fred Judd G2BCX, describing how he had scaled up an antenna from 144 to 28MHz. If you could scale up a design, why not scale down a design I thought?

In some desperation, I decided to have a go at building a Tonna 'lookalike' for the 70MHz band. Whilst I'm not much of an engineer, I do at least know how to use a tape measure, and yes, I can use a hacksaw! My main concern was how to get all the materials and how to fix the element to the boom.

I was then invited to join a member of the local club on a week's mini DXpedition to Jersey. When I saw that the RSGB 70MHz Trophy Contest took place during our visit, I immediately decided that I would like to work on the 70MHz band during the expedition. The Jersey trip only heightened the urgency to get a reliable 70MHz antenna ready. I wasn't sure that I

could get my existing antenna off the mast in one piece, let alone dismantle it and re-assemble it in time.

Bright Idea

It was at this point that I had a bright idea. If I'm going to use the Tonna design, why not use some of the Tonna fittings?

Next day my copy of *RadCom* popped through the door. I don't know about you, but I always scan the members' adverts before I read the rest of the magazine - you never know when there might be a bargain to be had.

Luck was on my side. There were several second-hand 50MHz Tonnas for sale.

A quick 'phone call and arrangements were made to pick up one that had hardly been used, for a reasonable price. When I picked it up, it was still in the box, in pristine condition.

I now had everything I needed to make my 70MHz Tonna 'lookalike'. The only problem was that all the metal work was too long. The Tonna manual showed the total length of each element (not just one half).

I then measured the centre piece which is used to join the two halves of each element and attach them to the boom.

Armed with this information I could calculate the length I needed to cut off each element.

My 50MHz Tonna is designed to cover 50.000 to 50.500MHz. So I assumed it was designed for optimum performance on 50.250MHz.

As I wanted to use my beam mainly around 70.200MHz, I used a ratio of 50.250/70.200MHz for my calculations. I double-checked each of the calculations, and carefully noted the results.

Outside, I set up my portable bench in the back garden and marked each of the elements before cutting them off with a hacksaw. I cut the longest first. That way, I thought, if I made a mistake, I could probably use that one for a shorter element later!

Element Separation

I then had to tackle the element separation on the boom. I remember reading in a book somewhere that the important thing is to measure each element position from the same origin, so that cumulative errors don't creep in.

I took the advice, and hit the first real problem! The Tonna 50MHz boom is made up of three sections, joined together with brackets. My intended 70MHz element positions on the boom would clash with these brackets holding the boom sections together.

The Jersey trip was by now only days away. I needed an answer quickly. The boom length at 70MHz would be somewhat shorter than the 50MHz version.

As I wasn't going to have to pack my new antenna up in a box, there was no

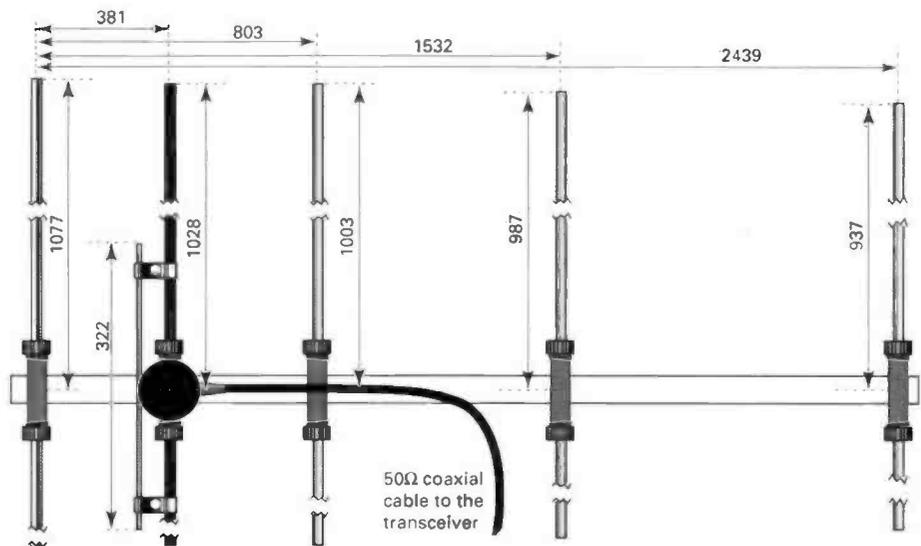


Diagram showing the final dimensions of G6MXL's modified Tonna antenna for 70MHz (see text).

need for the boom to be in several sections. So, I rang a local metal bashing amateur who recommended a local aluminium wholesaler, who would sell single lengths retail.

I bought a length of $\frac{3}{4}$ in square section aluminium long enough to meet my needs and marked it up with the various element locations. I then drilled the holes and assembled my new antenna.

Final Stage

The final stage of construction was to find the centre of gravity of the assembled antenna. I balanced it on a pencil sticking horizontally from the workbench!

The holes for the boom to mast clamp were marked and drilled. I clamped the antenna to a short pole, connected some feeder and set the matching stub up at about $\frac{5}{7}$ ths of the distance apart that I used on 50MHz.

The 70MHz gear was bought outside and connected up. I checked the v.s.w.r. which was well under 1.5:1. And I decided that I could live with that!

Listening around, the Cornish Beacon was romping in, far better than I normally heard it. But time did not permit many tests, so I set about marking the various elements with their respective hole on the boom with colour coded insulating tape.

I packed up the elements, and strapped the boom to the roof rack ready for the trip to Jersey. The boom was small enough not to overlap the front and back of the car.

Assembled Antenna

On Jersey, I assembled the antenna quite quickly. This was made easier by having a single section boom, rather than several sections, and having the colour coded elements.

During the contest which we were very late starting, we made about 30 QSOs,

with the best DX being a station in Scotland. That convinced me that my 70MHz Tonna 'lookalike' was working.

Two Versions

I have only provided the final (modified) dimensions, **Fig. 2**, that I used as a guide to help intending constructors. This is because there were at least two versions of the 50MHz Tonna antenna produced.

One of the Tonna antennas is designed to cover just 50.000 to 50.500MHz, whilst another is intended to cover more of the 50MHz band. As the original dimensions could be different between the different designs, I think it will cause less confusion if only the final, 70MHz, details are provided.

I've also heard on the grapevine of several other amateur modifications to the Tonna design. However, I have not seen any of the them published.

If you fancy having a go, you'll get more enjoyment and a sense of achievement if you figure it out for yourself! In addition to the adverts in the amateur press, you may like to keep an eye open for second-hand 50MHz Tonna antennas on Bring & Buy stands at Rallies and Club Junk Sales. You can also try obtaining the Tonna items as spares from your local dealer.

As you will have guessed, I'm not claiming any originality whatsoever. My aim has been to pass on a economical approach, for the non-engineer such as myself. I ended up with a reasonably lightweight, easily assembled, compact 70MHz antenna that performs reasonably well.

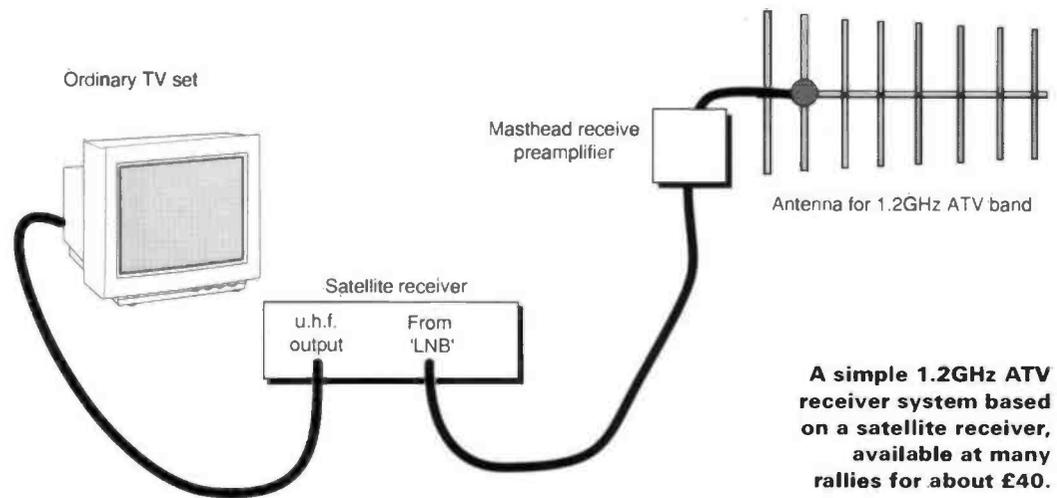
I hope this encourages you to have a go at building and modifying antennas. And, I think that many readers would agree that this is the most popular aspect of operating an amateur radio station...it certainly is for me!

PW



Simple ATV Reception

Gareth Jones
GW4KJW
describes how to assemble a cheap 1.2GHz ATV receiver system using equipment which is often to be seen for sale at radio rallies. Now you've got an excuse for buying that bargain satellite TV gear!



A simple 1.2GHz ATV receiver system based on a satellite receiver, available at many rallies for about £40.

It's a few years since television broadcasts began from the first *Astra* satellite. At that time there was something of a shortage of suitable low-cost receivers on the market.

Those stores that did have systems, usually only had models around the £200-300 mark, with a waiting list for deliveries - 'Oh no sir, more than my job's worth to let you have the shop's demo model, it's the only one we've got.'

Today the situation is very different, there are now many satellites in service. The 'first generation' satellite receivers, with their limited 16 channels have been replaced by more sophisticated models. Some of these, 48 channel sets with built-in decoders, sell for less than the original basic 16 channel models.

The market is now so competitive in some areas, that shops are rushing out new offers and deals week by week. So how exactly does this benefit the amateur television enthusiast? Simple, much of the original equipment has now been sold on or traded-in by owners upgrading to these newer sets.

Now Possible

It's now possible to buy a complete second-hand receiver system for around the £75 mark. You can often get a deal, around £40, for just the receiver itself. There are even some shops selling 'new' left-over earlier models for ridiculously low prices.

For entertainment value, satellite television is something you either love or loath. I don't propose to go into its merits or demerits. What I am going to do, is show you just how easily the equipment can be put to amateur television use.

For those not familiar with satellite television receiving equipment, there are basically three parts. There is the actual

dish assembly, seen sprouting on southern walls across the country. This is usually of the off-set focus type about 600-800mm in diameter.

Usually mounted on a boom underneath and in front of the dish, you'll see the **Low Noise Block** down converter (LNB). This item, in essence, is the 'front-end' of the receiver, performing some amplification of the received signal. An LNB may have a typical gain of 53dB and a 1.8dB noise figure in the range 10.97-11.7GHz.

Obviously, signals at such high frequencies require somewhat more complicated microwave techniques and waveguide 'plumbing', so the LNB is also a converter (mixer). The LNB mixes the satellite signals with an on-board 10GHz oscillator, down-converting the incoming signals to the much more easily managed 970-1700MHz range - 10.97GHz minus 10GHz = 970MHz likewise 11.7GHz minus 10GHz = 1700MHz.

The third unit is a box (receiver), sitting on or near your television. This unit tunes and receives the down converted signal from the LNB.

The receiver is a tunable i.f. and converts the signals to a still lower frequency in the u.h.f. TV band. The normal output channel is channel 35 (approx. 600MHz).

Let's forget the dish assembly and the LNB for the moment and concentrate on the third part, the receiver. The receiver, typically, has a channel bandwidth of around 27MHz - a little wide for amateur TV use, but acceptable. The receivers invariably have a.f.c. (7-8MHz) and very acceptable receiver thresholds of 8dB or less.

Amateur Band

The 970-1700MHz down-converted signals, includes, as many of you will have

noticed, the 1.2GHz amateur band almost slap-bang in the middle of the range. If you live in an area of high ATV activity, or near an amateur television repeater, reception is simple.

Simply connect a suitable 1.2GHz ATV antenna via a high gain receive pre-amp (for 1.2GHz), to the LNB input on the back of the satellite receiver, and you're in business. The illustration shows the technique involved.

The only significant modification you may have to make, is to the LNB voltage supply output. Many, though not all, satellite TV receivers use a type of LNB that feeds received signals to the tuner down the coaxial cable, but it expects the supply and control voltages to be on the same cable.

Since you don't really want to have 70V (or so) fed to the output of your 1.2GHz pre-amp, you need to disable this supply voltage. Depending on your type of receiver it's not very difficult to do.

You may need only to cut a track on the receiver's p.c.b., turn down the relevant pre-set on the board or even remove a component in the voltages supply stage. You should even be able to make it switchable so that it's still possible to power the LNB, restoring normal satellite reception capabilities.

I know you can buy dedicated, ready-built and aligned 1.2GHz ATV receivers or converters and, it's certainly not impossible to build your own. But for a 'dabble' on the band, to find out if it is to your taste, you won't be left with an expensive dust gatherer in your shack.

After all you can always connect it back up to a dish and use it for its original purpose - it's got to be worth it!

PW

Have you noticed how mad the retail trade has gone over pricing recently? It seems only a short time ago, several dealers were listing RRP prices. Now almost every one seems to be intent on putting the other out of business. Are these desperate times, or what? Giving products away for little profit results in poor service and lack of after care. If you can't see that new product in your local store, then you maybe buying the wrong item in the first place - however "wholesale priced" it is. I'm all for a bargain, but I've been bitten by the "how does he ever make any money, he's always giving it away" store.

When you walk into a radio store here are eleven tips to help make the right decision.

Ask the following questions, call it the Martin Lynch Customers' Charter if you like!

You'll Always Get A Better

- 1 Has he got most of the products he's quoting for on the shelf or does he have to chase around ordering it, after your credit card's been debited?
- 2 Has demonstration stock on show for you to browse at your leisure and doesn't wrap up the demonstrator when you wish to purchase, because he hasn't another in stock?
- 3 Has he got a proper workshop facility on site, sanctioned by the manufacturers?
- 4 Is he familiar with the product you're inquiring about or can he only quote you the lowest price. (Gives you real confidence if you have an operating query - or worse - it goes wrong).
- 5 When you visit the store, are you confronted with non Amateur Radio-related items - what is this retailers speciality?
- 6 Is he limited in the choice of goods you wish to view? A store biased to one make cannot compare fairly with it's competition - you may be forced into buying the wrong product.
- 7 Does he employ a "Quality Control" facility, ensuring goods sent, New, Used or Repaired are tested to specification?
- 8 Does he have a "family" area for those waiting, who are not so nuts about the radio you want to buy?
- 9 Does he present you with staff who aren't Licensed Radio Amateurs. Would you visit your Doctor, if he wasn't qualified?
- 10 The only method of attack he has is to keep slashing the price, not realising the care and attention you will need if it goes wrong.
- 11 Can't offer you "instant credit facilities", either by phone or in the store at very advantageous rates.

There are some who really don't care about price. In eighteen years of retailing one person who usually screws for the lowest price in the event of something going wrong. To category, I'm pleased I won't have the opportunity to be a MARTIN LYNCH CUSTOMER. You probably won't either. MARTIN LYNCH, we like to treat customers as for life, not one for a "few bob" and onto the next. In the meantime, I'll carry on giving you the best service versus the best after sales service you can get. Now that is guaranteed!

"Very impressed that you kept your "Price Promise Pledge"

amateur radio sales outlet in the UK"

courtesy were first class. It is a pleasure to deal with such a company"

"Certainly the best service and advice that I have ever received from an amateur radio outlet"

"Never too much trouble to give detailed explanations, even to those who know very little about the hobby"

"My second deal - very pleased. Much better attention than other companies in 45 years of amateur radio"

Service from your staff first class, also very efficient mail order"

"Your service and encouragement is second to none"

"Pressure free advice and information before buying, nice follow up to check delivery, I'll be a"

"Probably the best"

"As always, service and"

These are yet more comments from



More and more customers are realising the high quality offered by Yaesu and the "Nineties" series



of H.F. communications transceivers. The FT990 is probably the most "commercial grade" transceiver available to the Amateur. For example, no other has plug in boards interfacing to a mother board, giving you low servicing times in the unlikely event of a break down. No other has digital filters fitted as standard, giving you razor sharp selectivity. No other has a front panel layout that allows the operator to take full advantage of all the features available - without referring to the handbook every time. The list goes on. Visitors to the store always comment on how solid the FT990 feels to the hand. The performance has been underlined by Peter Hart and Rob Manion. Test drive one today!

The FT990 is available with built in PSU or as a DC version. Buy during August or September and claim your FREE filters from Yaesu UK.



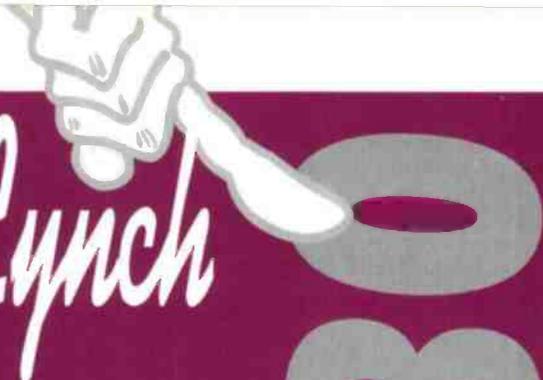
Scan IC-736

It's funny that only a year ago you were all asking for an HF rig with six, that offered 100 watts - well, well, well! The new IC-736. It didn't stop there. It was a world first, somehow they've squeezed it into the space possible! Don't forget what Peter Hart said - "amongst the best receive performance of any"

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G4HKS
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anything bar the lowest product - Amateur Radio, the price makes the biggest noise to those of you in this opportunity of letting you down. It will never be one. At last though you will be with us to the next....
you the BEST DEAL you will find in the world.

Lynch fan from now on" take it to the British Grand Prix"
"Nothing too much trouble, very courteous, very helpful"
"As usual 100% from Martin Lynch. Best in mail order in the UK"
"Congratulations on making it a pleasure to enter your premises"
"Excellent delivery time and after sales response"
"I really appreciate the trouble you went to in order to deliver the AR8000 so that I could
our satisfied customers

Limited Stock Sell-Off

Due to rather keen over ordering, I've still got a few of the items below at clearance prices. First come first served and all that. Phone First before making that journey! ALL are BRAND NEW AND COME WITH A FULL WARRANTY.

	LIST	MLP
Yaesu FT747GX, 100 Watt HF TCVR. (a "GxII" never existed!!)	£849	£649
Kenwood TH-78E, neat compact Dual Band Handie	£499	£399
Alinco DJ-580, as above but built at the Alinco factory!	£489	£389
Yaesu FT-416, 2M Handie, with 5 Watt NiCad & Charger	£349	£269
Yaesu FT890, 100W HF base/mobile transceiver	£1299	£1049
Yaesu FT890AT, as above but built in fast Auto ATU	£1499	£1249
Icom IC-737, latest HF Transceiver with built in Auto ATU	£1549	£1199
Yaesu FT-911R, 23cm handie complete with NiCads & charger ideal packet, etc	£429	£299

Super low finance is available on most of the above - phone 081-566 1120 today

Yaesu FT-900

HF MOBILE SCOOP!!

The NEW Yaesu FT-900 Mobile/Base Transceiver

On July the fifteenth, 1994, Yaesu Musen Co. of Japan unveiled their exciting (and world first), FT-900. For those of you who "preferred" to use the features of the FT-890 for mobile use, but found it a little too large, Yaesu engineers have "split" part of the front panel, enabling full feature HF mobile, with base station facilities from your cat, in the new FT-900.

For mobile operation, the new lightweight detachable sub-panel permits separating the transceiver and mounting the main unit in a remote location. This makes the FT-900 convenient for

mobile and maritime amateur operation, or wherever space is at a premium. With similar features to the FT-890, the new FT-900 incorporates an option ATU-2 Auto Antenna Tuner and many more newly introduced features, not yet seen on such a small and compact package. Operating frequency and other important settings are displayed on a high-contrast back-lit LCD. The new three-mode bargraph meter display features delayed "peak hold" circuitry for the tuning bargraph segments that simplifies tuning stations with rapidly varying signal strength.

Main Points are:

- ★ Removeable "Sub-Panel" ★ High Contrast LCD Multi Function Display ★ New "CW reverse sideband" letting you switch RX carrier offset ★ Adjustable BFO offset ★ Surface Mount Technology, on composite epoxy boards
- ★ Low Noise RX front end using parallel high-IDSS FETs ★ Twin DDS ★ 2.5Hz tuning! ★ Speech Processor ★
- ★ 100 Watts out with Auto ATU built in, not an external add-on ★

Stock available from Martin Lynch end of July. Prices start from £1299

NEW SUPER SLIM TH-79E

The TH-79E is a new very slim and lightweight DualBandier, offering features exclusive to this new design. Despite its compactness, the radio can operate full duplex and monitor two frequencies at once, within the same band. Monitoring both input and output of repeaters simultaneously are therefore possible.

80 non-volatile memory channels with ID
The TH-79E has 80 multifunction channels - all capable of storing TX/RX frequencies, CTCSS and split channel operation. Each channel can be assigned with letters (up to 7 characters) to identify each one individually. All memories are stored in EPROM, so no more worries about lithium backup!

Multiple scan Modes, DTMF Memory & DTSS & pager functions are all present in this tiny well constructed package.
★ Power on call sign display ★ Selectable dual & single band operation ★ A.B.C. (auto band change) ★ CTCSS operation (with optional TSUB) ★ Tone alert system ★ Auto repeater offset (VHF) ★ 3 position power, High/Low/Economy low ★ Over voltage display and audible warning ★ Auto power off ★ 10 minute time out timer ★

Dot-Matrix LCD & menu/guide system
Making its debut on handheld transceivers, the dot matrix display greatly improves user friendliness since there are no limitations on the variety of messages that it can handle. In addition to frequency data, this can be used to access a menu system with full alphanumeric display of functions and settings, the operator can also scroll through a summary of current operational status. What really sets this system apart is the "on-line" guide - simple operating instructions appear in the display whenever needed.



£10 Carriage On All Large Items



Yaesu FT-736

Still the only Base Station that can take all four VHF/UHF bands at once, the FT736 for 6/2/70 & 23CM is out on its own. No other offers you a built in PSU. No other offers satellite operation at the press of a button and is so convenient for packet operation. Its SSB facility allows true DX when the local FM chat becomes a bore. A Turbo front end, courtesy of messers muTek has been available for almost two years enhancing the receiver performance even more on 2 & 70.

Buy during August or September and claim your 6m card for only £100 from Yaesu UK.

The maximum retail price is only £1849, complete with PSU & auto ATU.

me when a manufacturer was going to bring across the whole range. Icom's ears must of been there however. Whilst they were busy giving a mains PSU and an auto tuner in the smallest about its brother, the IC-737 (without 6m), rig I've tested".



In this month's column David Butler G4ASR has news of wide-scale openings to North America on the 50MHz band and super DX conditions to Africa via Sp-E on the 144MHz band.

During the month of June propagation via Sp-E was an almost daily occurrence on the 50MHz band. It also extended to the 70MHz band on many occasions. But first I'll turn to reports regarding the 144MHz band.

An observation I've made every year is that Sp-E on this band seems to favour propagation in one particular direction throughout the summer season. Last year it was mainly to the south-east of the UK.

The 1993 Sp-E gave contacts into Hungary, Italy, Yugoslavia, Greece, etc. This year the propagation was predominantly to the south.

The 1994 Sp-E allowed QSOs to be made into North Africa. Stations in Morocco (CN8), Ceuta (EA9) and Algeria (7X2) were worked from the UK on at least four occasions.

From reports received, openings on the 144MHz band occurred on June 2, 18, 19, 20, 22, 24 and 25. The event on June 2 occurred between 1240-1300UTC. It mainly favoured stations located in DL, ON and PA.

Very few UK stations seemed to have got in the action. However, the station of G4FUF (JO01) reported hearing SP7RJT (KO00) and UR3DC (KO20).

The opening on June 18 was a little patchy. It was as if the ionisation was not quite enough to support communication at 144MHz.

It seemed to me that background meteor activity was just pushing the m.u.f. up to the 144MHz band. Of course it could have been meteor scatter.

The earth was encountering the June Lyrids shower at the time. However, the peak of this shower was two days earlier.

Stations in northern England reported a brief opening between 0835-0850UTC to Sicily (IT9). Later in the day, between 1630-1900UTC, Italian stations were reported.

At the QTH of G8GX (IO93) contacts were made with IK0BZY (JN61), IK7DMB (JN70) and I8MPO (JN70). Very little was heard at my QTH (IO81). Only I8MPO and TK/IK1AZP/P (JN42) were worked.

Interesting Opening

A much more interesting opening occurred on June 19. It also coincided with the PW 144MHz QRP contest!

Dave Hewett G8ZRE was one of the contestants in the PW 144MHz QRP event. He was using the call sign GW8ZRE/P from a site near Llangollen (IO83) where the 144MHz system consisted of a Kenwood TR-751E running 3W s.s.b. into a 2-element HB9CV antenna 2m above ground. He was therefore very pleased to work 7X2DS (JM16) at a distance of 1984km with as little as 3W.

Dave wonders if this is a first GW-7X contact. I suspect that it probably is. Algeria has only started issuing permits for the 144MHz band. QSL cards for 7X2DS incidentally go via Andreas Laumer DL2EAD, Wagnerpi 4, D-4005, Meerbusch, Germany.

During the same opening Spanish stations in EA4 and 7 call areas were also worked. But there was even better DX about!

The stations of CN8ST (IM64) and EA9AI (IM75) were worked by many on s.s.b. The station of CN8NS was also contacted. He was using f.m. on 144.400MHz!

A smaller opening took place on June 20. It started around 1530UTC and seemed to favour stations located in northern England and Scotland. Propagation was mainly to Portugal, Spain and Italy.

Best Of Month

Probably the best Sp-E opening of the month occurred on June 22. It actually consisted of three or four separate events starting around 1700UTC.

Operators located in DL, ON and PA were initially heard working the DX to the south of them. Stations on the east coast (JO01) then got into the action.

It then slowly spread to central and western England, Wales and finally up to northern England. Propagation was to the south allowing contacts to be made with EA and CT.

The stations of CN8ST, CN8HB and EA9AI again featured in many logs. If you were fortunate to work EA9AI his QSL information is **PO Box 2065, Ceuta 11702, Spain.**

John Regnault G4SWX (JO02) worked three EA stations between 1810-1827UTC. Later, from 1915UTC, he worked eight stations in areas EA1, 3, 4 and 5. John also worked CT1CLR, CT1DIN, CT1FAK, CT1WW and CT4KQ. The opening finished with John at 2004UTC.

At my QTH a brief opening was noticed at 1800UTC. It was not until 1930UTC that the main event started lasting some 60 minutes.

I was running with a completely new antenna system. It consists of 4 x 17-element Yagis at 25M a.g.l. fed with LDF5-50 heliax coaxial cable.

An MGF1802 I.n.a. is fitted at the feed point. Full elevation is provided by an actuator arm from satellite TV equipment. Azimuth rotation is taken care of by a Ham IV rotator. The transmitting amplifier uses a pair of 8874 triodes driven by an FT-221 transceiver.

Using the system described, in all a total of 19 s.s.b. contacts were made. Pick of the bunch was CN8ST, EA9AI and three CT stations. The rest of the QSOs were with stations in EA1, 4 and 7 call areas.

Three Separate Openings

Richard Gardner G4WKN (IO92) noticed three separate openings. The first

between 1818-1824UTC gave contacts with EA3FLN and F6HTJ both in locator JN12.

Another brief opening at 1830UTC gave further contacts with EA3DUY (JN12) and EA3TI (JN11). In the main event, 1925-2030UTC, Richard worked 12 stations in EA1, 4 and 7 and four stations in CT. The stations of EA4AJY and CT1NP were worked on S21 f.m.

Ian McCabe G0FYD (IO83) reports that he heard the Ceuta station EA9AI but was unable to raise him. However, he did work EB6YY (JM19) on the Island of Majorca. A total of eight EA and three CT stations were also worked.

Unfortunately the further north you were located the weaker the event became. In Cumbria, the station of Philip Lancaster G0ISW (IO84) only managed to work EA3DUY (JN12). Gotaways included EA3TI and EB6YY. Your turn will come Philip!

Another Sp-E opening occurred on June 24 between 1730-1930UTC. Unfortunately it coincided with a tremendous thunderstorm. Those that decided to keep their antennas connected were severely affected by S9+QRN. Yet again the best propagation from the UK was towards Spain and Portugal.

Lee G4RKV (JO01) uses an Icom IC-275E to drive a pair of 4CX-250Bs in a home-made W1SL amplifier. The antenna system consists of a pair of Vårgårda 9-element Yagis. A GaAs f.e.t. low noise amplifier is mounted at the mast-head.

Lee reported working EA9AI for a new DXCC country and IS0HQJ (JM49) on Sardinia. The stations of EA7RO and EA7TL both in IM76 were also contacted.

At the station of G4SWX the event started at 1735UTC and continued for 45 minutes or so. Contacts on s.s.b. were made with

four stations in Sardinia and five in southern Spain. The station in Ceuta, EA9AI, was finally got in the log successfully.

In between all the crashes and bangs I managed to sneak in a contact with 9H1BT (JM75). It was made very difficult by all the lightning static.

The Algerian station 7X2DS was active again but I have no reports that he was worked from the UK. He was contacting many stations in DL, ON and PA.

On the following day, June 25, there was another brief opening to Spain and Morocco. It started around 1300UTC. A number of operators in south-east England reported working CN8ST.

Little Aurora Activity

Very little auroral activity was detected during June. All openings, on June 3, 12 and 26, were small scale events.

They seemed to have been largely ignored by operators on the 50MHz band. Perhaps they were chasing louder DX!

On the 144MHz band only inter-UK contacts were made. However, the station of SM5BSZ (JO89) was putting in a good signal around 1615UTC on June 26. This is not surprising as he runs real QRO and a large antenna system.

The 50MHz Band

Activity on the 50MHz band was excellent during June. As expected Sp-E propagation was the cause of all the excitement.

Very simply, areas or patches in the E-layer get ionised to such an extent that they act as a mirror to v.h.f. signals. It's a wobbly mirror but a reflector none-the-less.

Signals can be enormous. Even stations running a few hundred milliwatts can put in S9+ signals at times.

Contacts are normally made in the range 1000-2000km. At certain times though E-layer enhancement or multi-hop Sp-E can be present. This can allow contacts to be made up to 8000km away.

I've had many letters from stations reporting DX worked via Sp-E on the 50MHz band. Unfortunately, I cannot mention everyone who wrote in. I've therefore restricted most of the reports to the more unusual openings.

With the exception of the 7th, the 50MHz band was open every day throughout June. Virtually every European country with access to the band was worked from the UK.

From reports received and my own observations the most intense days were June 1-3, 17-20, 22 and 25. It's interesting to note that Sp-E openings on the 144MHz band occurred on most of these days. Multi-hop or Spread-E openings between the UK and North America took place on June 15, 19 and 25.

Paul Bradbeer G7GUC (JO02) uses an Icom IC-275H 144MHz transceiver to drive a Spectrum transverter. This then feeds a 25W amplifier and HB9CV antenna.

Paul has worked many European countries with his system. Some recent QSOs have included SV1EN, SV8CS and TK/F5HRY. Contacts have also been made with OJ0/OH1VR (JP90) on Market Reef, CN8NS, CN8ST and the expedition station JY7SIX.

The station of **John Edwards GM7NVA** (IO85) consists of an FT-736R with 50MHz module running 10W. The antenna is a 5-element F9FT Yagi at 9m.

John found conditions on June 1 rather exceptional. Contacts were made with stations located in DL, F, OE, OH, OK, OM, OZ, SP, S5, YU and 9A.

Russian Republics

Many more stations are now active from the ex-Russian republics and from Russia itself. Stations worked in the UK have included RA3TES (LO15), RA3YO (KO73), UO8JJ (KN74), UXOFF (KN45) and UY5ZZ (KN68).

The Vatican is a rare DXCC country in many people's books. The station of HV4NAC (JN61) was active on June 9 and worked many operators. The opening in the UK was between 0945-1100UTC.

Contacts were also made into Asia. The stations of OD5SK (KM74), 4X11F (KM72), 9K2USA and 9K2ZR (LL49) appeared in many logs.

If you were fairly active you should have worked the UK Six Metre Group expedition to Jordan. They had numerous openings to the UK between May 29 and June 28. In this period a total of 2000 stations were worked by JY7SIX (KM71) on the 50MHz band.



Fig. 1: Some well known 50MHz operators (left to right) Ray Cracknell G2AHU, Geoff Brown GJ4ICD, David Butler G4ASR, and Ken Ellis G5KW.

Altogether, the UKSMG team worked 49 countries in four continents. No doubt the most outstanding QSO was with WD4KDP at 2155UTC on June 9. This contact was at a distance of 9775km.

The QSLs for JY7SIX go via **Paul Simons G4CCZ**.

Please note however that the cards will not be ready until September so don't send duplicates. Don't forget to enclose an s.a.e. as well.

As I've already mentioned there were three openings to North America. The first of these, a multi-hop Sp-E event, on June 15 was between 2200-2400UTC. It allowed contacts to be made with stations in Canada.

Mark Jeffs G7LJN (IO80) uses an FT-690, a Tokyo 50W amplifier and a 2-element HB9CV antenna. He worked VE1PZ (FN85) on s.s.b. at 2249UTC getting a 55 report.

The station K0SN/CY9 (FN97) located on St. Paul Island was also worked from the UK around 2250UTC. This is a rare DXCC country.

Neil Carr G0JHC (IO83) reports that earlier in the evening both he and G4XNS worked FP5EK (GN16) on c.w.

Layer Enhancement

The next opening, on June 19, seemed to be more of an E-layer enhancement rather than multi-hop Sp-E. It commenced around 1930UTC and lasted until 2215UTC.

Stations from call areas W1, 2, 3, 4 and 8 were worked by many operators. The band was also open to VE3 and FP5EK (St. Pierre & Miquelon) was again worked from the UK.

An opening on June 25 was excellent. It lasted nearly seven hours and coincided with a USA field day contest. Stations throughout Europe seemed

to have a pipe-line to W4 although other areas were worked.

Ken Osborne G4IGO (IO80) contacted 18 stations in W2, 3, 4 and 8 and heard a further 26 located on the east coast. He was also very pleased to work WB4NFS/VP9 (FM72).

At my QTH I use a Kenwood TS690-S with a 6-element long Yagi. The antenna has a boom length of 11m and is mounted on top of a 20m high tower.

The band was open with me between 1700-2300UTC. A total of 21 North American stations were worked, mostly on c.w. The majority of contacts, 15 in all, were located in the state of Florida.

At 2022UTC the station of WB4NFS/VP9 was worked on s.s.b. He contacted a total of 55 European stations from his QTH on the island of Bermuda. Surprisingly he was only running 10W to an R5 h.f. vertical antenna. It wasn't even designed to work on the 50MHz band!

Tropo To Ukraine

Sorry - no room to tell you about the troppo to EA8 and UT5 (Yes - Ukraine!) on the 144MHz band or the 10GHz contacts to Sweden. Details of ionospheric scatter tests will also have to wait another month or so.

But please don't stop sending in your reports. I'll get details in the column eventually! Send them to: **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP** or via packet radio @ GB7MAD or the DX Cluster system. Alternatively you can telephone me on (0873) 87679.

E N D



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HF Transceivers

Model	Description	P.O.A.	E	Carr.
TS-950SDX	HF Transceiver with auto ATU, DSP, 150W	P.O.A.	E	
TS-850SAT	HF Transceiver with auto ATU	P.O.A.	D	
TS-850S	HF Transceiver without ATU	P.O.A.	D	
TS-450SAT	HF Transceiver with auto ATU	P.O.A.	D	
TS-450S	HF Transceiver without ATU	P.O.A.	D	
TS-690S	HF Transceiver with 6 metres (50W)	P.O.A.	D	
TS-50S	HF Mobile Transceiver, 100W	P.O.A.	D	

HF Receivers

Model	Description	P.O.A.	D
R-5000	HF High Performance Communications Receiver	P.O.A.	D
DCK-2	DC Kit for R-5000	P.O.A.	
VC-20	VHF Converter for R5000	P.O.A.	
VS-1	Speech Synthesizer for R5000	P.O.A.	

VHF/UHF Transceivers

Model	Description	P.O.A.	D
TS-790E	All Mode Triband Base Station, 2m/70cm fitted, 23cm option	P.O.A.	D
TM-255E	All Mode 2m Mobile Transceiver, detachable front panel, 40W	P.O.A.	D
TM-455E	All Mode 70cm Mobile Transceiver, detachable front panel, 35W	P.O.A.	D
TM-251E	2M FM Compact Mobile Transceiver, 70cm Receiver, Packet connector, 50W	P.O.A.	D
TM-451E	70cm FM Compact Mobile Transceiver, 2M Receiver, Packet connector, 35W	P.O.A.	D
TM-551E	23cm FM Compact Mobile Transceiver, 70cm Receiver, Packet connector, 10W	P.O.A.	D
TM-702E	2m/70cm FM Compact Dual Band Mobile Transceiver, 25W	P.O.A.	D
TM-732E	2m/70cm FM Compact Dual Band Mobile Transceiver, dual receiver	P.O.A.	D
TM-742E	FM Tri-Band Mobile 2m/70cm fitted, 10m/6m/23cm options	P.O.A.	D

VHF/UHF Hand Portable Transceivers

Model	Description	P.O.A.	C
TH-28E	2m FM Hand Portable Transceiver with PB-13 Battery	P.O.A.	C
TH-48E	70cm FM Hand Portable Transceiver with PB-13 Battery	P.O.A.	C
TH-78E	2m/70cm Dual Band FM Hand Portable with PB-13 Battery	P.O.A.	C
TH-22E	2m FM Hand Portable, 5W output with 9.6V Nicad	P.O.A.	C
TH-42E	70cm FM Hand Portable, 5W output with 9.6V Nicad	P.O.A.	C

SECOND-HAND EQUIPMENT

Kenwood IC-725 HF transceiver, general coverage receive, excellent condition, c/w mic, DC lead, box and manual	£650.00
RN Electronics 20W 6M linear. (ideal for FT-690R)	£55.00
BNDS 6M 50W linear with pre-amp	£95.00
Sangean ATS-803A portable shortwave receiver, (2 months old)	£99.00
AOR-3030 HF communications receiver. 100kHz-30MHz all mode receiver. This unit has got a slightly dented case, therefore we are offering this unit with full 12 months warranty and all complete	£599.00
Low HF-125 30kHz-30MHz shortwave receiver, USB, LSB, AM, AMS, FM, CW. Excellent receiver	£269.00

PK-232 MBX Terminal unit, Packet, AMTOR, RTTY, Fax, CW. This unit is in very good condition and ready to go

Kenwood TH-47E 70cms handheld, c/w nicad pack, charger, aerial, box and manual

Kenwood IC-2KL 500W solid state HF linear. This is as new

Kenwood IC-275E 2m 25w Multimode base station, c/w built-in power supply. (This unit is in mint condition, c/w box and manuals)

Kenwood IC-475E 25w 70cms Multimode base station, c/w built in power supply. (This unit is also in mint condition, c/w box and manual)

Kenwood IC-726 100W HF transceiver with 10w on 50MHz, general coverage receive. (This unit is complete with mic, OC lead, box and manual)

Low HF-225 Europa, superb shortwave receiver covering 30kHz-30MHz, all modes, and complete with keypad. (This unit is as new)

JIL SX-400N base station scanning receiver, all modes, 26-550MHz. Excellent base scanner

Standard C78 70cms FM portable/mobile, c/w matching 10w linear

* Carriage free on all orders over £100. Please add £5 post and packing to orders under £100.

* 3 months warranty on all second-hand goods.

** Ask for SPECIAL PRICE if IC-275E and IC-475E purchased together **

Special Offers subject to availability Carriage B=5.00 C=£7.50 D=12.50 E=16.50

YAESU

Model	Description	P.O.A.	E	Carr.
FT-1000	200W HF All Mode Transceiver Built-in Automatic Antenna Tuner w/MM-1B8 Hand-held Microphone	P.O.A.	E	
FT-990	100W HF All Mode Transceiver (AC) Built-in Automatic Antenna Tuner w/AC Power Supply w/MM-1B8 Hand-held Microphone	P.O.A.	E	
FT-890AT	100W Compact HF All Mode Transceiver Built-in Automatic Antenna Tuner w/MM-1B8 Hand-held Microphone	P.O.A.	D	
FT-840	100W Compact HF All Mode Transceiver w/MM-1B8 Hand-held Microphone *FM Unit Optional	P.O.A.	D	

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- Detachable front sub-panel
- General coverage reception 100kHz - 30MHz
- Multi-Function Display on high contrast backlit LCD
- Three-mode Bargraph Meter with "peak-hold" facility
- Improved CW operation with reversible sideband and adjustable BFO offset
- Built-in Antenna tuner with microprocessor & 31 memories which store most recently used matching settings for quick recall

FT-250M NEW Mil. Spec. 2M FM transceiver. Selectable power 5, 25 or 50W. FTS-17A tone squelch option. Full DTMF capability with FRC-6 option.

FT-7400H 430MHz-35W Mobile Transceiver w/MM-266BJ Hand Microphone w/Mobile Bracket

FT-690RII 50MHz 2.5W All Mode Transceiver w/FBA-8 Battery Case for 9 x "C" cells w/MM-10E8 Hand Microphone w/YHA-14A Rubber Flex. Antenna w/FTE-2 1750Hz Tone Burst Oscillator w/Shoulder Belt

FT-290RII 144MHz 2.5W All Mode Transceiver w/FBA-8 Battery Case for 9 x "C" cells w/MM-10E8 Hand Microphone w/YHA-6 Telescopic Loaded Whip Antenna w/FTE-2 1750Hz Tone Burst Oscillator

FRG-100 50kHz-30 MHz Communications Receiver (DC) w/o AC adaptor

Kenwood IC-726 100W HF transceiver with 10w on 50MHz, general coverage receive. (This unit is complete with mic, OC lead, box and manual)

Low HF-225 Europa, superb shortwave receiver covering 30kHz-30MHz, all modes, and complete with keypad. (This unit is as new)

JIL SX-400N base station scanning receiver, all modes, 26-550MHz. Excellent base scanner

Standard C78 70cms FM portable/mobile, c/w matching 10w linear

* Carriage free on all orders over £100. Please add £5 post and packing to orders under £100.

* 3 months warranty on all second-hand goods.

ICOM

HF TRANSCEIVERS

Model	Description	P.O.A.	E	Carr.
IC-781	HF All Band, General Coverage Receiver, Built-in ATU and PSU, Spectrum Scope	P.O.A.	E	
IC-765	HF All Band, General Coverage Receiver, Built-in ATU and PSU	P.O.A.	E	
IC-729	HF/6m All Band, General Coverage Rx, 12v	P.O.A.	D	
IC-728	HF All Band, General Coverage Rx, 12v	P.O.A.	D	
IC-707	HF All Band, General Coverage Rx, 12v	P.O.A.	D	
IC-737A	HF All Band, General Coverage Receiver, built-in Auto ATU, 12V.	P.O.A.	E	
IC-736	HF/6M All Band General Coverage Receiver, built-in Auto ATU and power supply.	P.O.A.	E	

144MHz

IC-2SRE	2M FM Hand Portable + Wideband Receive	P.O.A.	D
IC-2GXE	2M FM Hand Portable incl Nicad/Charger	P.O.A.	D
IC-2GXET	2m FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-T21E	2m FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-275H	2m Transceiver, SSB/FM/CW, 100W 12v	P.O.A.	D
IC-281H	2m FM mobile, 50W 84 memo 12V	P.O.A.	D

430MHz

IC-T41E	70cm FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-4SRE	70cm FM Hand Portable + Wideband Rx	P.O.A.	D
IC-4GXE	70cm FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-4GXET	70cm FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-481H	70cm FM Mobile, 35W, 2840 Memo, 12v	P.O.A.	D
IC-475H	70cm Transceiver, SSB/FM/CW, 75W, 12v	P.O.A.	D

DUAL-BAND

IC-W21E	2m/70cm FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-W21ET	2m/70cm FM Hand Portable inc Nicad/Charger	P.O.A.	D
IC-X21ET	70/23cm FM Handportable inc Nicad/Charger	P.O.A.	D
IC-3230H	2m/70cm FM Mobile, 45W/35W, 30 Memo, 12V	P.O.A.	D
IC-2700H	2m/70cm FM mobile 50W/35W 120 memo 12V	P.O.A.	D
IC-820H	2M/70cm all mode Transceiver 45W/35W 12V	P.O.A.	D
IC-2340H	2M/70cm FM mobile 45/35W 100 memo 12V	P.O.A.	D

RECEIVERS

IC-R9000	100 kHz - 2 GHz Receiver. CRT Display	P.O.A.	E
IC-R7100	25 - 2000 MHz Receiver	P.O.A.	D
IC-R100	Wideband Receiver	P.O.A.	D
IC-R72E	General Coverage Receiver with Stand By Battery	P.O.A.	D
IC-R71E	General Coverage Receiver	P.O.A.	D
IC-R1	Handportable Receiver	P.O.A.	C

MULTIBAND

IC-901E	Multiband FM Mobile, 2m/70cm std, 12V	P.O.A.	D
IC-UX19	28 MHz Band Unit, 10W	P.O.A.	B
IC-UX59	50 MHz Band Unit, 10W	P.O.A.	B
IC-UXS92	144 MHz SSB Band Unit	P.O.A.	B
IC-UXR91	WideBand Receive Unit	P.O.A.	B
IC-UX129	1.2GHz Band Unit, 10W	P.O.A.	B
IC-Δ1E	2m/70cm/23cm FM Handportable inc Nicad/Charger	P.O.A.	C

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Specifications

- The Mysteries Explained

In this month's column Ian Poole G3YWX looks at long term accuracy associated with crystals and crystal oscillators.

In today's crowded bands, where every last scrap of spectrum has to be used, the frequency accuracy of a set is very important. Last month I looked at a set's drift, this time I am looking at the related subject of long term accuracy. This is normally associated with crystals and crystal oscillators, which are used to give very accurate and stable signals for use within the rest of the set.

In many older sets, particularly those with variable frequency first oscillators, crystals are used in calibrators to give an accurate reference signal. The set can be tuned into the signals which are produced and then the calibration can be adjusted to ensure the receiver is accurately set up. As the crystal source was so much more accurate than the set itself, specifications are rarely given for these calibrators.

Frequency Synthesisers

Most modern sets use frequency synthesisers. These do not need a calibrator circuit because the accuracy of the set is totally dependent upon the accuracy of the crystal oscillator used as the reference.

In some sets, the crystal oscillator may not need to be very elaborate. However, in some of the more expensive communications receivers, especially those for professional use, a crystal oven may be used. Essentially this is a temperature controlled container that houses the

crystal. This allows a high grade oscillator to be designed that gives optimum frequency stability.

A heating element is used to raise the temperature of the circuit to a predetermined level and then keep it there by the use of a thermostat. By adopting this approach it's possible to obtain temperature stability figures which are one or two orders of magnitude better than a standard crystal oscillator.

The way in which crystals and ovens are specified is not particularly straightforward. The overall accuracy is a combination of a number of factors all of which add up to give the total figure. First I'll have a look at some of the fundamentals of crystal specifications.

Crystal Specifications

The first point that is noted about crystal specifications is that they are not given directly in Hz or as a percentage. Instead, figures are given in parts per million (p.p.m.). This is the error expressed in a number of parts per million (or Hz per MHz).

As an example let's take a crystal with an error of 1p.p.m. This could give an error of one part for every million, i.e. 1Hz for every MHz. If the crystal had an operating frequency of 3.5MHz then its error could be 3.5Hz.

For any crystal several different figures will be given for its accuracy. Ageing, temperature stability and adjustment tolerance are the three most common.

Change In Frequency

Any crystal will change its resonant frequency by a small amount over a period of time. This process is called ageing and it results mainly from impurities entering the edge of the crystal lattice.

To reduce ageing, great care is taken during manufacture to obtain the finest finish possible on the crystal blanks. Then the crystals are encased in a can which is either evacuated or filled with an inert gas. Despite these precautions some ageing still takes place.

The ageing will normally be quoted as a number of parts per million over a given period of time - normally a year. Typically this might be about 5p.p.m., although it will be highly dependent upon several factors including the type of can and the way in which it is sealed.

Temperature also has an effect on the crystals. Like any tuned circuit it will be affected by temperature changes.

Although the levels of the change are considerably less than an ordinary L-C tuned circuit, they are still important. Any change is normally quoted against its frequency at 25°C, and it can sometimes be as low as 5p.p.m.

To manufacture a crystal to a given frequency, it must be ground to certain dimensions as the size of the quartz determines its frequency. There will always be some tolerance on the accuracy to which it can be ground and finally trimmed. This error will be present on

any crystal and it will usually be between 10 and 100p.p.m.

Crystal Ovens

Crystals mounted in ovens are specified in a very similar way to normal crystals. Figures for ageing and temperature stability will be quoted. The main difference is that the figures are not expressed exactly as p.p.m.

As the performance of oven controlled crystals is so much better, the specifications are quoted as a number of parts in a value of ten raised to a given power. Typically the temperature stability might be about 1 part in 10^7 per °C and an ageing specification might be 1 part in 10^8 per day.

Normally a period of a day is used for oven mounted crystals instead of the period of a year for crystals on their own. This gives an apparent improvement of 360 on the figure alone! Such are sales specifications.

Initial accuracy is not quoted because crystal ovens have an adjustment which allows the oven to be periodically calibrated against a very accurate standard. By adjusting this it's possible to remove the effects of ageing.

PW

That's it for this time, next month I will delve into the receiver circuits again and look at a few more receiver specifications.

The Yaesu FT-2500M Mobile Transceiver

Richard Newton GORSN takes a look at a new 144MHz f.m. mobile transceiver.

The Yaesu FT-2500M is a v.h.f., f.m. mobile transceiver covering 144 to 146MHz. It's supplied with a mobile mounting bracket, fist microphone and a power lead, along with an instruction manual.

The radio is of a compact design without being too small. It has a large heat sink at the rear, removing the need for forced air cooling. Also on the rear is an SO239 antenna socket and 3.5mm jack socket for an extension speaker. The radio itself is finished in moulded black plastics on a diecast chassis.

Military Specifications

Yaesu have manufactured this unit to meet with US Military specifications for shock and vibration. This has obviously been born in mind by the person who designed the case, as it has a military feel about it.

Personally, as for the 'military specifications', I can't help smiling, especially when I see a manufacturer come up with a new selling angle! I would expect any radio to be made to a suitable standard to withstand the normal everyday stresses of being used in a mobile environment, but ten out of ten to Yaesu for originality!

The radio is refreshingly simple in design. By this, I mean that its controls are well spaced and on the whole, well labelled.

The large l.c.d. display is very easy to read and extremely well lit by an orange back light. The intensity of this can be either manually set or will automatically change with light conditions. This is achieved by a small photo cell in the front panel.

Display Best Seen

The FT-2500M display is without doubt one of the best I have seen in a long while. The easy-to-read large characters and the large controls make this radio easy to use for those operators who are



The Yaesu FT-2500M mobile transceiver.

infirm or partially sighted.

A plastics flap used to cover the less used control buttons is a little disappointing. It's not hinged by pins, but instead it uses two ball and socket type joints. I found that this easily fell off when used and I don't think it would be long before the ball and socket joints became so worn that they were of no real use at all.

The choice of controls under the "less used" panel surprised me, they would have not been my choice at all. However, I guess it basically comes down to personal preference! But I did not expect to see the repeater shift button, the call channel button or the output power control button in this category.

The microphone connector is rather unusual. It's an eight pin modular plug, this has the appearance of a large telephone plug. It secures into the radio by a locking tab that clicks into place.

The modular microphone plug tends to inhibit the use of home-brew microphones. This is because it's not so easy to just buy a connector to use with your home-brew microphone.

The problem of connecting home-brewing microphones would not be so

annoying, if it wasn't for the fact that it's a necessity. Unless you want to break the law!

In the UK it's illegal, unless in an emergency, to use a fist microphone whilst driving. So, why do manufacturers continue to supply transceivers that are (by their own definition) mobile equipment, with a fist microphone, making it necessary for the purchaser to either home-brew or purchase a 'hands free' microphone?

My comment is obviously not a criticism of Yaesu or the FT-2500M alone. However, the unusual microphone connector does tend to preclude the cheaper home-brew option.

I wonder how difficult it would be for manufacturers to include a voice activated transmit or latched press-to-talk feature in the radio itself? Personally, I'm certain that if not completely necessary in other countries, such facilities would be welcomed by mobile amateurs the world over.

I made sure that in the time I had the FT-2500M that I used it as much as possible on mobile. But, before I tell you how it did I'd best just touch on some of the facilities it offers.

Selectable Output Power

The Yaesu FT-2500M offers the versatility of a three stage selectable output power. You can choose between approximately 5, 25 or 50 Watts, should you feel it necessary (I found the 25W more than enough).

The FT-2500M offers 31 memories which can be programmed very easily indeed, with repeater shift, odd split frequencies or with CTCSS tones. The memories can be scanned or locked out of scan entirely at will.

Each of the FT-2500M's 31 memories can be given a four character name that appears in the display instead of the frequency. This facility provided a bit of fun, but it also had the effect of making mobile operation easier. It was simple to see whether you were on S20 or S18 for example, and I also put in the last two letters of local repeaters.

The FT-5200M has the CTCSS encode facility, which seems to be standard on most modern mobiles, as these tones are now used to access some repeaters. The transceiver also supports the decoding of CTCSS tones with the optional extra facility fitted.

Most modern equipment is now supplied with a DTMF tone controlled squelch and paging facilities. The FT-5200M will support this, but not until you purchase one of those infamous optional extras! To me, it seems surprising that with this particular unit it's an option and not standard.

The transceiver was very easy to install into the car, but I had a slight problem! I didn't have a mobile antenna to do the FT-5200M justice and I had to borrow one! And I must thank Colin Riggs G3XAS, of Southern Scanning and Shortwave for loaning me a very good medium gain antenna, the TS antenna model TSM1002.

Joy To Use

I found that the FT-2500M was a joy to use mobile, the large display helps greatly and the received audio was very good. I could even hear it over the awful noises my Ford Escort makes!

During the tests, all reports on the transmitted audio were very favourable, even on simplex contacts in difficult conditions. I also found that the receive sensitivity was good.

However, what really impressed me was the FT-2500M's rejection of interference. If any of you live near or operate near to commercial pager sites you'll know what I mean when I say it is a little more than frustrating trying to hold a conversation on the radio through that abysmal row!

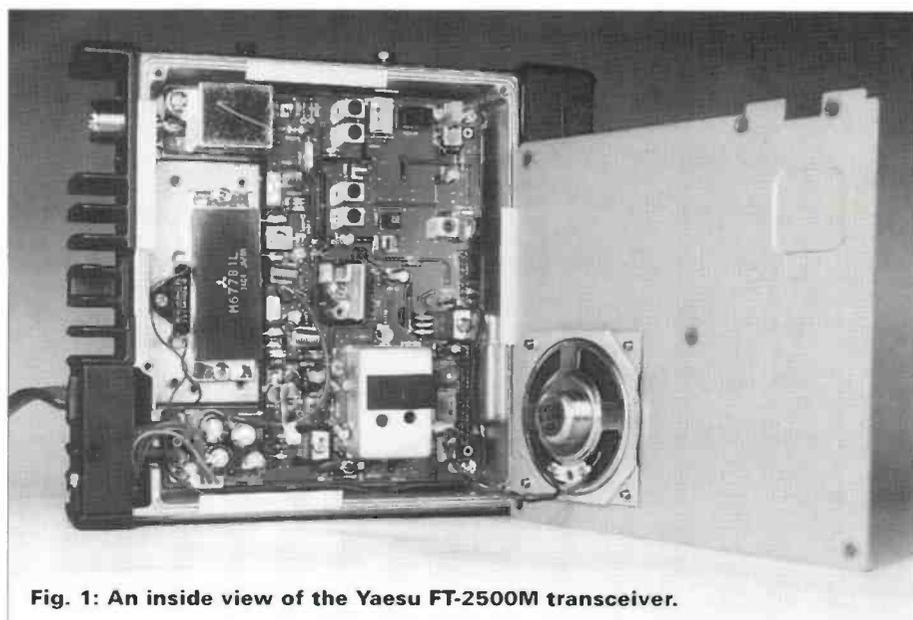


Fig. 1: An inside view of the Yaesu FT-2500M transceiver.

Manufacturer's Specifications

General

Frequency range (transmit)	144 to 146MHz
Frequency range (receive)	144 to 146MHz or 140 to 174MHz
Channel steps	5, 10, 12.5, 15, 20, 25 and 50kHz
Mode	F3 (G3E)
Supply voltage	13.8V d.c. $\pm 10\%$ negative ground
Current consumption (typical)	
Receive	600mA
Transmit	12A (high), 9A (mid), 5A (low)
Antenna impedance	50 Ω
Operating temperature range	-20 to +60°C
Dimensions	160 x 50 x 180mm (without knobs)
Weight	1.5kg

Receiver

Circuit type	Double conversion superhet
Intermediate frequencies	21.4MHz and 455kHz
Sensitivity	<0.2 μ V (for 12dB SINAD)
Selectivity	-6dB at 12kHz, -60dB at 30kHz
IF rejection	<70dB
Maximum a.f. output	3.5W into 4 Ω @10% THD

Transmitter

Output power	5, 25 and 50W
Modulation type	Variable reactance
Maximum deviation	± 5 kHz
Spurious radiation	-60dB
Microphone impedance	2k Ω

There's a pager site very close to my home (lucky Richard I hear you snigger!). Well, with the FT-2500M I would have very little to worry about. In the past, where I have used other radios (both amateur and professional equipment) and suffered greatly, the FT-2500M either did not suffer at all or only suffered minor breakthrough.

Other features on the FT-2500M include automatic repeater shift when a repeater frequency is selected, time-out timer, variable shift frequency and variable channel steps. It also offers programmed scan limits and priority channel monitoring.

Summing Up

In summing up, I found the FT-2500M to be a pleasant radio to use. On the whole it's a good general purpose transceiver.

The FT-2500M should work well as a mobile or home station. Connecting it to a high gain home station antenna would not cause it many problems at all.

My thanks go to Yaesu Europe (UK) Ltd., Unit 2 Maple Grove Business Centre, Lawrence Road, Hounslow, Middlesex TW4 6DR for the loan of the FT-2500M, which is available from any Yaesu approved dealer for £359.

PW

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Amateur Radio At University

Craig Bell G3RWP asks the question 'can you still enjoy amateur radio at University'? It was one of his main concerns when he planned to go away to study and he was determined to carry on enjoying his hobby.

(L to R): Craig Bell G3RWP and his father G8PY.



First let me introduce myself, my name is Craig, and my callsign is G3RWP. I became licensed when I was 16, my first callsign was G7JGX, I then studied for my Morse and became a G0.

I changed my G0 callsign for my father's old G3 callsign, because he had changed his G3 for an old club callsign, which he had been responsible for (G8PY), confused? Subscription Services Limited (SSL) are!

I am now 19 years old, and during the summer of 1993 I arranged to go away to University. I live near Grantham in Lincolnshire and the University that accepted me was Stirling.

Once I learned of my new QTH, one of my first thoughts was "I wonder what repeaters I can work from there?". I checked the good old repeater maps and made a list of the relevant repeaters. I thought this would allow me to chat to some of the local amateurs.

I am also interested in packet radio, so the next major amateur radio problem was the availability of nodes and BBSs in the area. I sent a quick bulletin off asking people in Stirling to let me know about packet activity and any amateur radio clubs.

Luckily, through the wonders of packet radio, I found out about packet and radio clubs before I even left home. With these simple queries answered I was ready to move out! The next major problem was not so easily solved.

Entire Shack

Have you ever tried to pack the entire contents of a bedroom/shack into a few bags? Well take it from me, it's not too easy. But I managed to condense my shack somewhat.

The inventory of equipment that I took with me went something like: p.s.u., 430MHz hand-held (for packet), dual-band hand-held, TNC and computer and printer, plus the all important miniature tool kit.

The equipment and I made the 300 mile journey to Stirling. During 'freshers' week, radio was the last thing on my mind. The drinks just kept flowing on and on, and socialising was very important!

The weeks passed and I became more settled in my new environment. The amateur radio equipment was unpacked. Initially I concentrated on

packet radio. The 430MHz hand-held with it's own set top antenna limited my coverage.

The packet frequency was extremely busy and sometimes I would go days without getting through to the BBS! Since then I have managed to improve the packet signals by using a typical student configuration.

The rig sits on top of its charger, the charger is propped up by a calculator, which is then placed precariously on top of the hi-fi speaker. If this is not bad enough, the whole set-up is very carefully balanced on top of the kettle. This totally wacky structure improves things quite dramatically. The additional height enables me to connect to the BBS with ease.

Accustomed To Hobby

As the days and weeks went by, more and more people had become accustomed to my hobby. My friends had seen all of the expensive equipment cluttering my humble bedroom (rabbit hutch) and they started asking more and more questions and paid more interest.

After a month or so you will end up giving your new friends an amateur radio demonstration. I gave a few demonstrations, most of which were on packet.

One of my friends, Katherine, sent a short packet message to one of my friends in Newark. Imagine how surprised she was when she received a reply a couple of hours later.

Katherine was extremely impressed with my new Kenwood TH-78 hand-held and said that it was sturdy, well built and looked great, how right she was! At this point I must add that the

problem of TVI has not been evident at University.

I thought that cramming 300 people into one hall of residence would be a recipe for disaster. Apparently not, although I'm running relatively low power I thought somebody would have complained if there was a TVI problem.

Locate Amateurs

Whilst I have been at University I have been unable to locate any other amateurs on campus. You would have thought with thousands of students on campus, there would be at least another active licensed radio amateur.

However, I have not tried that hard, if I wanted to, I could have printed some posters and stuck up them up around the campus looking for other radio enthusiasts. A lot of Universities have their own radio groups, unfortunately, Stirling is not that lucky. If, however, in the future I can locate any more amateurs I would seriously consider starting a group

Another thing that is worth looking out for are amateur radio clubs off campus. Having been in contact with a few of the locals, I obtained details of the Stirling Amateur Radio Club.

With one packet message I was able to organise free transport to and from the club every week. This is a great opportunity, believe me. As the months go by you will appreciate being able to get away from all your University friends for a couple of hours.

The biggest change that I have had to adjust to is that normally you can pick who you socialise with, but suddenly when you go to

University you are thrown together with people you may not normally associate with. It takes some getting used to, but it is a really great experience, and I am sure that I will keep in touch with my new friends after I have left University.

Having a hobby which you can do on your own can give you a chance to get away from the noise and chaos associated with University. I am certainly very glad that I have taken my amateur radio equipment to University, and if the first half year away from home is anything to go by, my stay at University is likely to be the best years of my life. **Craig Bell GM3RWP @ GB7SAN or G3RWP @ GB7BAD**
Email: aczcb1@stirling.ac.uk

PW



Craig's 'wacky' radio set-up in his University bedroom.

The Day The Inspector Called

I had been told by one or two colleagues on the key that a visit from the Post Office Inspector would occur within days rather than weeks. This, by the way was in the days when new licensees had to use c.w. only for the first year.

Nobody could be more precise, but of course the idea was for the visit to be a surprise one, so that you could be nabbed in the act of breaking one or more regulations. To be fair, the man due to see me did telephone on the day before he was arriving. So I had plenty of time to get things ready.

I think he broke the rules himself by giving me that much warning. But I can't 'drop him in it' now because he shuffled off this mortal p.a. coil many years ago!

Unduly Nervous

I wasn't unduly nervous while waiting for the inspector to show. I had a simple station consisting of an R1155, a RAF receiver and my own home-brew transmitter consisting of a crystal oscillator, driving an 807 p.a.

That was it, not much else except a few parts culled from old broadcast sets and an end fed 130ft wire. Yet with this, I was having the time of my life and the XYL was making preparations to sever the marital ties.

I still cannot understand how I derived so much pleasure from such simple equipment, which only worked on 3.5MHz, when I had just finished some years service as a pro in the RAF. I know home-brewing the outfit has something to do with it but after all, I did quite a bit of that and was paid for the job, so that's not the entire answer.

You can't say it was the thrill of communication for the same reasons and yet basically that is probably what it was (and still is) all about. I suppose in the end it is a sense of wonder at the whole concept of exchanging ideas over distances by methods which are still not fully understood by me, and then some!

Duly Appeared

Anyway, the Inspector and his colleague duly appeared and I conducted them up many flights of stairs to my shack which was in the roof space of an ancient office building. We were all rather puffed when we reached our destination and the man was looking decidedly seedy, indicating a defective 'ticker.'

He was no doubt put into a sour frame of mind by the climb and proceeded to throw the book at me. His colleague, a younger man was of the type sometimes seen around. He had a gauntness of visage indicating his upbringing in districts where foul chemical airs and dank canal waters combined to foster the growth of algae externally and in the lungs of the unfortunate residents.

The younger man wore clothes which were

*John Worthington
GW3COI relays the
story of the day the
inspector called on
him.*



The AVO man leads the way and 'all the points of deficiency were to be cleared'.

of such a colour and texture that he could step out of a house and immediately appear to vanish into the muted dirt browns and dark purple hues of the district. In his right hand he reverently and menacingly clutched a large AVO with which to measure my p.a. current.

'Let's see your log', the Inspector barked. I jumped guiltily and gave him the accounts book I had pressed into service as such. It was a book very much the same size as an RAF log and I had ruled the necessary lines and had scrupulously entered all the necessary information as per the licence therewith in pencil - the latter is another RAF method.

I can't remember why we always used pencil but I think probably the tradition grew from the fact that in the days before ball pens, the steel pen and ink entries were prone to mess and again probably pencils were found to be the only practicable method for aircraft operators.

The man said the log was totally unsuitable and that I should get a 'type approval' one immediately and I should henceforth enter it in ink. He then asked me what the transmitter consisted of, while inspecting it rather as a doctor probes a large boil. He was plainly unimpressed by my standard of construction, which to this day is no better.

I was able to describe it to him minutely as

I had dismantled and rebuilt it several times in order to get it going. This didn't satisfy him, and I had to do a full circuit diagram. He then signalled his AVO man to move in and measure the p.a. current, and it was found that I was running 40W instead of the allowed 25W.

He then wanted me to draw a circuit of the receiver but had to be satisfied with a block diagram. I was getting hysterical and when he looked at my completed drawing, and saw I had missed out the frequency changer and second detector, his already curled lip became like a roller blind.

Carefully Measuring

In the meantime the AVO man was carefully measuring everything in sight and plainly enjoying himself. I learned later that he had been a 'Top Band' only addict for years and carried a small replica of his earth mat in an inside pocket. He was a convinced QRP user and abhorred anything above 3W. So he was having a field day among my heretical high power. I then had to show my crystal certificate.

This I had obtained from its manufacturer as to its frequency thus ridding me of the need for a separate frequency measuring device.

The inspector was not satisfied with the certificate and launched into a lecture on the mandatory requirement for frequency measurement. The fact that I had been a professional c.w. operator for the duration of the Second World War cut no ice at all, I might as well have said I had been with ENSA ('Each night something awful').

Obviously the inspector compared everybody with his own standard of netting skill. And anybody who was familiar with operation in those days, phone only user (as he was) would often be 15kHz or more off each other's frequency and were thus quite liable to be 'out of band'. But at last the inspection and rolling came to an end.

When could I expect his next visit? Not too long into the future and all the points of deficiency were to be cleared absolutely by that time. The AVO man stood impassively like the chaingang boss he undoubtedly dreamed of becoming.

Inspector Warmer

On his next visit, the Inspector was a good deal warmer in his comments and it was now open for me to get cracking and join him for a natter on 'Top Band'. He was plainly discomfited about his inability to eavesdrop on 20wpm c.w. and did his best to swell the ranks of the microphone clutched. But we never became real friends as he was totally unable to drop his innate pomposity.

However, there can be no doubt he was a character who added his full weight to the amateur scene of those days.

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Transmitting Data By Radio Broadcasting

Jim Slater is an amateur radio enthusiast who spent many years in broadcasting engineering. And when it comes to sending data via radio, Jim says the professional broadcasters are catching up at last!



Many cars are now fitted with Radio Data System (RDS) equipped receivers. Jim Slater describes the advantages, the history and background of the data-by-radio system.

In the early days of our hobby it was amateurs who, having rather grudgingly been allowed to use the high frequencies, which nobody else thought would be any use, discovered the wonders of long distance h.f. communication.

In a very similar way, radio amateurs led the way by investigating and developing practical systems of radio data transmission. I consider it all started with the Morse code, which surely counts as the earliest form of data transmission.

Then radioteletypers arrived, and this system received a shot in the arm as amateur radio computing caught on. Radio amateurs discovered they could programme home computers to decode and display RTTY signals, dispensing with the old mechanical teletypers.

Experimental Work

Experimental work on digital transmission led to the creation of packet radio to the ever-extending hobby. Nowadays, thousands of enthusiasts have discovered the advantage of being able to send messages in digital packet form.

The major UK broadcasters, the BBC and the Independents have finally woken up to the fact that they too can transmit digital signals. And they now do so, not just for teletext, which has been with us since 1974, but for the transmission of messages to a wide range of recipients throughout the United Kingdom.

Data Broadcasting

The subject of Data Broadcasting encompasses various methods of adding extra information to existing sound radio broadcasts. The existing UK teletext service is one version which is well established.

A basic TV receiver displays only the television picture itself. Whereas a special teletext receiver also makes use of the extra signals which are being carried, and can display hundreds of pages of news and information.

Radio Data systems are an extension of the same concept. In this system the

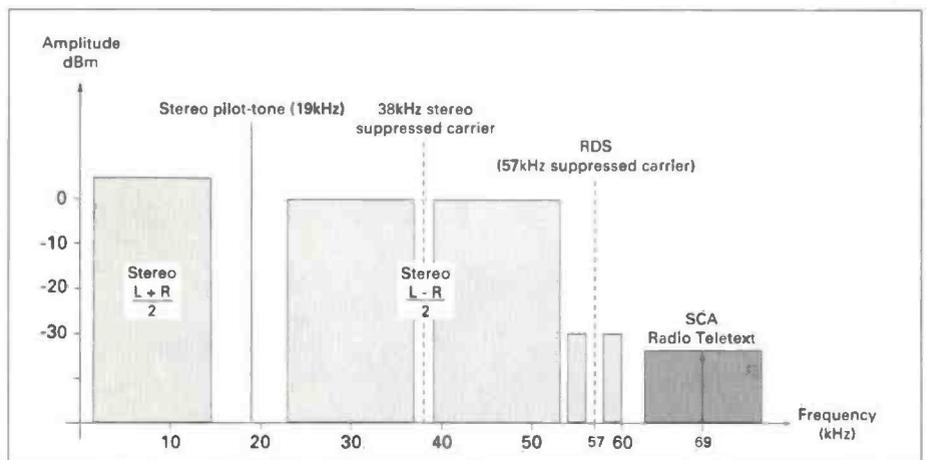


Fig. 1: The signal spectrum of the RDS system, the Radio Teletext and SCA system (see text).

broadcasters use the existing sound radio transmissions to carry extra information.

The extra information can be displayed or otherwise made use of by special receivers. The ordinary (non-equipped) receivers ignore the extra information and continue to receive the standard radio programmes.

There are two systems for carrying data services on the radio. These are: RDS (The European Radio Data System and Radio-Teletext (based on the American SCA System).

All the BBC v.h.f. transmitters and most Independent Radio stations carry the extra service known as the Radio Data System (RDS). And in Western Europe, virtually all countries also have RDS transmissions.

The RDS service is broadcast in the form of extra digital data signals. These, with the new receivers, enables listeners to make much more use of their radios. It provides facilities such as automatic tuning, easy station identification and instant programme information.

Idea From Sweden

The original idea for a radio data service came from Sweden. The Swedish Telecommunications Authority had developed a working experimental Programme Identification System (PI) some

years ago.

The Swedish idea was greeted with interest by other broadcasters in Europe. But it was only after a good deal of negotiation and many changes to the original system, that an agreement was reached by all members of the European Broadcasting Union (EBU) for standard EBU Tech. 3244 in 1984.

Nowadays, RDS is the subject of world-wide standard, CCIR Recommendation 643. Incidentally, CCIR stands for the Geneva based Committee Consultative International Radio, now replaced by International Telecommunications Union - Recommendation (ITU-R).

As a result of CCIR 643, RDS is therefore one of those rare commodities in broadcasting, a universally accepted standard. This has encouraged various radio manufacturers to commit their resources to making receivers to the RDS standard.

The detailed specification of the RDS have been published for some while. And the time now seems ripe for the introduction of an exciting new generation of radio receivers.

Continued on Page 48

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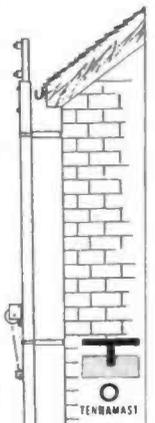
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Continued from Page 46

Some Reluctance

Initially, there was some reluctance among manufacturers to develop the complex new RDS receivers. But market research has shown that listeners would be prepared to pay substantially more for the facilities that RDS will bring.

The research stimulated manufacturers to make a start and the broadcaster's bold decision to provide regular transmissions encouraged manufacturing industry to design the necessary receivers. And, appropriately enough, Swedish-based Volvo were the first car radio manufacturer to bring an RDS radio onto the market.

Various other car radio manufacturers showed considerable interest. But the big breakthrough came when the major car manufacturers decided to include RDS radios in all their new cars, even those at the bottom of their ranges.

So far, there are very few 'domestic' receivers fitted with RDS circuitry. However, a handful of tuner manufacturers do offer RDS fitted equipment which make listening easier and can provide listeners with a wide range of new radio-based services.

How The System Works

Let's now take a look at how the radio data system works. In practice, the system uses digital data pulses which are inserted into the normal v.h.f./f.m. mono or stereo sound radio transmissions, Fig. 1.

The RDS digital signals are carried by a low-level 57kHz subcarrier. This frequency is three times the frequency of the 19kHz pilot tone used for the stereo signal.

The 57kHz sub-carrier is amplitude modulated by the bi-phase code data signals. The actual subcarrier is suppressed before transmission so that the data is transmitted as a 2-phase PSK signal.

The 57kHz subcarrier deviates the main carrier by a maximum of $\pm 2\text{kHz}$, Fig. 1. The system has been designed so that the additional data does not interfere in any way with the normal sound transmissions.

Overall, bit rate of the datastream is 57,000 divided by 48, which comes to 1187.5 bits/sec. By using bi-phase coding and special filtering, these signals are carried within a bandwidth of around 4.8kHz after modulation.

The diagram, Fig. 2, shows how the RDS signals are added to our normal v.h.f. signals. The diagram Fig. 3, shows how those same RDS signals are recovered in the receiver.

Automatically Tune

Receivers fitted with RDS circuitry can automatically tune to the station of your choice. They also have the ability to constantly take a quick 'look' at the various alternative frequencies carrying the desired programme.

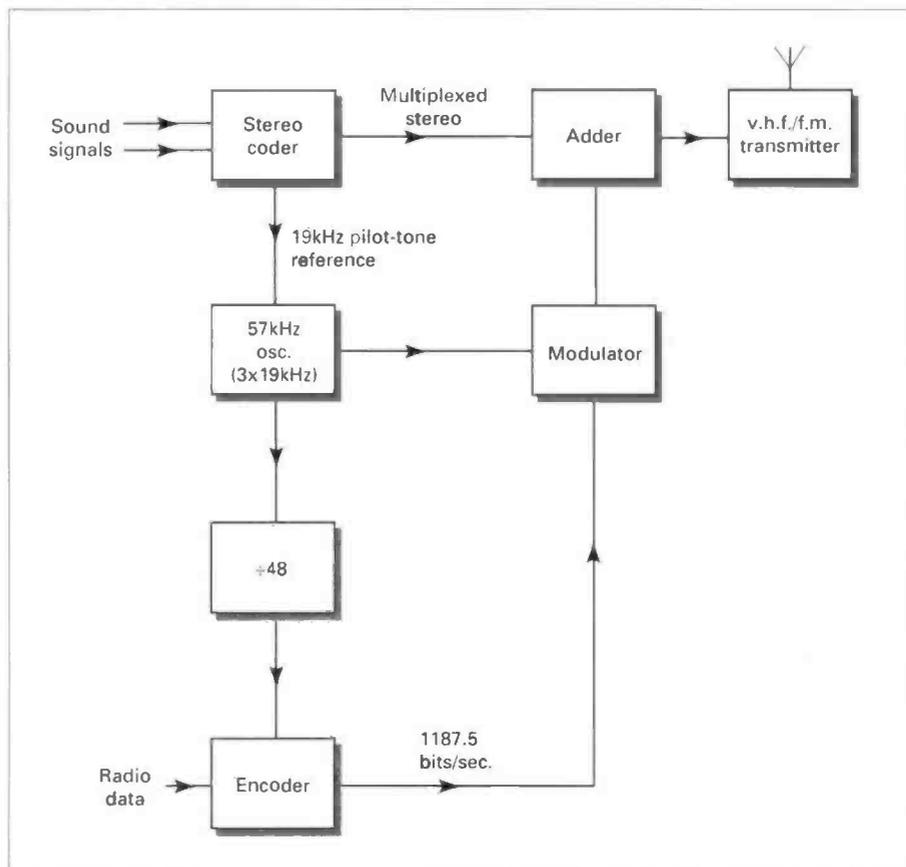


Fig. 2: Block diagram showing how the radio data signals are placed 'piggy-back' fashion on the v.h.f. broadcast programmes (see text).

Effectively, the best received signal is fed to the loudspeaker. Meanwhile, the tuner quickly searches for the same programme on other frequencies, automatic switch-over taking place inaudibly whenever a better channel is found. The receiver can also be asked to search through all music channels or all sound channels.

Additionally, the Traffic Announcement (TA) and Traffic Programme (TP) flags can be set to allow a traveller to have the regular programme which they are listening to interrupted. The listener can then hear traffic announcements, even if the announcements are being broadcast on a different frequency from the one on which they're listening.

The RDS signals can even be used to briefly switch a car radio from its cassette-playing mode whenever a traffic announcement is made. Broadcasts now have full scale travel services operating.

Car receivers with RDS have small displays providing information about the station to which the receiver is tuned and about the programme (as in the heading picture). But there's no reason why domestic portable receivers should not be fitted with larger displays.

Message Displayed

The RDS specification allows for messages up to 64 characters long to be displayed (see heading photograph). So it's possible to carry programme notes such as the title of the music, the artist or the record number.

Time and date information also forms part of the data. This helps listeners to pre-select specific programmes for recording.

Data is structured in groups of 104 bits, each comprising four 26 bit blocks. These blocks contain 16 message bits and ten protection bits.

There are two main types of message that can be transmitted. They are either short and repeatedly quickly, perhaps 11 times a second, to allow receivers to auto-tune to the best channel without delay, or longer messages.

The longer messages are transmitted every five seconds. These can provide information which will be displayed on the receiver - the so-called Radiotext mode.

A third type of signal shows the programme item code number, and this is transmitted once per second. This code allows the receiver to switch itself on at the start of a pre-selected programme.

Flexibility Keyword

Flexibility is the keyword of the RDS system. This means that future receivers will be able to have even more sophisticated facilities.

The EBU engineers have also provided a number of built-in programme codes. They include: News, current affairs, magazines, sport, children's programming, religion, popular music and folk music.

Since it's not possible to anticipate all future uses of the system, codes have been left free for future developments. For example

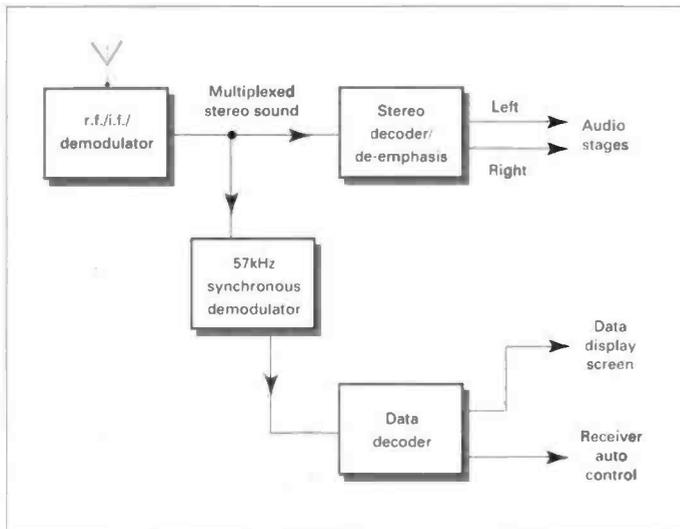


Fig. 3: Block diagram illustrating the receiving end of an RDS equipped receiver (see text).

code 31, the so-called 'alarm' code, will be reserved for emergency announcements.

Industry Surprised

The broadcasting industry was surprised in the mid 1980s when the former Independent Broadcasting Authority (now the Independent Television Commission) announced that it was to advertise two franchises for radio data services.

The franchise announcement was described as 'teletext by radio'. The services were not to use the standard RDS system, employing instead a system that has been used for many years in America, known as Subsidiary Communications Authorisation (SCA). The diagram, Fig. 1, shows how the RDS and SCA signals are fitted in the baseband spectrum of the transmitted radio signals.

Subcarrier Introduced

The SCA signals are on a new subcarrier introduced at 69kHz, which is allowed to deviate the main carrier by ± 7.5 kHz. And, by using frequency shift keying (FSK), a data rate of 5k bits per second can be achieved.

Some years ago, the BBC carried out tests on SCA-type systems. They found that the extra signals caused severe interference to many older-type v.h.f. tuners and receivers which had not been designed with the possible addition of extra subcarrier in mind.

The problems are usually caused by the SCA subcarrier interacting with the 38kHz stereo reference signal and its harmonics. These give rise to spurious signals well within the audio band.

In contrast to SCA, the European RDS system was specially designed so that the data would not interfere with normal reception. All the tests have shown that RDS works well without causing significant interference.

During 1985, the IBA carried out a series of tests over a period of several weeks. The Authority equipped the LBC (one of the independent radio stations serving London)

transmitter at Croydon to carry both RDS and SCA signal simultaneously.

The IBA asked dealers to report any complaints or interference to LBC reception made by their customers. It's understood that the tests did give rise to some complaints, and some dealers described the interference as extremely annoying.

Since it seems likely that most of the reported interference was due to the SCA signals, the authority were aware of the possible problems. So, IBA engineers took great care to ensure that the actual system chosen for Radio Teletext service eliminated these problems.

First Franchise

The first franchises went to companies wishing to transmit data services on the two London ILR v.h.f. transmitters. These carried the programmes of Capital Radio and London Broadcasting (LBC).

The facility could be used to offer a subscription service to companies. Data could also be received on either hand-held receivers with calculator-type displays, or on fixed receivers in offices.

Arrival of the 'Big Bang' of stock market deregulation in the UK provided the opportunity for the London franchisees to provide information services. I think the real advantage for the busy stockbroker is that his hand-held v.h.f. radioteletext receiver will pick up the vital data signals even when he's in the local pub!

It's interesting to note the way the Radioteletext services started. The would-be data providers actually approached the former IBA!

The slowly dawning realisation that data services could perhaps make money led to both the BBC and the IBA getting new data services on the air. Both services concentrated on share and commodity prices and executives could be seen monitoring their money on portable data displays!

Unfortunately, neither scheme proved to be a commercial success and transmissions ceased after a short time. It was a case of technology being ready before its time.

However, the failure hasn't stopped other

prospective users of the radio teletext system considering its use for electronic mail. There's also specialised news services, transmission of medical reports and even radio-paging and the Plessey Company showed a wrist-watch type v.h.f. receiver that could be ideal for receiving paging signals over a radio teletext system.

Entirely Different

The radio teletext service was entirely different from RDS, being a messaging service aimed at commercial operators, rather than the Public Service system which RDS provides.

Technically, the radio teletext use need not be confined to sending messages to miniature TV screens, although it seems restricted to this at the moment because of various regulations. However, there's no reason why text files or FAXes could not be sent over these v.h.f. radio channels, as a value-added service provided by the broadcasters.

I've described the two main radio data systems, RDS and Radio Teletext, but for the sake of completeness I mustn't forget another data transmission service via radio. And this one shows that such systems needn't be high-tech!

Droitwich Transmitter

For some years now the BBC's low-frequency (198kHz long wave, carrying BBC Radio 4) Droitwich transmitter has been carrying a fairly low-tech 25 bits/second signal. This allows electricity supply companies to remotely switch on and off night storage heaters or street lights.

The Droitwich transmission even includes a time code. This permits radio time switches to be used by electricity supply companies to vary the times when 'off peak' rates come into use, so as to make the optimum use of generating station equipment.

So, let's sum up my brief introduction to the Radio Data Services. And in essence, it seems that RDS, which is being currently conceived as a public broadcast service will bring all sorts of exciting and useful extra features to radio broadcasting.

Radioteletext is a rather more specialist system. It will probably find its main uses in providing specific information to groups of people who are prepared to pay for up to the minute information in a form of specifically prepared for them.

Nothing stands still in the broadcasting business however! The imminent introduction of Digital Audio Broadcasting (DAB) on the old UK Band III v.h.f. TV channels could completely change the face of data broadcasting.

Finally, for those with a technical interest in the RDS system, a free newsletter is available. You can get it from: **The EBC Technical Centre in Geneva (Case postale 67, CH1218 Gd. Sacconnex) Switzerland.**

PW

Antenna Wo

A Multi-band Dipole

For several years I've used a multi-band dipole similar to that described by W6SAI and W2LX in their book *Wire Antennas For Radio Amateurs*. The version I used covered 3.5, 7, 10, 18, and 24MHz, the other bands of 14, 21, and 28MHz are taken care of with a tri-band on top of a mast.

Each antenna is connected to the rig via a heavy duty coaxial cable, running underneath the lawn to the shack. The multi-dipole elements (Fig. 1) are trimmed to give a reasonable match on each band, without an external matching unit.

As I use a rig with valved p.a. stages, I can use the plate and load tuning to handle the final mismatch of antenna systems. I adjusted the plate (anode) current to 220mA and minimum mismatch when operating.

After 10 years of mainly c.w. operating, the 6146 p.a. valves show no signs of distress. I still get the same off-resonance peaks as when the valves were new.

Look again at the diagram Fig. 1. The five elements are spaced equally around the circumference of sections cut from a 100mm diameter plastics water pipe. There are 10 spacers, each section is about 50mm wide, along the length of the antenna (only five have been shown for clarity).

More sections would be needed to stop the antenna system twisting together, and allowing the individual elements to touch. But I also noted that this twisting and touching had no effect on the operation or matching of the antennas.

In an effort to reduce wind loading, I made a few modifications as shown in Fig. 2. I found no noticeable difference in characteristics. Now length B-C in Fig. 2, equates to 'a' in Fig. 1, A-D equates to length 'b', A-E equates to 'c' and so on. The short sections soldered onto the top line seem to act as resonators for each band.

In an effort to further reduce the wind resistance of the antenna I tried the layout shown in Fig. 3. This is a slimmer version of the idea shown in Fig. 2. And guess what, it works just as well!

The final version was made using two 21.335m length of 300Ω slotted feeder and keeping all other lengths the same. The joints at C, D, E and F, are strengthened by small, snug fitting 100mm long pieces of plain p.c.b. material. These points are taped and sealed to weatherproof them.

My thanks go to G0NAO for the loan of an antenna analyser and help in these experiments.

Jack Tweedy G3ZY
Clay Cross
Derbyshire

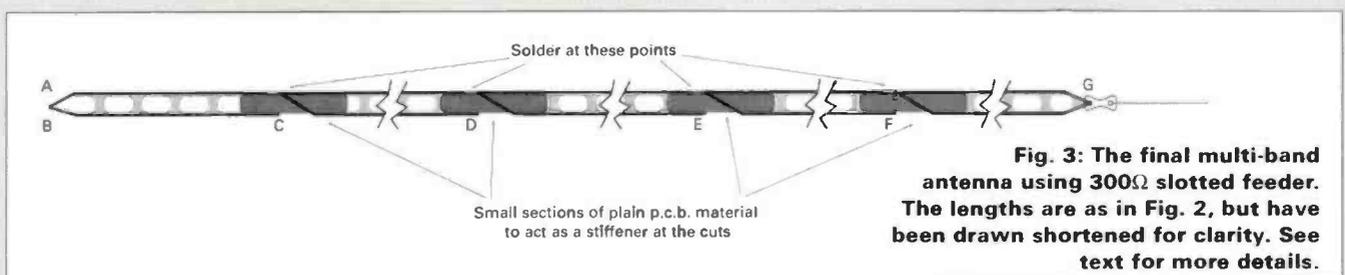
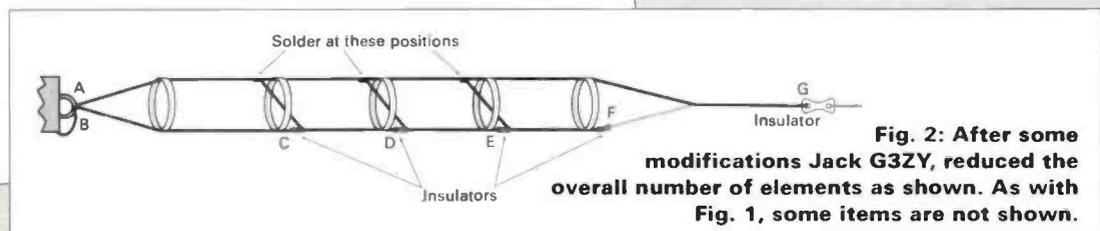
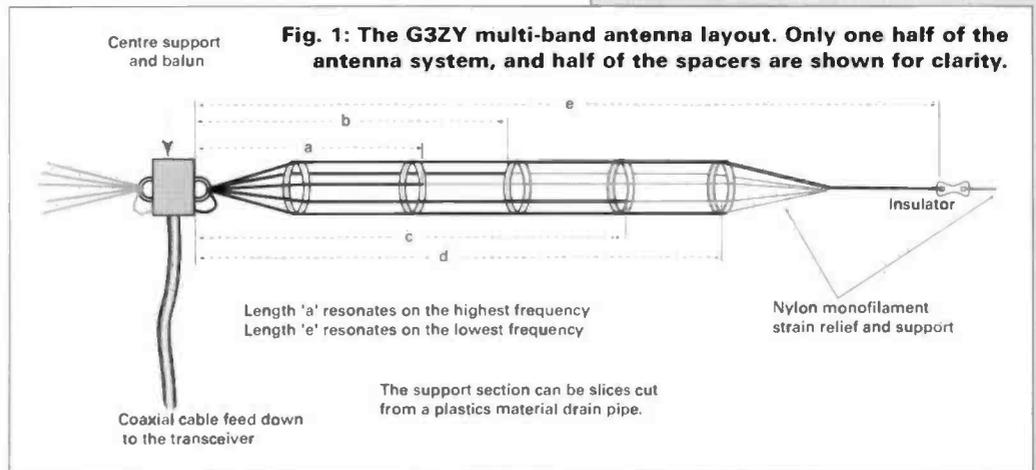
The Hula Loop

While shopping for Christmas presents, I spotted a 'hula hoop' in the toy shop. As I looked at it I began to see a 'magnetic' loop antenna for the 14MHz band. And at 99p it wasn't going to break the bank!

The hula hoop was some 750mm in diameter (although I have since seen others of differing sizes). I started by loosely taping a length of thin coaxial cable around the hoop.

I then tinned the ends and soldered them to the inner. The next job was to find a coil and capacitor combination that would bring the loop to resonance on 14MHz.

After many experimentations, I ended up with a 19 turn coil on the loop itself, and a 0-30pF Jackson variable capacitor. This



rkshop

Three more readers have a chance to write for Antenna Workshop this month.

capacitor has a 3mm spacing for the plates, and I've not found any arc-over at all at 100W from my FT-747 rig.

I also used a two turn coupling loop to get the r.f. to and from the transceiver. You can see the basic method in Fig. 1. Leaning against the wall of the shack I tuned up and tried a tentative call. To which UZ1CWQ gave me a five and eight, this response encouraged me greatly.

Once I had proved the system, I put two holes in the hula hoop and pushed the loop coaxial cable inside. The photograph of Fig. 2, shows a close up of the tuning and matching section.

Having noticed a little tingling occasionally when tuning up, even when I didn't touch the capacitor, I put a large

plastics container around the capacitor. This makes a much safer unit.

My second QSO was with EA5/G3LOD in Alicante who gave me a five and five. This was followed by SM4RKS in Karlstad, Sweden, with an even better five and seven.

Used in a vertical plane the 'Hula Loop' doesn't seem to exhibit any directional properties. Though I've made a version for the 3.5MHz band, it has had many problems with arc-over, and so I can't recommend it for this band.

D. Wood G3AEY
Great Chesterford
Essex

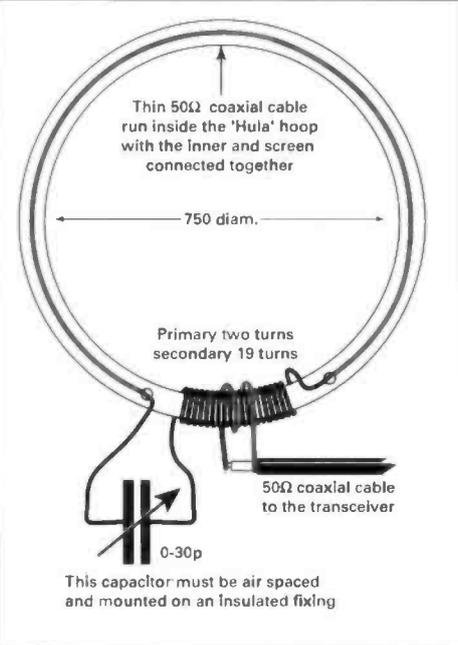


Fig. 2: A close up of the matching and tuning section. Note the Jackson air spaced capacitor.

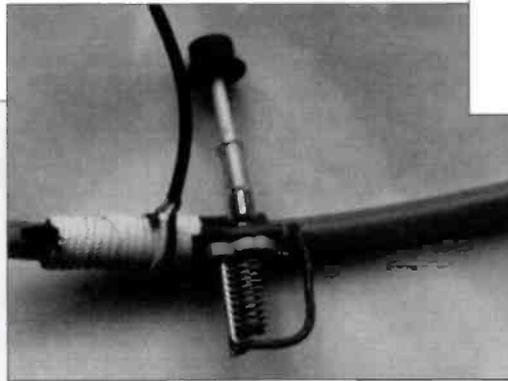


Fig. 1 (Above): This is the basic layout of the 'Hula Loop'. The capacitor must be a good quality, air spaced one.

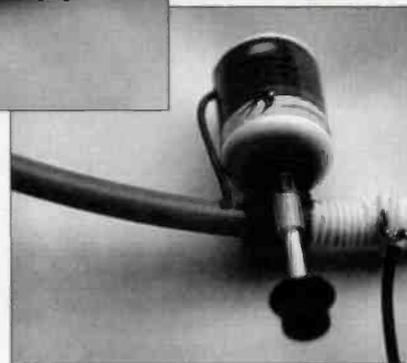


Fig. 3: A large plastics container was used for safety. But be careful, if the cable on the left is bare it can also give you quite a jolt.

Earth Rods Made Easy

A good earth connection is both a safety and r.f. asset for any amateur shack. Using a good r.f. earth connection can improve most h.f. transmissions. And by 'a good earth' point this normally means a solid copper (or copper plated steel) rod or tube of at least one metre length buried into wet earth.

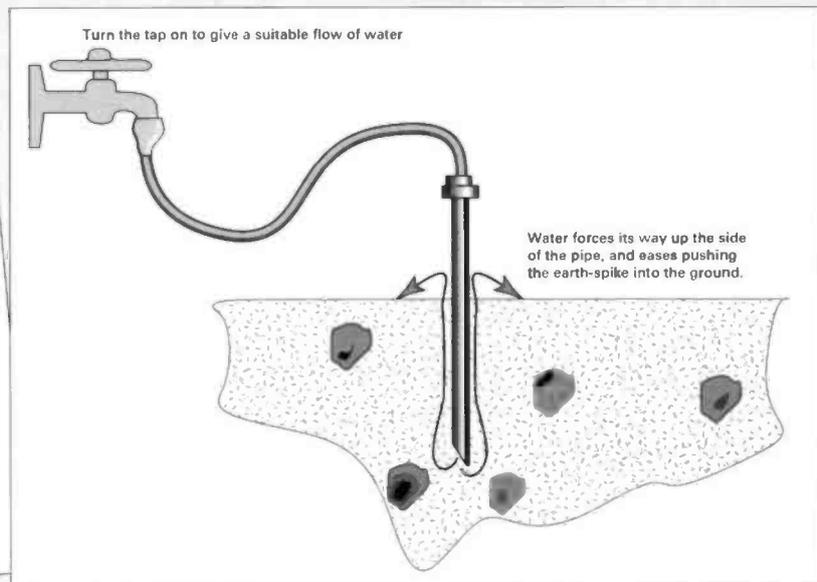
If it were just that easy to bury a 1000+mm of rod into the patch of stones we normally call a garden! Well, I've discovered an easy way to do it. Look at the drawing and you'll see my method.

I use a section of 22mm copper (central heating) pipe with a point cut on one end. At the other end, I fixed a hose pipe fitting.

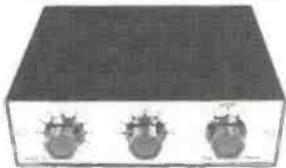
I can fix it, via a hose pipe, to my tap. With a suitable, but slow flow of water to ease the way, the pipe can be pushed into the ground. If you meet a large stone on the way, try again to the side.

My idea beats the alternative of thumping around with a large hammer (once you can find one that is). It also has the advantage of using the water to dampen the area in dry weather to improve ground conductivity.

Ken Grover G3KIP
Tunbridge Wells
Kent



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This month Peter Hunter GOGSZ has more news on the UK Amateur Radio Callbook, as well as details on an RAE Tutor programme.

In the May 1994 issue of 'Bits & Bytes' I mentioned a software version of the UK Amateur Radio Callbook. The programmers behind the UK Callbook (C & E Computers) have been upgrading and improving their software quite a lot over the past few months, and their hard work has certainly paid off.

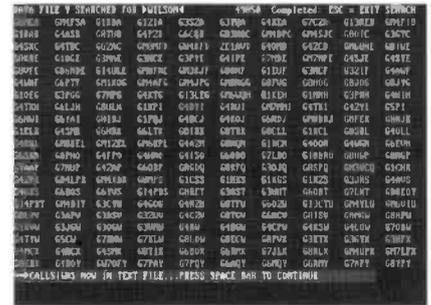
Not only have they made the whole program much faster, they have added search facilities for **Packet BBS's, Nodes, Prefixes and Countries**. Not only that, but these added programs are also available as 'stand alone' programs. So if you only want the 'Prefix/Country' search program, then that's all you need to buy.

The **Postcode** search, and **Surname** search sections have been greatly improved. It used to be a very long wait (even on my 33MHz 486) for the postcode or surname search to do its thing. Now, it's over in seconds, even for common names such as Smith. Also, the whole search file is saved as a standard ASCII (text) file and put in a directory called **Search**. This way, you can view the searched file whenever you want.

On top of all that, prices have actually been reduced! The full package, with everything included now costs just **£15**. The Callbook alone (without the 'add-ons'), costs just **£10.50**. And the stand alone modules are just **£5** each. These prices are inclusive of disks, post and VAT.

Full marks and many congratulations to C & E Computers. These people have dedicated a lot of time to making 'computers in the shack' much more enjoyable and useful.

The illustration **Fig. 1**, shows the list of choices with the full package. The 'on



Figs. 1 - 4: The various stages of the UK Amateur Radio Callbook at work (see text).



screen' picture **Fig. 2** shows the search by Surname in progress, **Fig. 3** is the search by Postcode, **Fig. 4** is the BBS/Node search. These pictures can't even begin to show the speed and ease with which this is all done.

You'll need about 7Mb of hard disk space to run the callbook program (which is really amazing when you consider the amount of data that's involved). Almost any 100% IBM compatible PC will run the program (even an Amstrad 1640!), so system requirements shouldn't be a problem.

By the time you read this the new data from the Radiocommunications Agency (RA) will have been installed in the program. This means that the UK Callbook on disk will be more up to date than the RSGB's printed version!

So send your money (cheques payable to P. Smith) now to: **C & E Computers, 149 Leaf Road, Houghton Regis, Dunstable, Beds LU5 5JQ. Tel: (0582) 868683.** My thanks to Pat Smith, of C & E Computers for sending the review disks.

Atari Morse

George Butler of Lucid Publications (famous for their Morse tutor) has been hard at work. This time Lucid have produced an **R.A.E. Tutor**, and Wow! what a programme. I haven't got an Atari ST any more, so George sent me a video of the program in use. Just watching the video made me wish I had an Atari.

The whole programme is like looking through an instruction manual. You get full colour circuit diagrams, etc., plus heaps of information, along with some sample RAE questions.

Sadly I haven't the space to do this software justice but, if you are thinking of taking the RAE and you own an Atari ST, then I can strongly recommend you buy a copy of the **Lucid RAE Tutor**. At just **£15** inclusive it's even worth buying a second hand Atari just to run it on.

For more information, or to obtain your own copy of the Lucid RAE Tutor, write to: **G. W. Butler G4BXU, Lucid Publications, 18 Hobart Road, Ramsgate, Kent CT12 6NW. Tel: (0843) 582939.**

Multiscan

Combitech of the Netherlands have just sent me information about a new modem for the IBM-compatible PC. It is called **Multiscan** and does just that. It will receive and transmit in all SSTV & FAX modes, in

black and white and colour, as well as RTTY, Amtor and Navtex.

The whole unit is available (at very reasonable prices) as either a fully built and tested unit, or in a multitude of kits to suit your pocket and skills. Starting from a bare p.c.b. for RX only, right up to the full system with all the components and a case.

The UK importers of the Multiscan will be the Bristol based company **Amdat, 4 Northville Road, Northville, Bristol BS7 0RJ. Tel: (0272) 699352** contact them for further details.

Grand Finale

And that's it from me, not just for this issue, but for good. I'm sad to say that, due to other commitments, I shan't be able to write 'Bits & Bytes' anymore. From the letters and 'phone calls I have received it would seem that most of you have enjoyed this column, I have certainly enjoyed writing it.

Hopefully, by the time you read this, **PW** will have found a suitable replacement for me (see separate panel - Ed).

Thank you all for your support, and the interest that you have shown in reading 'Bits & Bytes'.

73 to you all, and have fun with your keyboard, from Peter Hunter GOGSZ.

The *PW* Editorial team would like to thank Peter GOGSZ for his time and effort in compiling 'Bits & Bytes' over the last 18 months and are sorry to see him go. Taking over the column as from the October issue of *PW* will be **Mike Richards G4WNC**. Some of you will already be familiar with Mike's work as he used to write the 'RTTY' column in *Practical Wireless* and has a regular column, 'Decode' in our sister publication *Short Wave Magazine*. Ed.

E N D

Valve &

Ron Ham welcomes you to *PW*'s own vintage 'wireless shop' and takes a look at another item of Second World War equipment and suggests a possible diagnosis for a reader's 'deaf' R209 receiver.

When the *PW* 'wireless shop' was open last month I chatted about the R1116. This was an ex-RAF communications receiver of the late 1930s using 2V 'accumulator' valves.

Around the same time another, less sophisticated, battery driven receiver, the R1224A, Fig. 1, was being used. I think it was most likely employed at temporary ground monitoring stations. I've no doubt you'll note the similarity in chassis and component layout and valve types with pre Second World War domestic sets.

Wooden Cabinet

The R1224A's wooden cabinet is oblong, with a rear hinged lid and

Fig. 3: Close-up view of the Muirhead tuning dial used on the R1224A (see text).

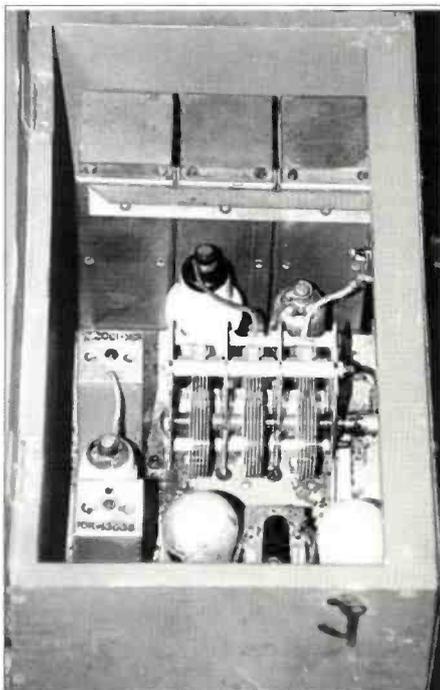
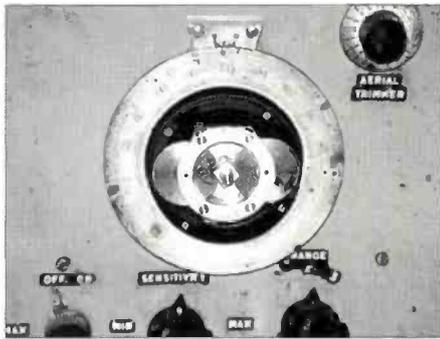


Fig. 1: Ron Ham takes a good look at the R1224A receiver in this month's column.

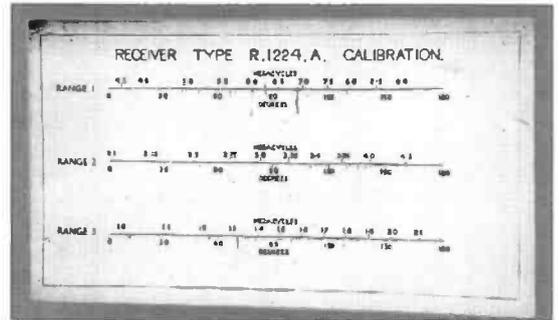


Fig. 2: The tuning scale with associated calibration used on the RAF R1224A receiver (see text).

finished in RAF blue. The screw holes I saw suggest that a small carrying handle was originally fitted to the centre of the lid.

By releasing two 'hooks' at the top front of the panel, right Fig. 1, the operator could open the lid to see the tuning calibration chart, Fig. 2. This set has three ranges.
Range 1: 4.3 to 9MHz.
Range 2: 2.1 to 4.3MHz.
Range 3: 1 to 2.1MHz.

Each tuning range on the R1224A has 0 to 160° marked on the chart. This is to associate the wanted radio frequency with the numbers scribed on the main Muirhead tuning dial, centre Figs. 1 and 3.

In other words, if the operator was expecting a signal on 7.5MHz, the chart shows that Range 1 must be selected. This is the right hand switch below the tuner, Figs. 1 and 3 and the dial turned to 120°.

Next, the receiver's front-end would be 'peaked-up'. This was done by adjusting the Aerial Trimmer control at the top

Fig. 4: The R1224A is housed in a wooden cabinet, access is obtained by releasing a hook at each end. With the lid opened, the three-gang tuning capacitor used in the receiver can be seen (see text).

right of the dial, Figs. 1 and 3.

Other controls marked **Reaction**, **On/Off** and **Sensitivity** are positioned respectively from the left along the bottom of the front panel, Fig. 1. There are also jack sockets on the upper left provided for headphones (top) and a 600Ω telephone line. Leads from the antenna and earth are connected to the large terminals on the lower right.

There's a multiway power cable, with wander plugs for the high-tension supply and grid bias batteries. The spade type connectors for the low-tension accumulator, enter at the rear of the chassis, Fig. 8 and right in Fig. 5.

The rubber insulation on this R1224A's multiway cable has hardened through age. Unfortunately it's falling off, thus leaving bare wires, especially at the cord-grip where it enters the chassis, top right in Fig. 5.

Take care and be aware! Disintegrating insulation like these in the R1224A can cause short-circuits between the h.t. and l.t. supplies and burn-out the valve filaments. It really pays to check the insulation very carefully.

Muirhead Dial

A similar type of Muirhead dial was used on the well known RF 27. Although smaller than the dial on the R1224A, it provides the same precise slow-motion tuning facility.

The indicator scale is geared to the front 'cap' and by rotating this, the outer assembly gradually moves. But, please keep in mind that these dials are now 50 years old and, because of storage, may run rough or be 'sticky'.

If you find a sticky R1224A dial, you should grip the outer 'cap' firmly between the thumb and first finger of one hand. Then with the other hand, unscrew the 'nut' in the centre.

Next, you should gently pull the 'cap' forward to expose the inner

gearing, Fig. 3. Now thoroughly clean the mechanism and lubricate the two outer wheel bearings with a light oil. (I use Three-In-One). Also, make sure that the end bearings on the 3-gang tuning capacitor, centre Figs. 4 and 8, are lubricated.

When you've finished the job, refit the dial cap. Make sure that it sits snugly on the square block (centre of drive Fig. 3) before tightening the knurled securing nut.

Lubricate Switch

When you're servicing a receiver of this age, it's a wise move to lubricate both ends of the wave-change switch shaft, just left of centre in Fig. 5. You should also check that the locking ball-bearings, or wheels, normally two, at the front panel end of the switch are well lubricated and move freely.

If you neglect the switch lubrication, the set's performance will be spoilt. This is because the switch will be 'heavy' to move and the many contacts are unlikely to 'lock-in' on the required range.

The three R1224A tuning ranges require three banks of coils with six alignment points on each one. These are housed under the large screening cans at the top of Fig. 4 and left of Figs. 5 and 8. I removed one screen, upper left Fig. 5 and left Fig. 6, to illustrate this point.

Warning! You should never adjust the alignment trimmers with the screening can removed. This is because, the added capacity of the can when refitted, will upset the efficiency of the circuit and the calibration.

Another important point to remember is the setting of the main tuning capacitor. This is in the centre of Figs. 4 and 8 and right Fig. 6. The dial 'tracking' and the receiver's efficiency throughout the range depends on the correct setting of the six adjustment points on each can, left in Fig. 6.

Vintage

By Ron Ham

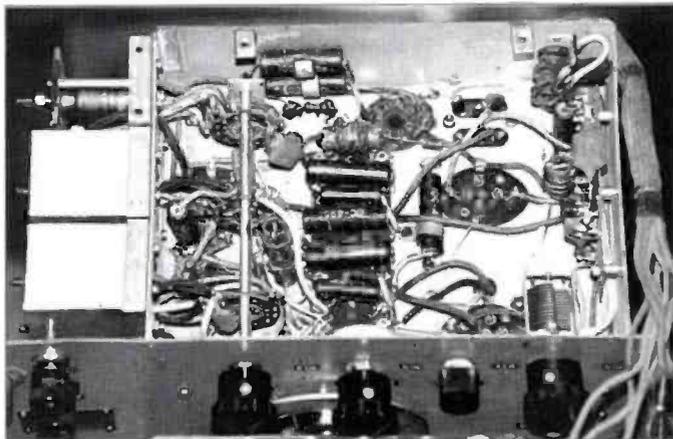


Fig. 5 (Left):
Under-chassis
view of the
R1224A receiver.

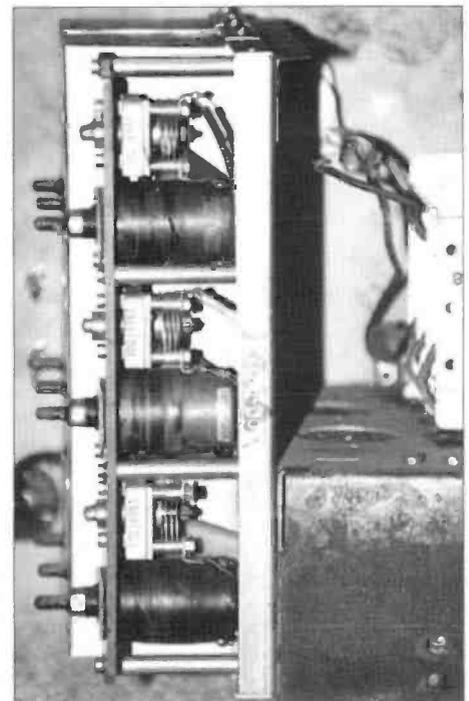


Fig. 6: (Right)
Tuning coils
(with adjustable
cores) and
associated air-
spaced variable
tuning trimmers
(see text).

Cores And Trimmers

When you're working on a receiver, service manuals often refer to cores and trimmers each being set to a specific frequency. The core adjustment is the screws protruding from the middle of each coil, Fig. 6, and the trimmer is the small air-spaced variable capacitor above each coil.

To obtain selectivity and sensitivity throughout each tuning range the alignment is critical. The same core or trimmer may have to be adjusted many times before it is correct. In some cases, the core is set to a frequency at the low end of the scale and the trimmer to a frequency at the high-end.

However, keep in mind that the alignment should be carried out with a signal-generator with the main tuning capacitor in the correct position. Incidentally, when aligning a front-end, watch out for harmonic signals, they can lead you 'up the garden path' as you tune and adjust on the wrong frequency!

Five Valves

The R1224A receiver has five valves, which are shown outside the set in Fig. 7. Their working positions are shown in Figs. 4 and 8.

The receiver uses two Mazda octals (ARP12 or VP23), 1 and 4; two British 4-pin (VR21 or 210LF), 2 and 3 and a British 7-pin with top cap (Tungsram VO2) at the far right of Fig. 7.

I cannot be sure that these valves are the original intended types because there's no circuit diagram or valve list attached to the set. However, the total filament current for those shown in Fig. 7 amounts to 430mA.

The two valves on the right in the photograph have the old style fabric insulating tape around the join between

the glass envelope and its base. This was often done by engineers to give mechanical strength at this point when the 'glue' had dried out and the valve was depending on its delicate 'pin' connecting wires to hold it in the base.

The two triodes (VR21) are positioned each side of the output transformer, lower right Fig. 4 and upper right in Fig. 5. The fixed capacitor between them is the feed from the 600Ω output transformer to the headphone jack.

After examining the set, it looks to me that one ARP12 is the r.f. amplifier (top right Fig. 4) and hidden behind the VO2 in Fig. 8, and the other is the i.f. amplifier, between the cans, left Fig. 4 and centre Fig. 8. Also, I think the VO2 (top left Fig. 4 and centre left Fig. 8) is the mixer/oscillator.

Although rusting is visible on the upper front panel and lower rear chassis, Fig. 8, I think this set is in reasonable condition. Considering it's more than 50 years old, it is ideal for showing a typical design of a battery operated receiver in the late 1930s.

Vintage Wireless Day

As I'm preparing this edition of 'V&V', plans are being made by David Rudram, (Hon. Curator of the Vintage Wireless Exhibition) for another Vintage Wireless Day. It's to be held on Sunday September 11 at the Amberley Chalk Pits Museum, Amberley, Near Arundel, in West Sussex.

In addition to outside exhibitors the museum has a fine collection of domestic radio and television receivers, valves and components on display for all to see. Most of the ex-army and RAF sets that I have discussed over the past 10 months have been kindly loaned to me by David from the museum's military collection.



Fig. 7: (Right)
Valves used in
the R1224A
receiver.

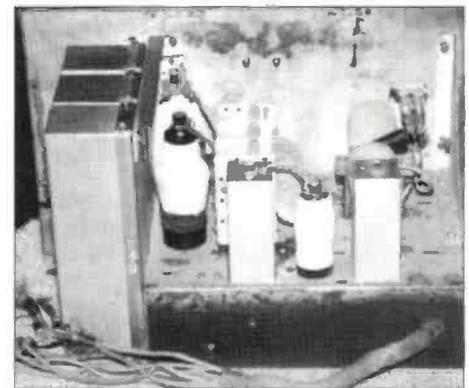


Fig. 8:
Crumbling
rubber
insulation on
the power leads
can cause damage
to valves on
vintage
receivers (see
text).

Rather Deaf

"I haven't used the set in almost 20 years and it now appears to be rather deaf", so wrote Robin Vesma of 7 Usborne Close, Staplehurst, Kent, TN12 0LD, about his ex-army R209 receiver.

If anyone has any spare modules or a complete R209 set, Robin would like to hear from you. From my memory, the R209 was made around 1950 and powered from a 12V battery supply.

Inside the R209, the high-tension supply for the valves is derived from a vibrator pack. The set covers from 1 to 20MHz and is a companion to and built in the same style, as the R216 v.h.f. receiver.

It's likely Robin that the 'deafness' in your R209, now some 40 years old, is caused by resistances going high. The decoupling capacitors 'leaking' in the front-end and/or the i.f. modules won't help either. This would deprive the

valves of their correct working voltages and thus considerably reduce their performance. However, I plan to look at the R209 in the next 'V&V'.

Finally this month, has anyone got a manual or any information on the CT501 wobulator? It's the RAF type ref. AP 117E-0601-1, 2 and 3. If so, please contact Rob Filby, at 11 West Street, Timberland, Lincolnshire LN4 3RX. Rob needs your help!

Well, it's time to shut up the 'shop' again, but don't forget that I'm open for business in the shape of your letters at any time. Cheerio for now and keep writing to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 4HE.

This month we welcome Roger Cooke G3LDI back to his monthly spot and this time he brings you news of a new node, and a new mode!

Situated on the north Norfolk coast, Cromer is famous for its crabs, they're very nice too. I know, having spent numerous hours picking and eating them!

The town is over the North Norfolk ridge and Norwich area repeaters or BBSs are inaudible. But packet activity in Cromer has increased to such an extent that a new user group has been formed.

The Cromer Repeater Group will be responsible for both voice and packet repeaters. Permission, granted by Trinity House, has allowed installation of the repeater antennas on the lighthouse, thus giving a way out of the town itself.

The new group's chairman is **Doug G3NMY**, the treasurer is **Kevin GOULG**, and the secretary is **Norman G8SMQ**. As soon as the formalities are done, the radio amateurs of Cromer will be joining the rest of the world!

Data Modes

Data modes on h.f. are forever becoming more efficient. Pactor is better than Packet, Clover was supposed to be better than Pactor.

A new data mode, G-TOR, has been acclaimed as the latest contender in the battle for data speed throughput. From results carried out in the USA, it would appear that G-TOR is roughly four times faster than Pactor, and about twice as fast as Clover.

An innovation of Kantronics, G-TOR is short for Golay-TOR. The benefits of this system are: a dramatically increased throughput, an apparent reduction in the effects of interference and multi-path and low cost.

The key features of G-TOR are:

- 1 Extended Golay forward error correction coding
- 2 Full frame data interleaving
- 3 On-demand Huffman data compression with run-length encoding

- 4 Link-quality based baud rate, 300 200 or 100baud
- 5 a 2.4 second hybrid ARQ cycle
- 6 Fuzzy acknowledgements
- 7 Reduced overhead within data frames
- 8 Standard f.s.k. tone pairs (mark and space)

Research and simulation of this new protocol was carried out off-air before on-air tests. The results using a KAM-PLUS, were very encouraging. In fact the results were better than the simulator predicted. Operating as a synchronous ARQ mode and regardless of transmission rate, the cycle duration for G-TOR is always 2.4 seconds. Data frames are 1.92 seconds long, with acknowledgements taking 0.16s. At 300baud, each data frame contains 69 (at 100baud only 21) bytes of data, one control byte and a two-byte CRC are sent.

Synchronisation is established during the linking phase. The calling station (master) sends a G-TOR frame with TO and FROM callsigns.

The Information Receiving Station (IRS), synchronises to the frame by looking for its callsign. Once in step, it acknowledges the master and sends <LINK ESTABLISHED> to its terminal.

Data transmission begins, with sufficient time between the end of the data frame and the start of the acknowledgement for h.f. path propagation. A change in information flow direction (changeover) is accomplished by extending the acknowledgement bytes into a changeover frame.

Once acknowledged by the other station, changeover is complete. Link quality, defined by the number of consecutive good or bad frames received, determines link baud rate.

The effective performance of stations, while using adverse h.f. channels, relies on the combined use of Forward Error Correction (FEC), interleaving and redundancy. These

improvements are incorporated in G-TOR within the firmware of the KAMPLUS (or the KAM with the enhancement board).

Transmission Frames

Prior to transmission, 300baud frames are divided into 48 12-bit words and matched with 48 error correction words of 12-bits each. The entire 72 byte data frame is then interleaved bit by bit, and transmitted.

Upon reception at the IRS, the reverse process is carried out. The frame is synchronised, de-interleaved, decoded and checked for proper CRC.

If the frame seems to contain an error, the IRS will request the matching parity frame be sent. Upon receipt, this frame is used in combination with the data frame in an attempt to recover the original data bits. If no recovery seems possible, the ARQ cycle begins again. Data interleaving and the power of the Golay code can correct three error bits in every 24. This normally results in the transfer of error-free frames.

During January, over 1 million bytes were transferred, error-free, from Lawrence, Kansas to Laguna Niguel, California. The transfer of this large file was done several times, alternately using Pactor and G-TOR. On average, the Pactor mode took from 12 to 17 minutes while G-TOR took half as long for the transfer.

Operation

Operation with G-TOR is much like AMTOR. From standby you can copy AMTOR FEC (also used as the calling mode for G-TOR CQs), or wait for a G-TOR link request from another station.

To initiate a link with another station you must type: G-TOR callsign <CR>. The link is then established and the Terminal Node Controller TNC reports Linked to callsign. During a

QSO changeover is dictated by the usual keyboard (or host-mode) directives, Control-C T and Control-C E.

Not available for the KAM without the enhancement board, you will have to obtain an up-grade and an enhancement board to use G-TOR. All are available from your usual dealer outlets. If however, you purchased either the KAM-PLUS or the enhancement board since 1 Feb this year, the upgrade (Version 7.0) is free.

The Kantronics Host Master driver software will also be upgraded to provide G-TOR at no extra cost. Although Host Master is not required to operate G-TOR

Packet Award

Not many operators realise Packet and Pactor has operating awards. But in recent months the team of Richard G3XVF and Ted G8CDW have been looking at the Quarter Century Awards (QCA) available from the British Amateur Radio Teledata Group.

These awards are now available for digital modes other than RTTY. Richard has now claimed the 1st QCA award for Pactor to be added to the first QCA issued for Packet operation, claimed a short while ago.

Minimum requirements for packet and PACTOR awards are confirmation of contacts with 25 different countries. Further details can be obtained from the BARTG awards manager, **Nigel G4KZZ** who is QTHR. A stamped s.a.e. would be appreciated.

It's wonderful to be back monthly again. I must say thank you to all my readers. As usual, comments and messages to G3LDI @ GB7LDI, or snail-mail (QTHR) for photographs etc.

E N D

THE BANDS

Paul Essery GW3KFE has some sound advice this month, news of new QRP awards, plus reports on the bands, conditions and other interesting news for h.f. operators.

Consider this: if you call unsuccessfully, you are just QRM to the rest! Unfortunately, 90% or more of the rumpus in a pile-up is caused by people who don't know where the DX station is listening, but who call 'blind'.

When it comes to band conditions, coronal holes are knocking things about still, but the sun seems to be returning to normal. On the other hand, the spectacular fall in sunspot count works against us.

Listen round, and don't be fazed when conditions are odd! For example at NFD (GW3JSV) it was noted that 28MHz was 'giving'; by the time we had unplugged the 21MHz antenna and plugged in the 28MHz PL259, the band was dead again!

Operating News

I have news that N4GCK will not now be operating from the Yemen as 700CW in July. There's also news that F6EXV is understood to be home after his activity from rare and dangerous spots in Africa.

Tom Christian VR6TC was recently evacuated from Pitcairn Is for urgent medical treatment. At the time of writing he was understood to be recuperating in Auckland, New Zealand.

Wales Award

From **Leighton GW0LBI**, in Trelewis I've had news of the Worked All Wales QRP Award. It involves using power of 5W or less, contacts, with all eight counties of Wales.

To get the award, send your list (certified by another amateur), plus an A4-sized s.a.e. to: **Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB.**

There's also a Worked All Wales Milliwatt Award, which calls for you to use less than one watt (i.e. milliwatts) for the contacts. The actual awards are free if you meet the operating conditions. Further information from Leighton GW0LBI.

Your Letters

Now it's time to turn to your letters. That 'Plastic Man' **Ted G2HKU** is back on the air now that the hospital are satisfied his body has accepted the plastics piping(!)

Ted's return was celebrated on 1.8MHz by c.w. to GW4IUN and s.s.b. to ON7BW. Low power on 3.5MHz with an Icom IC-721S plus key turned up PA3ALX, and on 10MHz Ted tried an MFJ Super Hi Q Loop at two metres up; EA7HAT gave 599, while a switch to the G5RV reduced this to 579. Others on the band, ZA1EAF, 7X2CR, and OH0MEP.

The G5RV antenna on 14MHz went out to 9K2MU, VKs, KH6AD, DL8YR/ST2, while the MFJ loop antenna turned up a 599 from Iceland's TF3GC.

The HF6 antenna on 18MHz c.w. accounted for SU1STAR, UX6LT and 3B8CF. On 21MHz c.w. the MFJ loop got 569 from RX6AY, while the HF6 handled things to LU/G4SMC with G3SED operating (The Camel Trophy Team), plus VP5P, ZZ5AS and ZS6ME.

Finally 24MHz was where a spell of low-power on the IC-721S turned up EA1FBJ/MM off the coast of The Gambia. The second letter from G2HKU showed that he had added 7MHz from CO2/K7JA, and on 28MHz c.w. managed EA9AI and OH0/AC6T. I liked the footnote on his letter "still mending: XYL does the bending"!

Two letters arrived from **John Heys G3BDQ** near Hastings. The first one covering the month to mid-May, comments that John also had been in hospital - it must be fashionable!

Normally, John's activity is for about 30-45 minutes on 14 or 21MHz in mid-afternoon. However, 7MHz yielded c.w. from JT1BH, and 14MHz sideband accounted for VKs, XX9AS, JR5JAQ, and OD5JY.

John's 21MHz activity and the microphone came up with PY0ZFB (Fernando do

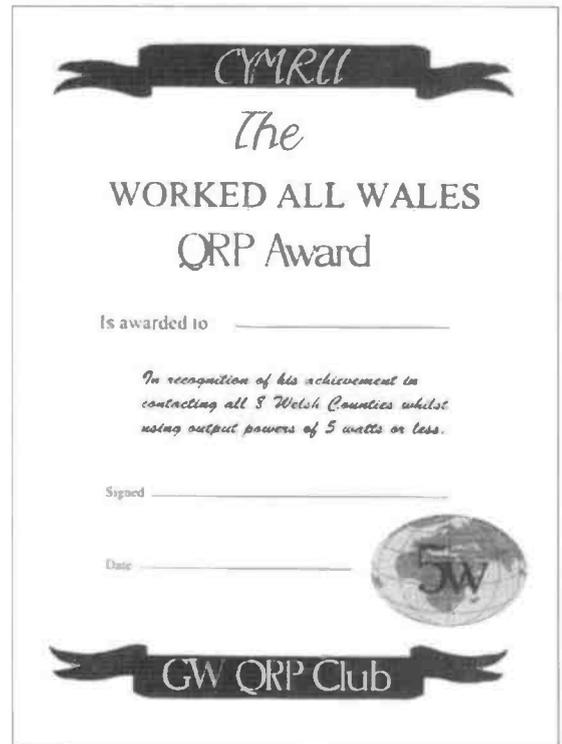


Fig. 1: Leighton Smart GW0LBI brings news that there are two new Welsh awards available for QRP trophy hunters (see text).

Noronha?), AP2JZB twice, ZD7GWM, OU1JUX twice, FH5CB, FH5ET, the ZS94F 'special', and much smaller fry. Interestingly enough, other than the PY, nothing was raised to the west.

For an interesting pair, hear this: The GB0CT (Channel Tunnel) station was hooked on May 6. And a few minutes later, the TM5TSM at the other end - on 144MHz f.m.!

In the second letter, John notes that the sunspot collapse has taken much off the higher (18, 21, 28MHz) bands. But there's some short-skip inter-G stuff to give a taste.

John worked on 21MHz sideband to collect O2EGH, ET3SID and other Africans, PY0TUP on Trinidad Is plus c.w. to Y19CW. On 18MHz I noted his contact with S79CK/C (Astove Is), ZD7WRG, 7X2JF, plus c.w. to 3DA0CA (Swaziland), and 3V8AS.

The 14MHz s.s.b. from G3BDQ went to XX9AS, 3X0YU, ZA1MH, EG9ITU, while on 3.5MHz John connected with 9V1XQ and a host of the O-Day commemorative stations.

Down in Yeovil, **Don G3NOF** found the best times to be between 1500 and 1800Z but things were very patchy, particularly on the

higher bands. Don's 14MHz operations showed DL8YR/ST2, J28GG, KH2/VP9BP, P29WK, SU1STAR, V85SS, and 5H3DC.

Up on 18MHz G3NOF worked AP2JZB, BV3BW, O44BS, FS/W1FC, TJ1AD and S21CS, and 21MHz produced ET3SID, JU55UAB, PY0ZFB, S79CK/D (Desroches), ZD7WRG, and 3X0YU. The 24MHz ration was Z21CS, S21ZG, and EZ5AA, while on 28MHz no contacts could be made (no details on equipment or antennas).

In his later letter, Don mentions that conditions were still bad, but 14MHz had been useful in the afternoon, short path to Asia and to Africa. The best time when he wrote had been around 2000 when occasionally the band opened to 18MHz. For example PY0TUP, S79CK/C and XU0HW. On 21MHz D3X, PY0ZFB, 3X0YU were the pick; up on 24MHz SV5/PA3G10/M, ZS5N, and 9G1SO.

So, that's all for now. Your letters and reports please, by mid-month, to Box 4, Newtown, Powys SY16 1ZZ.

E N D

This month Peter Shore has news of a new transmitting station, details on Digital Audio Broadcasting and the latest broadcasting schedules.

The Voice of America (VOA) has just inaugurated its new transmitting station in Thailand, located at Udon. Reports suggest that the station cost about 120 million US\$ (about £70 million), for which VOA has got six 500kW transmitters and high-gain antennas. A further 500kW transmitter at Udon is available for Radio Thailand.

The Udon station can be remotely controlled from Washington DC, unlike others in the VOA's world-wide network of relays which require more 'hands-on' operating techniques. The new station will cover Central and South Asia and parts of the Far East, easing the burden on the two relays in the Philippines at Poro and Tinang. These two transmitting sites are about to undergo extensive modernisation programmes with more automation to allow them to be operated with fewer staff.

Meanwhile, the VOA has announced its latest audience figures. The figures show that 92 million people world-wide tune into programmes from the Washington-based station, most of whom are young, male and well-educated.

In Europe, including the former Soviet Union, some 21 million listen to the VOA, while the largest audience is in South Asia and the Near East where 25 million tune in. The African audience numbers around 20 million, 6 million in Latin America and 19 million in China. The last figure is clearly an estimate as systematic audience research is not permitted by the Chinese authorities.

Radio Thailand's use of Udon began during July with English transmitted at 0000-0100; 1130-1330; 1900-2000 and 2100-2300 all on 4.83, 9.655 and 11.905MHz.

Digital Audio Broadcasting

The Finnish state broadcaster, YLE, has

announced that it will start building a Digital Audio Broadcasting (DAB) network in the country in 1997. Tests have already been carried out around Helsinki.

The first DAB receivers will be available from the late summer of 1995, most likely in the high-end car radio market, when a number of services are likely to be launched. A Europe-wide launch is a possibility at the giant consumer electronics fair in Berlin, the Funkausstellung, during September 1995.

In the Czech Republic, the Radiozurnal First programme is now transmitting RDS on f.m. and is one of the first eastern European countries to adopt the RDS system that is now in widespread use across the continent.

Current Schedules

Radio New Zealand International's current schedule is: 2137-0500 on 15.115, 0500-0800 on 11.90, 0800-1206 on 6.10 or 7.125, 1206-1650 on 6.10 or 7.125 or 9.70, 1650-1850 on 6.10 and 1850-2137 on 11.735MHz.

There is a short English-language news bulletin from Radiostation Pacific Ocean in Vladivostok on Saturday at 0750UTC on 17.86, 17.85, 17.805, 17.645, 17.61, 17.59, 15.535, 15.425, 15.415, 15.18, 12.07, 12.05, 12.01, 9.865, 9.82, 7.21 and 7.185MHz. There may be other channels as well for this service, which is aimed principally at the Russian merchant fleet at work in the Pacific. The Russian identification is Radiostantsiya Tikhyy Ocean. At all other times, Russian is broadcast.

Radio Moscow may be about to close its one-hour a day Dutch language service. According to a report on Radio Vlaanderen International's Radio World programme, there is only one member of staff left in the Dutch section, who is having

to produce seven hours of programmes each week, quite an undertaking!

In the Netherlands, people will probably prefer tuning to Holland FM rather than Radio Moscow. The old pirate radio ship the MV *Communicator* has been given permission to moor between the towns of Enkhuizen and Lelystad and will be on the air using a 23kW m.f. transmitter. The ship is to be painted in red, white and blue, the colours of the Dutch flag.

Vatican Radio's English service to Europe is carried on the World Radio Network on Eutelsat II F1 at 13° East on the transponder at 11.554 and the audio subcarrier at 7.74MHz. Short wave broadcasts continue alongside at 0500-0520 on 6.245, 3.945, 0630-0645 on 15.21, 11.74, 9.645, 7.25, 6.245, 3.945, 1020-1030 on 21.73, 21.515, 15.21, 11.74, 6.245, 1615-1630 on 9.645, 7.25, 6.245 and 1950-2010 on 5.882, 3.945MHz.

A frequency change has been noted for Radio Vilnius' English service. The 0000-0030 transmission to North America is now heard on 9.53MHz. English is heard only at weekends on this frequency, with programmes in Lithuanian during the week.

Radio Portugal broadcasts from Lisbon in English at 0130-0200 Tuesday-Saturday on 11.84, 9.705, 9.635, 9.60, 9.57, 9.55MHz, 1530-1600 Monday-Friday on 21.515 and 1900-1930 Monday-Friday on 17.68, 11.975, 9.815 and 9.78MHz.

Radio Exterior de Espana has English to Europe at 2100-2200 on 6.125MHz. There is also a transmission to Africa at 1900 on 11.775MHz and to North America at 0000 and 0500, both on 9.54MHz.

Swiss Radio International's 24 hour-a-day English service on Astra has begun, on the transponder at 11.332 and the subcarrier at 7.56MHz. Many DX clubs are urging their members to

write to the station protesting the loss of the Swiss *Short Wave Merry Go Round* hosted by Bob Zanotti and Bob Thomann. They suggest that letters should be addressed to **Ulrich Kundig, Managing Director, SRI, CH-3000 Berne 15, Switzerland.**

London Listeners

Listeners in London tuning to 105.4MHz in June might have been surprised to hear French programmes. Radio France International (RFI) enjoyed a swap of frequencies with the BBC World Service, with the BBC on the air on f.m. in Paris. The exchange was established to mark the 50th anniversary of D-Day and also the entente cordial between the two countries (this all happened before the debacle of the election of the successor to M. Jacques Delors!).

Meanwhile you can tune to RFI's short wave service in English at 1200 on 17.575, 15.325, 15.195, 15.155, 13.64 and 9.805 and at 1600 on 17.85, 17.795, 17.62, 15.53 and 6.175MHz.

Beamed To Europe

The Voice of Free China in Taipei, Taiwan, has English beamed to Europe at 2200-2300 on 21.72, 17.75MHz, both from WYFR in Florida. From the mainland, China Radio International broadcasts to Europe in English at 2000-2100 and 2100-2200 on 9.92, 8.26, 6.95 and 4.13, 2200-2300 on 9.88MHz via a hired relay in Russia.

That's all I've got room for this month so until next time 'happy listening'.

E N D

ARCADE

The *PW* Shopping Arcade

Welcome to the *Practical Wireless* 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let your eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other *PW* Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading *PW*!

Services

Queries:

Practical Wireless,
PW Publishing Ltd., Arrowsmith Court,
Station Approach,
Broadstone, Dorset BH18 8PW.

We will always try to help readers having difficulties with *Practical Wireless* projects, but please note the following simple rules:

- 1: We **cannot** deal with technical queries over the telephone.
- 2: We **cannot** give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.
- 3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
- 5: Only one problem per letter please.

Back Numbers

Limited stocks of many issues of *PW* for past years are available at £2.00 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of £1.50 per article or part of article. Over the years, *PW* has reviewed many items of radio related equipment. A list of all the available reviews and their cost can be obtained from the Editorial Offices at Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW for a large stamped self-addressed envelope.

Binders

PW can provide a choice of binders for readers' use. Plain blue binders are available, each holding 12 issues of any A4 format magazine. Alternatively, blue binders embossed with the *PW* logo in silver can be supplied. The price for either type of binder is £5.50 each (£1 P&P for one, £2 for two or more). Send all orders to PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

Constructional Projects

Components for *PW* projects are usually readily available from component suppliers. For unusual or specialised components, a source or sources will be quoted.

Each constructional project is given a rating to guide readers as to the complexity.

Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron.

Intermediate: A fair degree of experience of building radio or electronic projects is assumed, but only basic test equipment will be needed to complete any tests and adjustments.

Advanced: A project likely to appeal to the experienced constructor. Access to workshop facilities and test equipment will often be required. Definitely not for the beginner to attempt without assistance.

Mail Order

All items from *PW* are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 659930. Payment should be by cheque, postal order, money order or credit card (Mastercard and Visa only). All payments **must** be in sterling and overseas orders **must** be drawn on a London Clearing Bank.

DAYTON

HamVention '95 - Come Fly With *PW*

DON'T MISS THE AMATEUR RADIO HOLIDAY OF THE YEAR!

Join the *PW* Dayton HamVention holiday, led by Rob Mannion G3XFD, as we depart from Gatwick on Tuesday 25 April 1995 to fly direct to Cincinnati in the USA for £650!

When our Delta Airlines flight into Cincinnati arrives, we'll travel by coach to the Holiday Inn at Englewood in Dayton (approximately one and a half hours). Where we'll be staying for a total of six nights.

The Holiday Inn is comfortable, has a good swimming pool and lots of choices for 'eating out' close by, if you don't wish to eat in the Hotel. The Hotel is one of the nearest to the HamVention and there's good public transport available in and around Dayton.

On Wednesday 26th there's a chance to spend the day at the internationally famous American Air Force Museum. You'll be able to visit the superb IMAX 3D cinema (entrance to museum is free, but there's a small charge for the cinema).

Thursday 27th, optional trip to Cincinnati (approximately £15) for a day's shopping and sightseeing. Alternatively, you may visit Dayton or take a look at the giant 24-hour Meijer's Department store close to the Hotel.

The HamVention opens on Friday at mid-day and runs to late Sunday afternoon. On Monday, there's a morning at leisure until our coach transfers us to Cincinnati for the overnight flight to Gatwick.

The £650 is based on sharing a twin-bedded room (if you're travelling alone we'll gladly arrange this for you) and includes: Return scheduled flights from Gatwick and meals on the flight, six nights at the Holiday Inn, return airport/hotel transfers in the USA, entry fee to HamVention, excursion to Air Force Museum, all local city and state taxes and US airport taxes and the new UK airport tax of £10.

Not included in the price are: transport to and from Gatwick, meals during the stay, health insurance, laundry, drinks and personal expenses.

Rob Mannion G3XFD is leading the *PW* party, but as with the successful 1994 trip, the tour is being organised by Andy Garside of Gullivers Groups & Incentives.

**So, don't delay, contact Andy Garside today to book your place on Dayton '95. Write, telephone or FAX Andy at Fiddington Manor, Tewkesbury, Gloucestershire GL20 7BJ.
Tel: (0684) 293175, FAX: (0684) 290093.**

Classified Ads

To advertise on this page see booking form below.

Receivers

B.F.O. KITS Resolves single side-band on almost any radio, £16.49. H. CORRIGAN, 7 York Street, Ayr KA8 8AR.

TRANSCEIVER PRC 316 HF AM CW 4 Watt output with speaker/mic. and manual £105.00 (last few). Mega Crank Handle Type 500v £45. All prices include p&p. Send large SAE for list. CP Surplus, 56a Worcester Street, Wolverhampton WV2 4LL.

Service Sheets

TECHNICAL MANUALS, AR88, CR100, R210, HRO, £5 each. Cirkits only. 150 pence, plus S.A.E., lists thousands. Bentley, 27 De Vere Gardens, Ilford Essex IG1 3EB. Phone: 081 554 6631

Books

Unique DIY plans for wind, solar and water power projects, welding generators, battery chargers, portable generators, boost, engine crane, electric bike etc. Send two 1st class stamps for catalogue. Jemmett Engineering 8 Hallam Gardens, Pinner, Middlesex HA5 4PR

Computer Software & Hardware

ULTIMATE MORSE TUTOR for PC's and ATARI £30 from BOSCAD Ltd, 16 Aytoun Grove, Baldrigeburn, Dunfermline, Fife KY12 9TA or Tel: 0383 729584, evenings for detailed information.

JVFAX/SSTV, HAMCOMM, PKTMON. 9FD or 25FD PC Transceive Interface, Programs, Manuals, Pictures. £22.50 G8SLB (QTHR). Tel: 081-595 0823.

For Sale

ZD9SXW TRISTAN DA CUNHA DX'PEDITION. Roger, G3SXW used his Samson ETM-9C memory EL-KEYER for 23,320 QSO's. SAE details ETM-9C and other models. G5BM. QTHR. Tel: 0531 820960.

JVFAX, HAMCOMM, GEOCLOCK, PACKET RADIO and many more can be downloaded on the Amstrutt Bulletin Board. Tel: 0822 611161.

QSL, SWLS ECONOMY CARDS. Very low prices, quick delivery. Sample enquiry to: G3ETU, 34 Park Lane Court, Salford, Manchester M7 4LP. Tel: 061-792 9144.

NOW OUT The official 1994 Spring UK Amateur Callbook on disc for IBM compatible PCs, 15.1m on 3 x 3.5 HD, covers callsigns up to GoUOZ, G7SGS, 2E1CUL. Includes beacons, repeaters nodes and mailboxes £10.00 Plus £1.50 PPI. J Bailey, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN.

RECONDITIONED ROTARY CONVERTER type RC8A 24 volt, input 115 volt, 3 phase 400Hz, output 1.8 amps. £40 + carriage. G Gaughan, 64 Gosport St. Lymington, Hants SO41 9BE. Tel: 0590 676708.

ALINCO DY-F1 2M TX handheld with keypad and Rx scan 130-170. One with charger £160, one without £150. Tel: 0376 330220 or 0850 011022.

PHILIPS RADIO type 381A excellent valves intact £60 or nearest. Tel: 081 597 8224 daytime.

ICOM IC781 SM9 SP20 all as new. Original boxes, manuals. £2500. Box No 30.

Wanted

WANTED FOR CASH Valve communication receivers and domestic valve radios (working or not). Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, FY1 2EU. Tel: (0253) 751858 or (0253) 302979.

DISCLAIMER

Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. *Practical Wireless* advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available.

The publishers of *Practical Wireless* wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Valves

VALVES GALORE Most valves available from stock. Otherwise obtained quickly. Please send SAE stating requirements or telephone. **VALVE & ELECTRONIC SUPPLIES** Chevet Books, 157 Dickson Road, Blackpool FY1 2EU. Tel: (0253) 751858 or (0253) 302979.

WANTED, VALVES GZ34, KT66, K688, PX4, PX25 and all West European/USA manufactured audio valves. Please post list of what you have available for prompt reply. We also wholesale audio tubes, valves and CRTs. Minimum order £100. Billington Export, 1E Gillmans Ind Est, Billingshurst RH14 9EZ. Phone: 0403 784961 Fax: 0403 783519. Callers strictly by appointment only please.

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TEL: 081-684 1166. Fax: 081-684 3056.

ORDER FORM FOR CLASSIFIED ADS PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 2.5cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to the PVW Publishing. Treasury notes should always be sent by registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659920, Fax: (0202) 659950

Please insert this advertisement in the issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for insertion/s. I enclose Cheque/P.O. for £..... (42p per word, 12 minimum, please add 17.5% VAT to total).

Name:

Address:

Telephone No.:

Box Number @ 70p: Tick if appropriate

Category heading:

Educational

COURSE FOR CITY AND GUILDS Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone - THE RAPID RESULTS COLLEGE, DEPT JX116, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr Recordacall service 081-946 1102 quoting JX116.

HEATHKIT EDUCATIONAL PRODUCTS/UK DISTRIBUTOR Spares and Service Centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham. Glos. GL54 5NS. Tel: (0242) 602402.

LEARN MORSE with your PC. £6.99 from Shoestring Software, (PW), 78 Carmarthen Road, Swansea SA1 1HS. **FREE DEMO AVAILABLE.**

RAE MAIDSTONE YMCA KENT 8.30PM SEPT 9TH & 16TH (0634 831504 for enrolment). Novice course (0622 744545) & Morse classes (0580 892253) £6.50 per annum + £1.20 per week. Why pay more? Membership Sec. Brenda G0LJK 0622 850277.

Miscellaneous

DIY Inexpensive radio projects. Easy to make, SAE, RYLANDS, 39 Parkside Avenue, Southampton SO1 9AF.

ATT FT-101 OWNERS. For FT-101 MK1, MK2, B and E only. 3 Band Kit 10, 18 and 24MHz £23. Double Balance Mixer for Less X MOD £24. Set of Valves (all Jap. normally £78) £59 if you cut out this advert, P & P £1.49 per order, G3LLL, Holdings Amateur Electronics, 45 Johnston Street, Blackburn BB2 1EF. Tel: (0254) 59595. Open Tue, Wed, Fri & Sat, Lunch 12-1.30pm. But phone & Check Holidays!

SHAREWARE REFERENCE GUIDE

Find out what really is available in PD & Shareware - ham radio, graphics, business, scientific, electronics, maths, education, etc.

You'll find them all here, every thing you need in one book. Thousands of the best PD & shareware programs for DOS & Windows, described in detail with the hardware requirements for each.

This is probably the most complete and up-to-date shareware reference book available today. For you copy, send £2.50 by cheque, PO, cash or pay by Access/Visa to:

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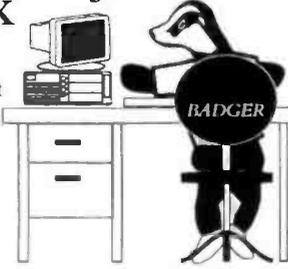
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IMPORTANT NEWS from BADGERS DESK

BADGER PC sales are going UP and UP whilst prices have been coming DOWN. The starting price for a 386SX40 base unit with 2Mb of RAM, keyboard, 1.44 Mb floppy drive, serial and parallel ports is just £269 including VAT and delivery to your door.

Phone now or write for an information pack. 081 902 5218 or 081 905 7488

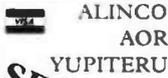


AMSTRAD for repairs, spares and second user, phone for details.

73 John G3TLU.

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Practical Wireless PCB Service

Badger Boards, 80 Clarence Road, Erdington, Birmingham, B23 6AR. Telephone: 021-384 2473

Enquiries, orders and remittances should be sent to: **Badger Boards, 80 Clarence Road, Erdington, Birmingham, B23 6AR.** Tel: **021-384 2473**, marking your envelope PW PCB Service. Cheques should be crossed and made payable to **Badger Boards**. When ordering please state the article title as well as the board number. Please print your name and address clearly in block capitals and do not enclose any other correspondence with your order. We have talked to Badger Boards about the club and group discount on orders, and they are happy to continue this service. Club secretaries and group leaders should contact Badger Boards direct for the new discount rates. Please allow 28 days for delivery.

Board	Article (Project) Title	Issue	Board	Article (Project) Title	Issue
WR315	PW Bourbon 3.5MHz TX	Aug 93	WR288	Morse Master	Jun 91
WR314	UHF Pre-Amplifier	Dec 92	WR286	Meon-4 (RF PA)	Jun 91
WR313	10MHz Transmitter	Nov 92	WR287	Morse (Speedbrush)	May 91
WR312	Receiver/Mixer (Getting Started)	Nov 92	WR255	Meon-4	May 91
WR311	Oscillator BFO (Getting Started)	Sept 92	WR285	Scope Probe PSU	Apr 91
WR310	1.2GHz Pre-scaler	Aug 92	WR284	Scope Probe	Apr 91
WR309	Volt Reg/Divide by 100	Aug 92	WR283	Sudden Receiver	Mar 91
WR308	TTL 1MHz Oscillator (Getting Started)	July 92	WR282	Repeater Toneburst	Feb 91
WR307	Crystal Checker (Getting Started)	June 92	WR281	High Voltage PSU	Jan 91
SET	WR303/304/305/306 Inductance Bridge	Apr 92	SET	WR263/264+WR276-80 Marland Transmitter	Jul 90
WR302	GDD (Getting Started)	Apr 92	WR272	NiCad Recycler	Sep 90
WR301	Challenger Receiver	Feb 92	WR275	Low Voltage Alarm	Jun 90
WR300a	OSCAMP Oscillator	Mar 92	WR273	Valve PSU	May 90
WR300	OSCAMP Amplifier	Feb 92	WR275	RX Attenuator	May 90
WR299	Multivibrator (Getting Started)	Jan 92	WR271	Product Detector	Apr 90
WR297/298	Additional Beaver boards		WR270	Badger Cub	Apr 90
SET	WR295/296 PW Beaver	Oct 91	WR269	Glymme	Feb 90
SET	WR292/293/294 Chatterbox	Aug 91	WR268	Inwell (RF PA)	Feb 90
SET	WR290/291 Robin Freq. Counter	Aug 91	WR264	Inwell (Relay)	Feb 90
SET	WR292/293/294 Chatterbox	Aug 91	WR263	Inwell (VFO)	Jan 90
WR289	Meon-4 (Control)	Jul 91	WR267	PW 49'er	Jan 90
			WR266	Tuned Active Antenna	Jan 90
			WR265	Tuned Active Antenna (PSU)	Jan 90
			WR199	Meon 50MHz Transverter	Oct 85
			WR161	Marchwood 12V 30A PSU	Jul 83

CALL BADGER BOARDS ON 021-384 2473 FOR UP-TO-DATE PRICES

BOOK SERVICE

FREE DRAW

For every book order received between August 11 and September 8 1994 the name and address of the customer will be entered into our free draw. On September 9 one name will be pulled from the sack. The lucky person will win an MFJ-105B 24 hour, 10in diameter, quartz wall clock as donated by Waters & Stanton Electronics.

So why not place an order for that book that you've been thinking about buying and you may be the lucky recipient of a new clock for your shack!

SATELLITES

NEWNES GUIDE TO SATELLITE TV

Derek Stephenson

This book, the 3rd edition, is a hard bound volume, printed on high quality paper. The author is a satellite repair and installation engineer and the book covers all information needed by the installation engineer, the hobbyist and the service engineer to understand the theoretical and practical aspects of satellite reception with dish installation and to how to trouble-shoot when picture quality is not up to anticipated reception. Mathematics has been kept to a minimum. **371 pages. £18.95**

SATELLITE BOOK - A Complete Guide to Satellite TV Theory and Practice

John Breeds

This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by an expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology. **280 pages. £30.00**

SATELLITE EXPERIMENTER'S HANDBOOK

2nd Edition

Martin Davidoff K2UBC

The book is divided into four main sections - History, Getting Started, Technical Topics and Appendices. It provides information on spacecraft built by, and for, radio amateurs. In addition, it discusses weather, TV-broadcast and other satellites of interest to amateurs. **313 pages. £14.50**

SATELLITE TELEVISION

A layman's guide

Peter Pearson

Pictures from space, that's what satellite television is all about. Orbiting satellites, 35000km high, receive TV signals from stations on the earth and re-transmit them back again. This book explains all you need to know to set up your own satellite TV terminal at home, dish and accessories, cable and tuner. **73 pages. £1.00**

SATELLITE TELEVISION INSTALLATION GUIDE

2nd Edition

John Breeds

A practical guide to satellite television. Detailed guide-lines on installing and aligning dishes based on practical experience. **56 pages. £13.00**

WEATHER SATELLITE HANDBOOK

4th edition

Dr Ralph E. Taggart WB8DQT

This book explains all about weather satellites, how they work and how you can receive and decode their signals to provide the fascinating pictures of the world's weather. Plenty of circuit diagrams and satellite predicting programs. **192 pages. £14.50**

WRTH SATELLITE BROADCASTING GUIDE

1994 edition

Bart Kuperus

This brand new publication, written by one of the experts from the respected World Radio TV Handbook, will be a great help to everyone interested in the world of satellite radio and television. Featuring over 300 pictures and graphics. All the information you need to know about installing your own satellite system. **366 pages. £15.95**

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Some titles are overseas in origin.

TO ORDER:

PLEASE USE THE ORDER FORM ON PAGE 63 OR TELEPHONE THE CREDIT CARD HOTLINE ON (0202) 659930.

LISTENING GUIDES

AIR BAND RADIO HANDBOOK

4th Edition

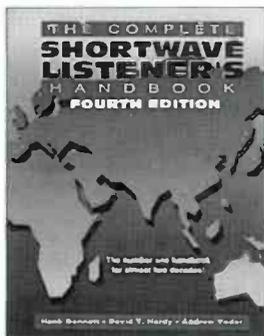
David J. Smith

Extensively revised & updated (October 1992). Air band radio listening enables you to listen-in on the conversations between aircraft and those on the ground who control them, and is an increasingly popular and fascinating hobby. A new chapter on military air band has been added. The author, an air traffic controller, explains more about this listening hobby. **190 pages. £7.99**

THE COMPLETE SHORT WAVE LISTENER'S HANDBOOK

4th EDITION

Hank Bennett, Harry Helms & David Hardy



This book is a comprehensive guide to the basics of short wave listening. Everything you need to get started as an s.w.l. is explained in a clear and easily understood manner. Receivers, antennas, frequencies, propagation, Q-codes, etc. are all covered. **321 pages. £17.95.**

DIAL SEARCH 1992/94

George Wilcox

The listener's check list and guide to European radio broadcasting. Covers m.w., l.w., v.h.f. & s.w., including two special fold-out maps. Also includes a full list of British stations, a select list of European stations, broadcasts in English and 'Making the Most of Your Portable'. **46 pages. £4.25**

FLIGHT ROUTINGS 1994

Compiled by T.T. & S.J. Williams

This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. **122 pages. £6.00**

FERRELL'S CONFIDENTIAL FREQUENCY LIST

9th Edition

Compiled by Geoff Halligey

Spirally bound, this easy-to-use reference book covers 1.6 - 28MHz in great depth, all modes and utility services, with new reverse frequency listing showing every known frequency against each callsign, who's using what frequency and mode, what's that callsign? These are some of the answers this book will help you find. **544 pages. £17.95**

GUIDE TO FACSIMILE STATIONS

13th Edition

Joerg Klingenfuss

The new edition of this super reference book covers the world's facsimile stations, their frequencies and methods of working. There is a section covering the equipment needed to receive FAX over the radio. To give you an idea of what is available there are many pages of off-air received FAX pictures. **392 pages. £18.00**

GUIDE TO UTILITY STATIONS

12th Edition

Joerg Klingenfuss

This book covers the complete short wave range from 3 to 30MHz together with the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 19549 entries in the frequency list and 3590 in the alphabetical callsign list plus press services and meteorological stations. Included are RTTY & FAX press and meteor schedules. There are 11800 changes since the 10th edition. **534 pages. £24.00**

HF OCEANIC AIRBAND COMMUNICATIONS

4th Edition

Bill Laver

HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies. **31 pages. £3.95**

INTERNATIONAL RADIO STATIONS GUIDE

BP255

Peter Shore

As in 'Broadcast Round-up', his column in *PIW*, Peter Shore has laid this book out in world areas, providing the listener with a reference work designed to guide around the ever-more complex radio bands. There are sections covering English language transmissions, programmes for DXers and s.w.l.s. Along with sections on European medium wave and UK f.m. stations. **266 pages. £5.95**

INTERNATIONAL VHF FM GUIDE

7th Edition.

Julian Baldwin G3UHK & Kris Partridge G8AUU

70 pages. £2.85

MONITORING THE YUGOSLAV CONFLICT

Langley Pierce

A guide to monitoring the Yugoslav radio transmissions of the UN, aircraft and

shipping engaged in the civil war in the former Yugoslavia. **28 pages. £4.95**

NEWNES SHORT WAVE LISTENING HANDBOOK

Joe Pritchard G1UQW

A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. Also covers the technical side of the hobby from simple electrical principles all the way to simple receivers. **276 pages. £15.95**

POCKET GUIDE TO RTTY AND FAX STATIONS

Bill Laver

A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in ascending frequency order, from 1.6 to 26.8MHz. **57 pages. £3.95**

RADIO LISTENERS GUIDE 1994

Clive Woodyear

This is the third edition of this radio listener's guide. Simple-to-use maps and charts show the frequencies for radio stations in the UK. Organised so that the various station types are listed separately, the maps are useful for the travelling listener. Articles included in the guide discuss v.h.f. aerials, ROS, the Radio Authority and developments from Blaupunkt. **68 pages. £3.45**

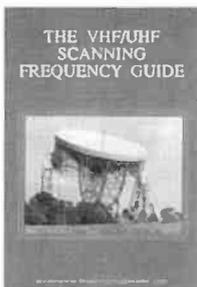
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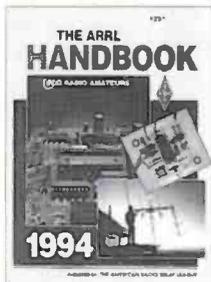
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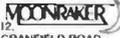
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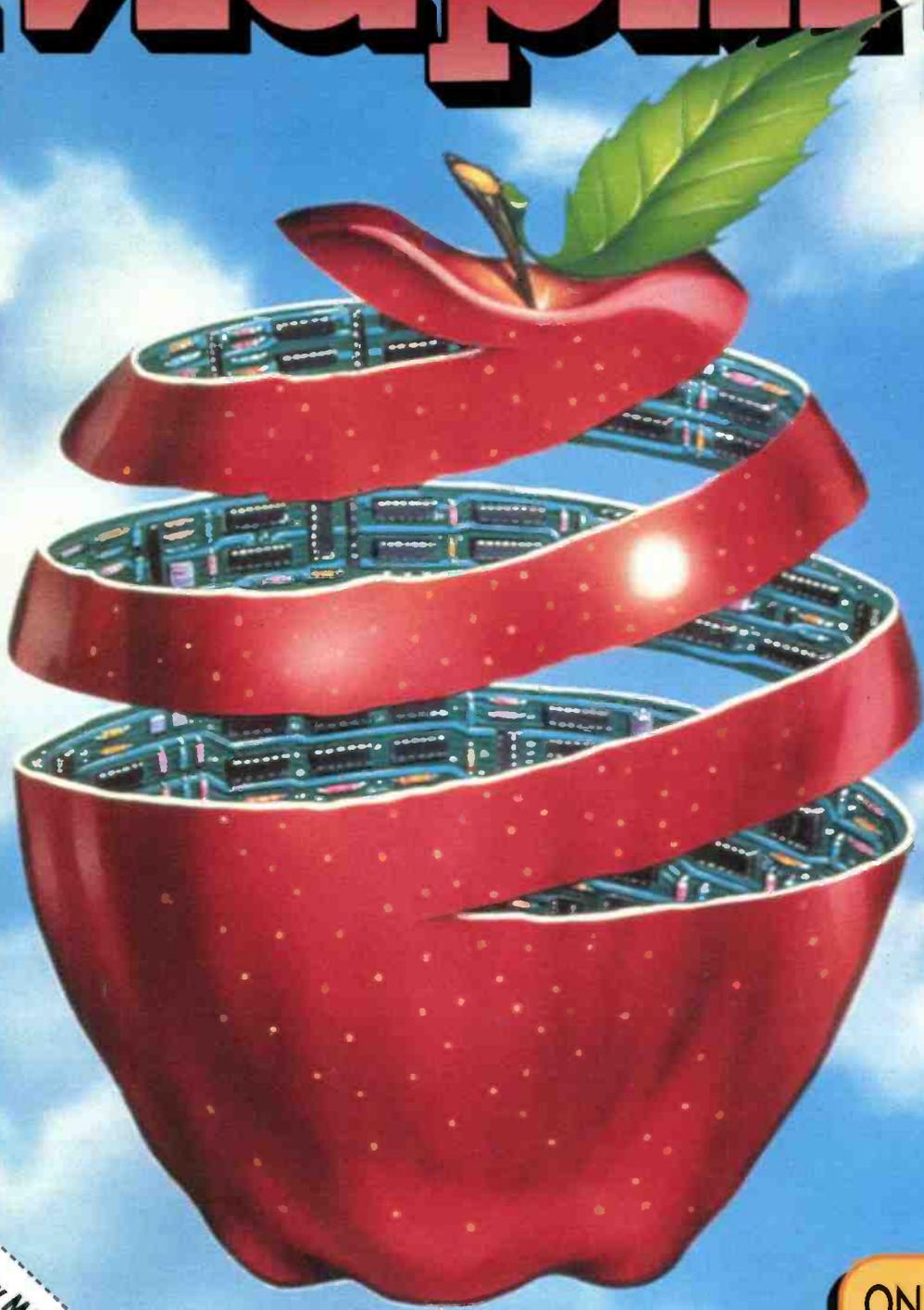
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