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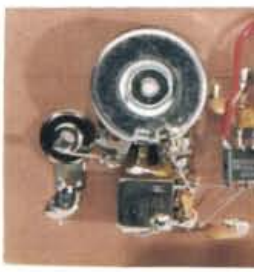
Cover Subject.

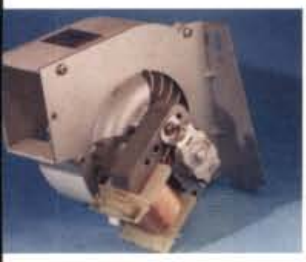
Members of the Poole Radio Society enjoying a field day in the picturesque Dorset countryside on a glorious day in summer 2000. Contacts made during the day included QRP and h.f. into the United States and v.h.f. contacts into Switzerland.

Photograph by: **Tex Swann G1TEX**

November features



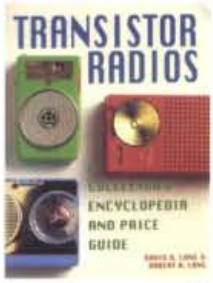
November regulars



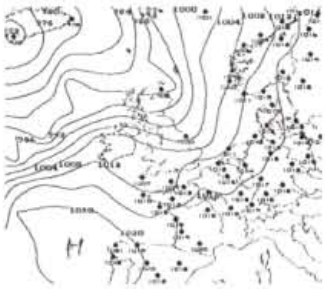
page 12

page 16

page 38



page 44

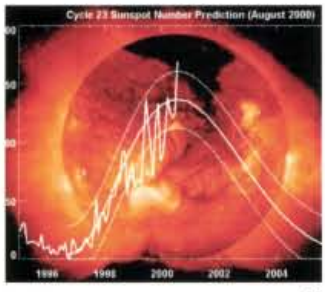


page 36

page 47

page 47

page 58



page 60

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Our Rob is never lost for words, read his thoughts about the Radio Licensing Centre this month

rob mannion's keylines

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

This month my 'Keylines' editorial's in a different style as it's presented in a format where I can cover topical points firstly, to be followed by the 'topping and tailing' comments in 'Rob Mannion Signs Off" at the back of the magazine. Everyone on the editorial team hopes that you'll enjoy the extended editorial and I'll be pleased to hear your comments.

Subscription Services Ltd. (in reality part of the Post Office), well known to the Amateur Radio fraternity because their telephone number (01179) 258333 is very often our 'first point of contact' regarding our licences, now operate under the auspices of Post Office Customer Management. And in my experience (and to many others so I understand from readers) this busy Bristol number has been answered by very helpful staff working at the Radio Licensing Centre (RLC).

However, although the RLC number has proved to be of great help in recent years to many Radio Amateurs (including myself) a recent change has led to some of our readers becoming very concerned indeed. And it all stems from a draconian sounding tape recording which announces that: "In order to comply with the requirements of the Criminal Procedure & Investigations Act 1996, all telephone calls to the Radio Licensing Centre are recorded".

Police Station?

I must admit that when I first heard the recorded message - I had to agree with the readers who'd telephoned us for an explanation that the announcement did sound as though the caller had got through to a Police Station or Secret Government establishment! But if you've got the nerve to wait for the very brief tape recording to finish - you're then connected to the usual friendly operator.

So, what's going on? Why the change and why adopt such an austere approach to the public? To find out I asked **Les Mountford**, the RLS Manager who told me it stems from the fact that it's a requirement since they started recording telephone calls to the centre recently. The format - so it appears - has to be adopted because that's what their legal department says it has to be!

So, there you have it - another example of the results of legislation forcing its way into our lives. Necessary in legal terms it may be, but surely there can be a better and more pleasant sounding way of informing us that our calls may be recorded?

I always do my best to avoid other 'Call Centres' (preferring to write rather than wait for ages on the telephone talking to a succession of operators). But when I am forced to use them I always note the polite 'Your calls may be recorded', preceded or followed by the usual waffle 'as part of our continuing effort to provide the best service' - flannel perhaps but much more pleasant to listen to.

Don't be put off - despite the message you'll get through and find that there is a friendly voice waiting!

My Apologies

My apologies go to readers who were looking forward to getting a free 'Foreign QSO' poster in this issue. In our efforts to produce the best *PW* possible each month for you, I've taken the decision that my editorial budget would be best spent in other ways on your behalf. So,

> "...why adopt such an austere approach to the public?"

no poster - but the best editorial content instead!

The promised review of the ADI AT-600 Amateur Radio (with Airband coverage) receiver will not now be published. On reflection I decided that as the transceiver had been reviewed - in the January 2000 issue of *PW* from the Novice's viewpoint - and that the rig had been fully reviewed by **John Goodall G0SKR** in the August 1997 *PW* - there was no real need to publish a further review on this well known transceiver. Apologies to everyone involved in the review for my temporary insanity!

73 Rob G3XFD

practical wireless services

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

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

Components For *PW* Projects

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

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues for *PW* are £2.50 each and photocopies are £2.50 per article. Binders are also available (each binder takes one volume) for £6.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Prices include VAT where appropriate.

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

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Technical Help

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

amateur radio waves

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.

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

Access To RAE

● Dear Sir

It was with interest that I read the letters in the 'Letters' pages in the August and October issues of *PW* concerning RAE test centres. Perhaps readers in the North West areas may be interested to learn that the **Preston Amateur Radio Society PARS)** has now been passed by the RSGB as a Satellite Test Centre. Anyone wishing to sit their RAE or NRAE with us is more than welcome. The current City & Guilds fee for the examinations are at the moment fixed at £12.80 for the NRAE and £27.55 for the RAE. At this moment in time we will be charging £15 for the NRAE and £30 for the RAE these prices being all inclusive.

As you can see from the above figures, what we have added on for the use of our facilities is minimal, our aim is just to provide a service to prospective Radio Amateurs, not to make a profit. I will be receiving the paperwork for the December examination shortly, so if any of the readers want to use our club's facilities they can contact me at **140 Mendip Road, Leyland, Lancashire PR5 2UH** or by telephoning **(01772) 460780** (calls after 6pm please).

I look forward to hearing from potential RAE/NRAE candidates!

● **Tony Allsopp 2E1GHV**
Lancashire

Editor's praise: Well done that club! I wish you and your club well in your future efforts Tony

Shop Around For RAE

● Dear Sir

I've just been reading the letter from **Mal Broxton MW0CHI** (*PW* 'Letters' October issue) regarding access to RAE courses, and it parallels my own recent experiences. As I work shifts, it did not seem worth enrolling for an evening class, as I would miss so many of the lessons, so I decided to study on my own.

When I contacted Southampton City College (Approximately 20km away), the help desk operator said they did not accept external candidates, but seemed totally unaware of the difference between the RAE and the Marine VHF Operators exam. I did my best to explain, but when I got a call back later, it was from the Marine Technology Centre - offering me a place on the Marine VHF course!

I subsequently found out that the City Technical College have dropped the RAE, though it appears that the City & Guilds are unaware of it. I then tried Highbury College of Technology in Cosham, Portsmouth (about 50km from Winchester). What a difference!

I was put through to the instructor, **Ron Snelling**, who could not have been more helpful. My working shifts, he said, would not be a problem. He would make sure I got all the necessary handouts, and would spend extra time with me when I was there to ensure that I didn't miss out on any part of the course.

My suggestion? Shop around! This will help to support the well run courses, and to ensure that they keep running for others in the future. But in the long term, I agree with the Editor's comment that the only way we can ensure the long term availability of good training is to take care of it ourselves.

Kieran Enright
Winchester
Hampshire

Editor's comment: What refreshing news Keiran. Any more of the same readers?

The Right Direction?

● Dear Sir

Since the turn of the 1980s, Amateur Radio has become a 'popular' hobby mainly with the enormous influx from CB, its numbers far exceeding those ever envisaged or achieved in earlier years.

Popularity brought with it greater numbers of specialist retail outlets, and an overflowing annual calendar of rallies and exhibitions and that large numbers of people are essential to the hobby's future. Paradoxically we now see that despite the large numbers of licences still currently held, the rate at which new licences are issued has been diminishing recently and UK activity on our bands appears at an all time low.

In addition, we now hear of specialist retailers closing or diversifying into other areas, and of rallies being cancelled for lack of support. Does this suggest that our hobby is in decline, or more precisely that the 'popular' side of our hobby is in decline? Could it be that, as considered inevitable by some, the movement from CB to Amateur Radio has almost dried up creating a vacuum where once there was new blood?

Traditionally and before the 'popular era, it was widely considered that the hallmark of a good Radio Amateur was keen interest and active involvement in the means and techniques of radio communication. This worked well for over half a century, yet the more recent 'popular' element brought with it an army of communicators, people who were very often happy to buy entirely off the shelf...people who were only really more often interested in communicating using radio rather than experimenting with radio communication methods and techniques and furthering their knowledge and skills.

The term 'posh CB' is sometimes bandied around as descriptive of modern 'popular' Amateur Radio! So, does the lack of band occupancy by UK licensees or other recent trends indicate this 'popular' army is now melting away?

I suggest that 'popular' Amateur Radio is in sharp decline and will soon be almost extinct. The communicators can do it better by mobile telephone or the Internet direct, so why go through the motions of using Amateur Radio at all...with their need for costly equipment plus the vagaries of h.f. propagation?

Yet there are still people who are actively interested in the means and methods of communicating by radio be they relative newcomers with modest experience or old timers with a lifetime's knowledge, all getting on with their own thing. Things like building/using QRP gear, experimenting on l.f. or on microwaves, getting into new antenna technology like the crossed field system, or digital speech transmission on h.f. are examples of interest and activity which will secure the long term future of our hobby. (Even if numbers of people involved are smaller, rather than misplaced reliance on vast numbers of communicators).

Schools, colleges and universities and of course the Cadets and Scouts offer a host of bright motivated young people who might be glad to be introduced to a serious technical interest with long term potential. It might even help many of them formulate their future careers.

Also some of our many hibernating licensees might re-emerge to re-visit a hobby which had found its proper direction again. Finally, perhaps we might reflect on the thought that true radio amateurs are born and not mass produced.

● **H. A. Aspinall G3RXH**
Skipton
North Yorkshire

Test Centres

● Dear Sir

I write following on from **Mal Broxton MW0CHI's** comments (October *PW*) in support of the points I made in a letter some months ago concerning test centres for the RAE. I would have hoped that someone from the City and Guilds might have responded to the issues I raised. I cannot see why local justices, ministers of religion or others of similar standing can not be used a local invigilators.

If the Open University can do so for degree examinations, why not the C&G for the RAE? I can recall the Master of one ship I was on, supervising a young AB sitting an OU exam in the middle of the Baltic Sea. The exam papers were sent out by normal post via the company agent and kept locked in the Captains safe until the day of the examination. A short list of instructions to the Captain was included and as far as I am aware there was no problem, as the young lad passed.

So come on C&G where is the problem? As a former lay member of Her Majesty's Inspectors of Schools and Children's Panel, (Scottish juvenile justice system) I would be more than willing to act as a local invigilator.

● **Colin Topping GM6HGW**
Fife
Scotland

The Belgian RAE

● Dear Sir

You requested comments about the exams in foreign countries in your answer to a letter titled 'Access to RAE Test Centres' in

the October issue of *PW*. Here in Belgium, the exams are organised by the Belgian Institute of Post and Telecommunications (IBPT/BIPT) in Brussels. Exam fees are fixed by the law (900 Belgian Francs for the written exams and 450BF for the Morse test), as are the number of sessions per year (two each year for each licence type).

By the way, 900BF is more or less equivalent to approximately £13.50 Sterling. Hope these comments help.

Best wishes.

- **Michel Vanaken**
  Amay
  Belgium

Editor's comment: Thank you Michel - any more feedback on the RAE subject from readers living abroad please?

Amateur Radio Abroad

- Dear Sir

It seems to me that the Amateur Radio Licence and the accompany RA booklet leaves the conditions attached to the use of radio abroad very much without clarification, and that *PW* could do a valuable service by printing some information on the subject - even perhaps on an annual basis as conditions change? For instance Paragraph 11c (compliance with requirements of the host country) seems to me to be a perfectly reasonable requirement, but no clue is given as to where those requirements may be obtained for each relevant country!

Paragraph 11f (use of prefix) is clear enough, but no list of appropriate prefixes is provided. Paragraph 11g (comply with CEPT T/R 61-01) gives no clue what that is, or where it may be found.

And lastly the whole paragraph implies (though it is not stated) that you can just breeze into a country and use the radio without either asking, or even notifying the host country of the intended operation. Quite apart from the needs of common politeness, it seems to me most unlikely that any typically paranoid government would allow that! (especially Britain and the USA).

If you turn right to the inside back page, paragraph z implies that (in effect) even though you might be entitled to use a radio, there is a possibility that the equipment might be confiscated on entry to a country. This rather makes the whole agreement pointless! But more to, the point there is a again no clue as to where further information might be had.

I was looking at the licence with an imminent holiday in Portugal in mind, but when faced with such a lack of information I have abandoned the idea of taking a radio!

- **Tony Jaques G3PTD**
  Stretford
  Manchester

Editor's comment: The *RSGB Yearbook* has comprehensive details on 'Operating Abroad' with reciprocal facilities (including CEPT) with a summary of CEPT explanation of the regulations, together with addresses of the various International Societies, with addresses and E-mail details. The International Amateur Radio Union (Based in Geneva, Switzerland) web site www.iaru.org will also help for those with access to the Internet. Things change rapidly and anything we publish could be misleadingly out of date. However, Readers living abroad are invited to write into the letters page to share the information as to where to get the relevant booklets, etc., for operating in their countries. So, it's over to you readers!

Organising Craven ARG

- Dear Sir

I was interested to read **Bob Glasgow GM4UYZ's (Cockenzie & Port Seton ARC,** Scotland) letter in September's *PW* because Bob's 'system' is how we also 'organise' the Craven Radio Amateur Group. In our case it is because we are so much smaller than his club, with not many local members to build it much bigger (I'm currently Hon. Sec.).

On a personal note I understand from **Geoff G4CPA** that my name was being bruited about on 80m recently! He worked the Editor (G3XFD/EI5IW) when he was on holiday in Ireland. Geoff was the person most responsible for getting CRAG the honour of first club station to get the Islands of Scotland Award.

Incidentally, having seen the Editor's holiday photograph in the October 'Keylines' page, you may be interested to know I've had made for me a G3XFD Portable Mast Support (the 'Tenna-Tourer) bracket, by a friend who is good at welding. I tried it out and it did its job very well. He made it using lengths of bed angle iron. A plastic sleeve (An off-cut of pvc water pipe) converts it from taking 2 inch masts, to 1.5 inch masts.

I particularly enjoyed the September 'Valve & Vintage' as **Phil Cadman G4JCP's** article took me back to my early days as an s.w.l. and tyro constructor. Ah, I remember those 90V h.t./1.5V l.t. valves well. It was in that period that I bought a box full of miniature valves at a club junk sale. When I got them home I discovered that they were ALL EB91's (Double diodes) disguised as some CV number or other! Anyone want to have a go at building valved diode receivers?

- **Geoff Theasby G8BMI**
  Keighley
  Yorkshire

Editor's suggestion: Readers interested in having a portable mast base as Geoff describes, but not having access to engineering and welding equipment can buy them ready-made as the *PW* 'Tenna-Tourer' mast base. My mast base is extremely successful and they're available from Tennamast (Scotland) Ltd. Their telephone number is (01505) 503824 and their advert can be found on the 'Local Dealers' page.

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

amateur radio rallies

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

OCTOBER 15th
Blackwood Radio, Computer & Electronics Rally
Organiser: Stuart Instone GW0NPL
Telephone: (01495) 240260/(07970) 777756 phone/fax
E-mail: ireham@aol.com
The Newport Centre, Newport, South Wales, about 2km from J25A on the M4, plays host to the Blackwood Radio. Doors open at 1030/1100. There will be a Bring & Buy, talk-in, car parks, trade stands, special interest groups, licensed bar, catering, disabled facilities and family attractions.

OCTOBER 28th
The GQRP Club Mini-Convention
Organiser: George Dobbs G3RJV
Telephone: (01706) 631812
E-mail: george@gqrp.com
Taking place at St. Aidan's Hall, Sudden, Rochdale this annual event offers Bring & Buy, surplus, junk, components, kit traders as well as QRP lectures and food & drink all day, including the famous pie and peas! Admission is just a £1, doors open at 10am and talk-in will be on S22.

OCTOBER 29th
Galashiels & District Amateur Radio Society
Organiser: Jim GM7LUN
Telephone: (01896) 850245
E-mail: jimk@gm7lun.freeserve.co.uk
Galashiels & DARC are holding their Annual Radio & Computer Rally at The Volunteer Hall, St Johns Street, Galashiels, Scottish Borders, from 1100-1600. There will be traders, Bring & Buy and refreshments.

NOVEMBER 4/5th
North Wales Radio & Electronics Show
Organiser: M. Mee GW7NFY
Telephone: (01745) 591704 (combined 'phone/FAX)
Opening at 1000 on both days this annual event now in its 14th year takes place at the North Wales Conference Centre, Llandudno. Entrance fee is £2 for adults and under 14s can get in for free when accompanied by an adult. There will be a club room and an extensive Bring & Buy.

NOVEMBER 12
Great Northern Hamfest
Organiser: Ernie Bailey G4LUE
Telephone (01226) 716339 or (07787) 546515 (mobile)
The Great Northern Hamfest is now in its 10th Year and this year's event promises all the usual rally features. Taking place at the Metrodome Leisure Complex, Queens Road, Barnsley, South Yorkshire the doors will open to welcome you at 1000.

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. Please contact the organisers direct.

Letters Received Via E-mail

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

amateur radio **news**

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

An Appreciation by Rob Mannion G3XFD

Clive Trotman GW4YKL 1930-2000

President of the Radio Society of Great Britain in 1995, Clive Trotman GW4YKL was well known and respected among Radio Amateurs. Here Rob Mannion G3XFD pays tribute to a man who certainly made his mark.

Clive Trotman GW4YKL was a 'little man' with a great big heart - and what a heart! Although small and slight in stature he really made up for it with his 'get up and go'. So, it was with great sadness that I last met my old friend, with his wife Maureen, at the Longleat Rally in late June 2000. "It will probably be the last time you'll see me" said Clive, who was very ill with cancer - and it was. However, even though he passed away in early September, with the funeral taking place on Monday the 11th, Clive is someone who really made his mark.

As President of the **RSGB** during 1995 Clive, in his own way, made history by becoming the first President of the Society to have entered into the Amateur Radio hobby via CB radio. In fact Clive was totally honest in telling people that he was on CB (and s.s.b. too!) before it was legalised in the UK. The CB interest took hold and he ventured into Amateur Radio and again made his mark. His effervescent character and ready smile made him welcome everywhere.

Born in Bridgend in South Wales, Clive was in manufacturing engineering for many years and ended up as a Factory Manager for a Japanese company. As a golfing fanatic he was one of the first people on the course I knew who invested in a mobile telephone so he could play golf and still be 'contactable!

Unfortunately, I was unable to attend Clive's funeral at Bridgend Crematorium on Monday 11 September, but despite the 'fuel crisis' two former RSGB Presidents attended amongst the many other Radio Amateurs. The numbers attending truly reflected the esteem in which Clive was held.

My sympathies and admiration go to Clive's widow Maureen, their daughter, grandchildren and great-grandson. Finally, on October 3, Maureen scattered Clive's ashes on the 7th hole on St. Mary's Hill Golf Course in Pencoed. An appropriate final resting place because that's where Clive scored a 'Hole in One' in 1999, something he was very proud of and now his family and friends can think of the location as being very special to them. It was a honour great to know you Clive!

Send all your news and club info to... Donna Vincent G7TZB at the PW editorial offices or e-mail donna@pwpublishing.ltd.uk

New AOR Catalogue Available Now

Jump on the web wagon!

If you enjoy browsing through catalogues on the Internet then the new AOR general catalogue is just for you!

Derbyshire based AOR have recently uploaded their new general catalogue onto their website. It is presented as a 12 page Acrobat PDF format file and covers all their major stock items in a fair amount of detail.

The file size is around 1.3Mb with the picture quality having been reduced to keep transfer times to a minimum. But be assured all text is perfectly legible! The address of the file is: http://www.aoruk.com/pdf/aor-cat.pdf

- **AOR Uk Ltd.,**
  4E East Mill,
  Bridgefoot,
  Belper,
  Derbyshire DE56 2UA.
  Tel: (01773) 880788
  FAX: (01773) 880780
  E-mail: info@aoruk.com
  Web site: http://www.aoruk.com

Abolished - Under 14 Age Restriction

New initiative brings in youngsters

The latest news from the Radiocommunications Agency is that no matter how young you are you can now sit the RAE - read on to find out more.

Following recent discussions between the RA and the Radio Society of Great Britain (RSGB), it has been agreed that the 14-year age restriction (to obtain a Full Amateur Radio Licence) should be completely removed. Previously, to be eligible you had to be 14 years of age or over or have held a Novice licence for a least a year.

If you have obtained a pass in the RAE (and either the 5w.p.m. or 12w.p.m. Morse test for a Class A/B and A respectively), you may now apply for a full licence. It is no longer a requirement to have held a novice licence for a year if you are under 14.

This initiative is part of the ongoing process to refine and improve access and facilities for amateurs. Both parties feel that (in view of the increasing technical and operational ability of youngsters today) this restriction is a particular anomaly, which ought to be discarded, and recognising that those talented youngsters should be actively encouraged and nurtured.

After all, if you are good and keen enough, you are old enough!

- **Radiocommunications Agency,**
  Wyndham House,
  189 Marsh Wall,
  London E14 9SX
  Tel: 0207 211 0211
  FAX: 0207 211 0507
  Website: www.radio.gov.uk

A first for the Northampton Repeater Group

New 28MHz Repeater

After three and a half years of hard work the Northampton Repeater Group finally get their 28MHz repeater on air.

David Meakins G4SCJ project manager and constructor together with fellow Amateurs, **Albert Kion G0DLF** system designer and constructor and **Simon Manning G1IRG** r.f. engineer and constructor have spent three and a half years trying to obtain permission and construct a two sited 28MHz repeater. On Saturday 23 September 2000 all their efforts were rewarded when it finally went on air.

The repeater, **GB3CJ** operates from two different sites in Northampton approximately 5km apart and uses a 13cm link, the input frequency is 29.540 and the output frequency 29.640MHz and requires a 77Hz CTCSS tone and a deviation of + or -2.5kHz. Signal reports would be appreciated by any listeners and can be sent to: dm.carpets@virgin.net

Radio dealer communicates with aid agencies world-wide

amateur radio trade

What's going on in the UK's Amateur Radio trade this month? Read all about it here.

World-wide Communications

Radio communications systems have been supplied to aid agencies world-wide by UK based company, in a bid to help humanitarian relief operations.

The radio communications company South Midlands Communications Ltd., based at Chandlers Ford, Hampshire have recently been involved in supplying aid agencies with communications systems. The systems, including v.h.f. and u.h.f. hand-helds and v.h.f., u.h.f. and h.f. mobile and base station radios, have been configured for support organisations operating in Uganda and Mozambique.

The equipment will be used will interface with that already in use. The h.f. mobile radios were installed into Landrover vehicles at SMC's vehicle fitting area, which is equipped to install equipment into anything from a private car to a large Formula One support trailer!

South Midlands Communications Ltd.,
SM House,
School Close,
Chandlers Ford Industrial Estate,
Eastleigh,
Hampshire SO53 4BY.
Tel: 0238 024 6200
FAX: 0238 024 6206
E-mail: sales@smc-comms.com
Website: www.smc-comms.com

New service is announced

Credit Cards Now Accepted

Wanting to buy from QuartSLab but live overseas or don't have an account - don't worry they've just announced a new way of paying.

Due to increasing requests particularly from overseas customers QuartSLab Marketing have announced that they are now able to accepted payment for orders by credit card. This means that non-account customers can now pay by cheque, postal orders or credit card, thus making it easier for all.

QuartSLab Marketing Ltd.
PO Box 19,
Erith,
Kent DA8 1LH.
Tel: (01322) 330830
FAX: (01322) 334904
E-mail:
sales@quartslab.demon.co.uk

For those of you who just can't get enough of historical radio

amateur radio vintage

Historical and vintage news and views are still playing a big part in modern day radio.

Bawdsey Battle Lost

A piece of pioneering history is demolished after 60 years of radar and radio work.

With an ironic sense of timing, immediately following the commemoration of the 60th anniversary of the 'Battle of Britain' in the early days of the Second World War, the Maritime & Coastguard Agency (MCA) announced that the pioneering radar mast at Bawdsey on the Suffolk coast in Eastern England was to be demolished.

Despite the structure's place in history as the site for the first full scale tests of British radar and then being incorporated into the 'Chain Home' system which came into service in 1939 and playing a major part in the defence of Britain, the Bawdsey mast - a Grade II 'listed building' - lost its own 'battle' against corrosion and was demolished on 21 September 2000. Much modified from the original 1939 height (130m), it was taken over from the Ministry of Defence by the MCA in 1993 to serve as a maritime v.h.f. radio communications station. The replacement is to be 60m high and the service will continue.

amateur radio clubs

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

LANCASHIRE
Morecambe Bay ARS
Contact: Brian Watson G0RDH
Telephone: (01524) 424522
Website: www.radiosociety.org
Morecambe Bay Amateur Radio Society is pleased to announce that it has been approved as a satellite examination centre for the RAE/NRAE examinations. Anyone who would like further information should contact the examination secretary, Chris Richmond G0TOO, 120 Westminster Road, Morecambe, Lancashire LA3 1SH, Tel: (01524) 410805 evenings and weekends. The club meet on alternate Tuesdays at the Trimpell Sports & Social Club, Outmoss Lane, Morecambe, Lancs.

NORTHERN IRELAND
Contact: Terry Barnes GI3USS
Telephone: 0289 1473 948
Website: www.geocities.com/ siliconvalley/park/7260
Join the 'boys' (and girls) from the Bangor and District club on the 1st Wednesday of the month from 8pm at the Clandeboye Lodge Hotel, 10 Estate Road, Bangor, Co. Down BT19 1BJ. You'll be assured of a warm welcome.

Cheers! Keith Burnside G14IYO (Ireland's Youngest Operator) pictured with Rob G3XFD at the Bangor Club - As Rob enjoys a much awaited pint of Guinness!

WALES
Cleddau ARS
Contact: Trevor Perry GW4XQK
Telephone: (01646) 600725
Website: www.cleddau-ars.co.uk
The Cleddau Amateur Radio Society meets every Monday evening except Bank Holidays at the Community Education Centre, Neyland, Pembs SA73 1EH.
For details of latest events check out their website.

WILTSHIRE
Trowbridge & DARC
Contact: Ian Carter G0GRI
Telephone: (01225) 864698
E-mail: iancarter@freeuk.co
The Trowbridge & District Amateur Radio Club meets on 1 November 2000 for the Judging of entries for the G2BQY Constructors Cup. The meeting starts at 8pm and venue is the Southwick Village hall, Southwick near Trowbridge, Wiltshire. Contact Ian for details of DARC's regular meetings.

YORKSHIRE
Wakefield & DRS
Contact: John G7JTH
Telephone: (01924) 251822
Website: www.sandalmagna.demon.co.uk/wdrs
Wakefield & District Radio Society meet on Tuesdays from 8pm at the Ossett Community Centre, Prospect Road, Ossett, West Yorkshire. Events to look out for in the coming weeks are: October 17: On-the-air/natter night, 24th: Brewery visit and 31st: Games night. Go along you'll enjoy it!

Keep those details coming in!

Radio Basics

Rob Mannion G3XFD - presents the first of the 'new season' columns aimed at the newcomer to radio construction. And to start off - Rob takes a look at some ideas to provide you with soldering success.

Now that the evenings are drawing in - it's time to prepare yourself for a busy autumn and winter on the workbench. However, if you get as involved in constructional side as I often do ... the spring will be upon you before you realise it!

The large amount of correspondence received here at the *PW* editorial offices left us in no doubt just how much 'Radio Basics' (RB) is enjoyed by many less experienced readers. The only surprising revelation though, is that there are also quite a number of more experienced readers enjoying the column. So, obviously RB is working well!

All the letters that came in from RB readers during the summer in response to the offer we made regarding the free 'drawing pin board' lay-out sheets have been answered. Additionally, although I wasn't able to personally reply to everyone - all the comments on the series were noted. Thanks for you help readers and we'll be acting on the many ideas you've raised.

The most common problem mentioned by readers referred to soldering and the difficulties many of you have. In fact, it appears that **very many readers** are so discouraged the idea of soldering that the process is avoided as much as possible.

So, to start off the winter series of RB I thought that this would be the ideal time to look at soldering irons, soldering, techniques and accessories to help you get the best results. The advice comes from my own personal experience and I'm sure if you take my advice you'll go some way to enjoy the hobby as much as I do.

Soldering Irons

My personal favourite brand of soldering irons are those made by Antex. I was introduced to Antex irons many years ago by an Uncle who worked at one of the original Mullards semiconductor factories in Southampton. He too had one arm (A Second World War injury) and eventually joined in the 'brain drain' to a (then) remote valley in the USA which developed into Silicon Valley!

My Uncle had found the original Antex irons to be light and easy to use. Although they were heavier in those days, they were still lighter, more robust and easy to use than their contemporaries.

Nowadays, Antex irons come in a range of wattages and the model I'm shown using, **Fig. 1**, is the 25W model. My National Health Service artificial arm's 'split hook' doubles up as needle nose pliers and a heat-sink!

Another useful Antex model (I've always kept one handy for portable use and when away from home) is the 25W 12V d.c. iron. Extremely useful, this iron is popular with many constructors because of the lack of mains leakage as it's not operated directly from the mains, although many (including myself) tend to use it in the workshop much of the time because a 12V power supply is usually available and the iron comes with a nice long lead.

Very often I've seen the 12V d.c. 25W iron on sale at motor car accessory shops - I thoroughly recommend these **but please don't be tempted by the often poor quality imported battery powered irons that come from the Far East**. If you have any problems finding Antex Irons on sale or you want to learn about the whole range, please see the separate information panel I've prepared for you.

● Fig. 1: Rob G3XFD busy on his workbench using his Antex 25W soldering iron on a 'Radio Basics' project. Note his 'built in' heat sink' and 'needle nose' pliers!

Flux Fumes

One of the problems associated with soldering is that even modern resin-cored solder gives off fumes that can be at least uncomfortable and at worst dangerous. And, if you're anything like me (very sensitive to any form of smoke) I strongly advise you to make up a simple extractor fan unit.

The photograph in **Fig. 2**, shows an old extra fan unit that I took from our old family microwave oven. The oven failed last year but I soon found a new job for the fan!

In use I just place it near to where I'm soldering - a current of air soon starts drawing the flux fumes towards the unit providing it's within a hand's breadth or so. Next comes the difficult bit - getting rid of the fumes!

I soon gave up the idea of trying to rig up some permanent flexible tubing to carry the fumes out of a window or convenient wall ventilator. Instead, I used some thick (translucent) polythene tubing which comes flat from a roll. This is sold to protect ducting under concrete floors and is very useful for our purposes.

All you need to do is to secure one end of the polythene tubing over the outlet of the fan using a cable tie or something similar and

then place the far end of the tube where you want to vent the fumes. Next you switch on the fan and 'Hey Presto' - the flow of air flowing down the tube inflates it to a proper tubular shape!

The final trick is to arrange for the far end to be kept open permanently (I use a short length of plastic water waste pipe). This is advisable because the system could blow a series of 'raspberries' and sound rather rude without an open end! No point trying to solder when you're laughing!

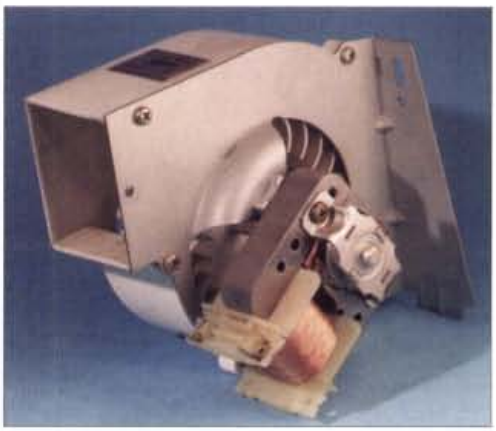
Your own innovation and personal sense of technical adventure need be your only limitation with my suggestion. For instance you could even arrange for a smaller tube to be placed right over the place where you're soldering. This could be linked directly to the input of the fan, which could then be linked up to a foot-switch so it's only on when needed. Plenty of room for experimentation isn't there?

Soldering Tips & Bits

When it comes to soldering there's no better 'tip' than to 'keep a clean' tip on your iron's bit! No pun intended but it's really worthwhile.

Keep a pad of wire wool mounted on a block of wood handy to clean the tip of the iron frequently. Rub the bit into the wire wool every now and again and once clean make sure a small amount of solder is 'flowed' over the bit to keep it 'tinned'.

Eventually the tinning will burn off and the crusty remains of the burnt flux will impair heat transfer between the iron's bit and the job to be soldered. Don't forget even the tiniest amount of flux residue on the iron's bit will provide a very efficient barrier between the heat and the solder. That's why they use power station flue ash to make insulating wall blocks for house-building!



● Fig. 2: A simple home-brewed extractor fan can be made from a centrifugal fan taken from an old microwave cooker, or something simliar (see text.

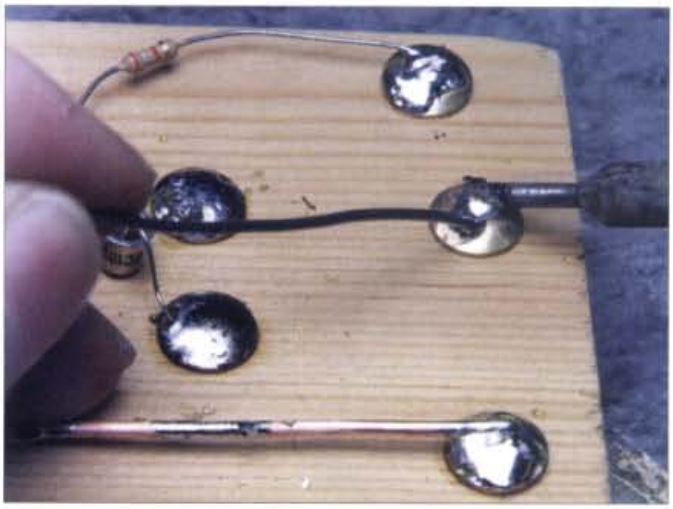
Don't forget that dirt and grease on the component leads to be soldered (some you won't be able to see) can also interfere with heat transfer and the soldering process. Always make sure all surfaces to be soldered are as 'bright' and clean as possible. It saves much frustration and future problems for the eventual joint and success of your project!

Some guidelines for soldering simple projects - aimed particularly at anyone building a project using drawing pins as soldering points.

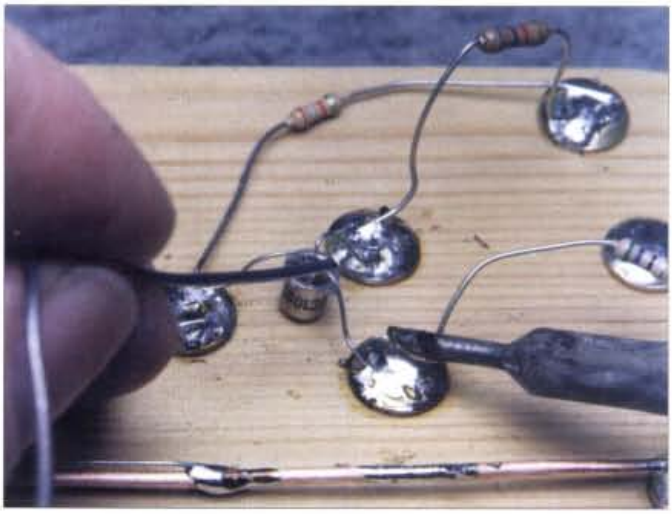
Iron power: Choose a soldering iron of 25W. The larger power will mean quicker heat transfer, reducing the chance of you damaging components.

Iron bits: Until you gain more experience avoid fine 'pencil' bits and use either a angled (around 75%) bit or a chisel point.

Solder size: Always use resin core (multiple cores of flux are moulded in during manufacture) solder 'wire' and until you're experienced avoid the smaller diameter size. Start off with 18s.w.g. solder, this will mean you using less, with the result that the minimum of flux (with resultant ash and dirt) will be produced. Only progress on to smaller diameter solder when you are confident of making a 'one application - one good joint' successful job.



● Fig. 3: Large traditional drawing pins make good soldering points and terminals. It's best to 'tin' the top of the pin when it's in place and before use as a terminal (see text).



● Fig. 4: With care, once you have 'tinned' the top of the Drawing pin you'll be able to solder several points on to the pin without melting the solder on the whole of the head, thus not affecting the other joints (see text).

Drawing pins: Large traditional drawing pins, **Fig. 3**, make ideal soldering terminals and points for training purposes. It's best to 'tin' them thoroughly before using them for terminals and anchoring points. Place the hot bit onto the pin's top **and take the solder to the job** (always solder to the points where it's to be used).

Danger: Allow plenty of time for the relatively large amount of solder to cool - it takes several minute after the initial soldering!

Once you've initially soldering ('tinned') the drawing pin you'll quickly learn how to only melt a tiny part of the solder on the pin when making a joint/termination, **Fig. 4**. By doing so you won't undo previously made joints - it takes practice but please do try.

Finally, remember that the final joint should be fairly 'bright;' looking and with the wires firmly soldered and not appearing to just 'stick' to the solder. And if the solder has a granular, crumbly look - consider it to be a 'dry joint' and re-do it- using more solder and a fresh amount of flux (which comes with the solder of course).

So, there you are -a very quick look at very basic soldering. Do have a go for yourself - you won't be disappointed. Once mastered you'll find you can progress on towards ever more complex and challenging projects. It's great fun and worthwhile! PW

Information Panel

It's worth checking with any of our advertisers whether or not they stock Antex soldering irons, but the following companies are known to sell the Antex range:

John Birkett, 25 The Straits, Lincoln (see advert Pg. 49).
Sycom, PO Box 148, Leatherhead, Surrey (see advert Pg. 49).
The QRP Component Company, Haslemere (see advert Pg. 61).
The soldering iron manufacturers **Antex (Electronics) Ltd.**, can be contacted directly at **2 Westbridge Industrial Estate, Tavistock, Devon PL19 8DE. Tel: (01822) 613565, FAX: (01822) 617598, Website: www.antex.co.uk**

THE PRODUCT DETECTOR

Gordon King G4VFV looks at product detectors and what they actually produce for us in modern receivers

The dots and dashes of an A1A (c.w.) mode signal, apart from the key clicks resulting from unintentional (and undesirable!) amplitude modulation (a.m.), would be essentially inaudible when tuned by an ordinary a.m. receiver. To obtain the audio tone necessary for reading Morse a constant-frequency input signal is 'mixed' with the keyed A1A input signal. The mixing action is provided by a fairly simple circuit whose selected output signal corresponds to the **difference** in frequency between the two inputs.

The constant-frequency input signal is generated by an oscillator known as a **beat-frequency oscillator (b.f.o.)** activated by an on/off switch. The nominal frequency of the b.f.o. relates to the receiver's final intermediate-frequency (i.f.).

To obtain the most easily read beat note, the frequency of the b.f.o. is adjustable over a range of about ±3 to 4kHz. Thus with an i.f. of say 455kHz the beat note frequency would be 1kHz when the b.f.o. is adjusted to 454kHz (455kHz-454kHz=1kHz).

What happens is that the interaction between the Morse encoded i.f. signal and the b.f.o. signal generate additional signals at the receiver's a.m.detector. One of these signals has a frequency corresponding to the frequency difference between the i.f. and b.f.o. signals. It's this signal which yields an a.f. version of the A1A mode transmission and which is passed on to the receiver's a.f. stages.

The same effect occurs when an oscillator slightly removed in frequency from the i.f. is lightly coupled to the input of an a.m. detector. Some scanning receivers might adopt a similarly simple technique to resolve A1A mode and, hopefully, single sideband, suppressed carrier (s.s.b.) transmissions as well.

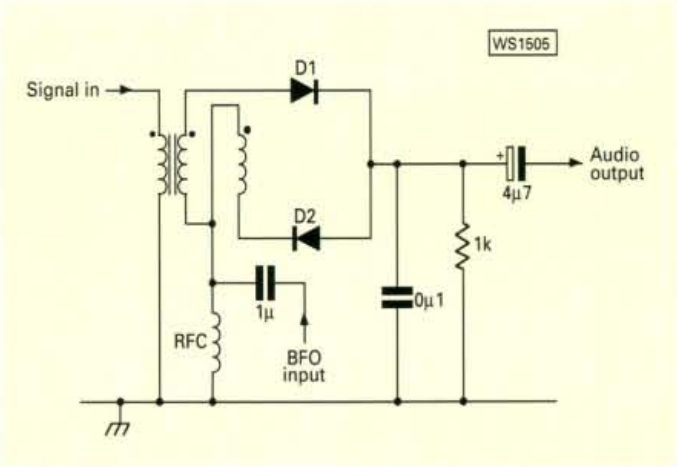


Fig. 1: Passive product detector circuit showing example component values.

Stronger Signal

Although simple c.w. receivers can provide satisfactory A1A reception they fail rather sadly when it comes to J3E mode. One reason is that a **stronger** b.f.o. input is required for the satisfactory reception of J3E than A1A signals.

In addition, optimum resolution of J3E demands a circuit of enhanced eloquence, known as a **product detector**. It's so called because the output stems from the **product** of the b.f.o. input and the i.f. input. This is rather like the action of a mixer or frequency changer circuit.

The product detector is also suitable for receiving A1A signals but when it's involved with J3E signals the b.f.o. input is then generally known as the carrier-insertion oscillator (c.i.o.) input.

Over the years a multiplicity of product detectors have evolved. The earliest circuits were designed around valves and diodes and the more recent ones around the bipolar transistor, the various types of field effect transistor (f.e.t.) and the integrated circuit (i.c.). In the pre-solid-state days a single frequency changer or similar valve was often used to work as both the product detector **and** the c.i.o. by home constructors of the time.

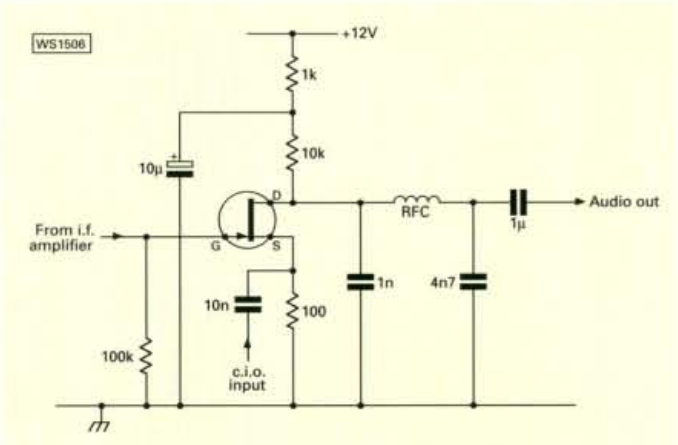


Fig. 2: Active circuit using a junction gate n-channel f.e.t. with component value suggestions.

Simplest Is Passive

One of the simplest product detector is called a **passive** circuit, **Fig. 1**. It contains no active component, such as a valve, transistor or integrated circuit (i.c.) and hence doesn't require an operating voltage.

It's a circuit which has been around for a long time yet is still quite viable and workable either in the simple single-balanced form shown (based on a couple of matched high-speed silicon switching diodes) or in a slightly more advanced form where four diodes of this kind are used (an extra two for balance enhancement) in a single-or a double-balanced configuration.

Although circuits like the passive offer simplicity of design, low cost, low noise and good isolation between the two inputs, they do require a relatively strong b.f.o./c.i.o. input for the best results. The triple-wound transformer in the circuit is a wide-band toroidal having a ferrite core. The dots by the windings relate to their phasing. The unwanted higher frequency signal components at the output are bypassed by the 0.1µF capacitor so that only the

difference frequency audio signal is developed across the 1kW output load resistor.

Active Circuits

The circuit shown in **Fig. 2** is of an active product detector based on a junction gate n-channel f.e.t. Here the i.f. signal is connected to the gate and the c.i.o. signal to the source.

The required difference-frequency signal appears at the drain across the 10kW load resistor is capacitively coupled to the a.f. stages. The Radio-frequency choke (r.f.c.) with the 0.001µF and 0.005µF capacitors form a low-pass filter (l.p.f.) for ridding the a.f. output of unwanted higher frequency components.

Another active circuit is shown in **Fig. 3**. This uses a dual-gate metal-oxide silicon (m.o.s.) f.e.t.

Gate 1 receives the i.f. signal and gate 2 the c.i.o. signal. The a.f. signal is delivered by the drain and, as in the previous example, the unwanted higher frequency signals, a function of the mixing process, are deleted by the l.p.f. made up of the r.f.c. and the two associated capacitors. Clear a.f. signals are then capacitively coupled to and loaded across the volume control from where the required level is fed to the a.f. amplifier stages.

Donald Duck Effect

The b.f.o./c.i.o. comprises a conventional oscillator circuit. Good frequency stability is required because even small variations in frequency result in disconcerting changes in the frequency of the A1A beat note.

In J3E mode frequency variations make it difficult to resolve the audio because of the resulting 'Donald duck' effect! For these reasons crystal-control of the oscillator is desirable.

In practice J3E transmissions can only be resolved when the suppressed carrier reinserted by the c.i.o. is correctly related to the appropriate (for the frequency band in use) upper or lower sideband. It will be recalled that an s.s.b. signal consists of just one of the sidebands of a.m. The other sideband along with the carrier wave are suppressed before transmission.

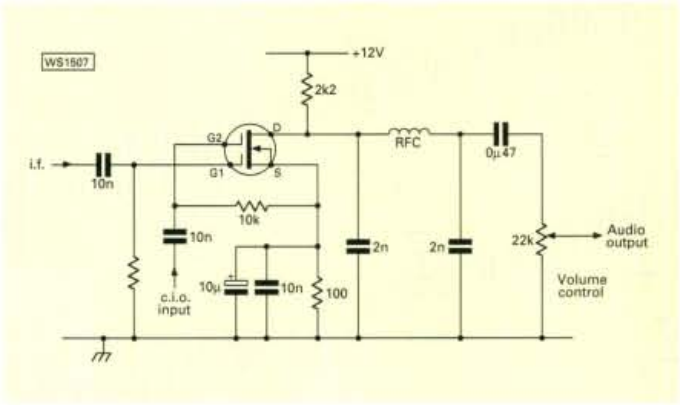


Fig. 3: A circuit using a dual-gate m.o.s.f.e.t. with typical component values.

Therefore it's the job of the c.i.o. to replace the missing carrier at the receiver correctly with respect to the side-band transmitted. This means that the carrier needs to be reinserted on the high-frequency (h.f.) side for lower sideband (l.s.b.) and on the low-frequency side for upper sideband (u.s.b.). A front panel switch on some receivers facilitates this requirement, while on others sideband selection is linked to the band selector switch.

Next time I'll be looking at the direct conversion receiver and transceiver, which also adopt the product detector. *PW*

Errors & Up-Dates

The 'PW Four' - a 70MHz transmitter and receiver combination, published October 2000.

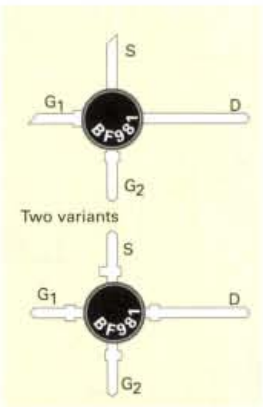
There were a few missing bits of information from the 'PW Four' 70MHz transmitter - receiver that was published on pages 54-57 of the October 2000 issue of *Practical Wireless*. The missing information was mainly for the toroidal coils and other inductors.

So, for the toriodal coils, the turns were as follows:

T1 7t (this started out as a transformer rather than a simple coil, but kept its component number with this change to minimise other problems).
T2 7t(p) 2t(s)
T3 3t(p) 6t(s) 7t (to resonate with C11 at 70MHz)
T4 10t(p) 2t(s)
T5 7t(p 7t(s)
T6 TOKO 85FCS4402EJ
All the toriodal-wound transformers are wound on T37-12 type ferrite toroids

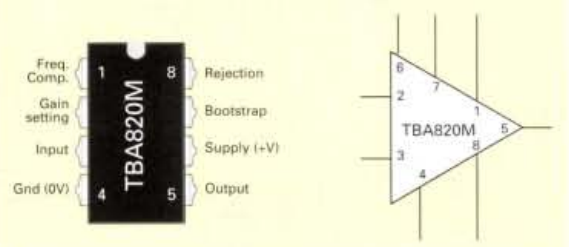
FB1 2t on a standard ferrite (tubular) 'bead' (around 3.3mm o.d. 1.5mm i.d. and 5mmm long.
FL1 10.7MHz crystal filter is in an HC49 'can'. The actual filter 'form-factor' may be chosen to suit what is available, and may be of 10M8A, 10M08H or 10M15A types.
FL2 455kHz Toko type CFM2-455A (455kH ±4kHz)
L1 5t (5mm i.d.) Made from 1mm tinned (or silver-plated) copper wire stretched to around 8mm long and tapped at 1.5 turns from the 'earthy' end point.
L2 TOKO LMC4200A (455kHz)
XL3 10.245MHz to mix with the incoming 10.7MHz signal from the first mixer Tr8, to produce the 455kHz i.f.

Pin-out for the BF981. Although we tend to insert a pin-out drawing of an f.e.t. or transistor, this has not always happened in the past, but a pin-out diagram is presented here.



IC2 (an **MC3357P**) shown as both diagram and schematic at the same time. The device is rather complex internally, and as such is easier to show in this form (which we have done previously in projects).

IC4 (a **TBA820M**) was shown without pin-out on the main receiver circuit diagram of Fig. 1. Another pin-out diagram is presented here:



PCBs and Overlays

We have had some comments and questions, asking why we haven't produced p.c.b. patterns and overlay drawings for many recent projects. I can only offer my apologies to those of you who would like these drawing to be on the pages of *PW*. I can only offer the fact of lack of time in the modern world as the main cause of this service tending to disappear.

Although many authors do provide a copy of their own original layouts, these are often not suitable to publish 'as-is' (especially from PC Software as we are Macintosh equipped). We try to present the author's work in the best possible light. And to that end, we have a particular style of producing projects, which often means many component numbers have to be rearranged.

This resequencing of component numbers, often means that the author's original drawings may no longer be accurate to the *PW* versions. The reduced time of production and the proliferation of other tasks to be achieved within the time schedule means that we had to take the decision to show good quality annotated (to *PW* component numbering) photgraphs of the prototype.

Now at least you can be sure that it has been built and that it should work. In the future we intend to present as many constructional projects as we can in this way.

I offer my apologies for the errors that have crept into the published project of the 'PW Four'.

Rob Mannion G3XFD

An easy to build...

SIMPLE CAPACITANCE METER

James Brett G0TFP presents an easy to build instrument to directly read capacitance in the range of 1pF to 10µF.

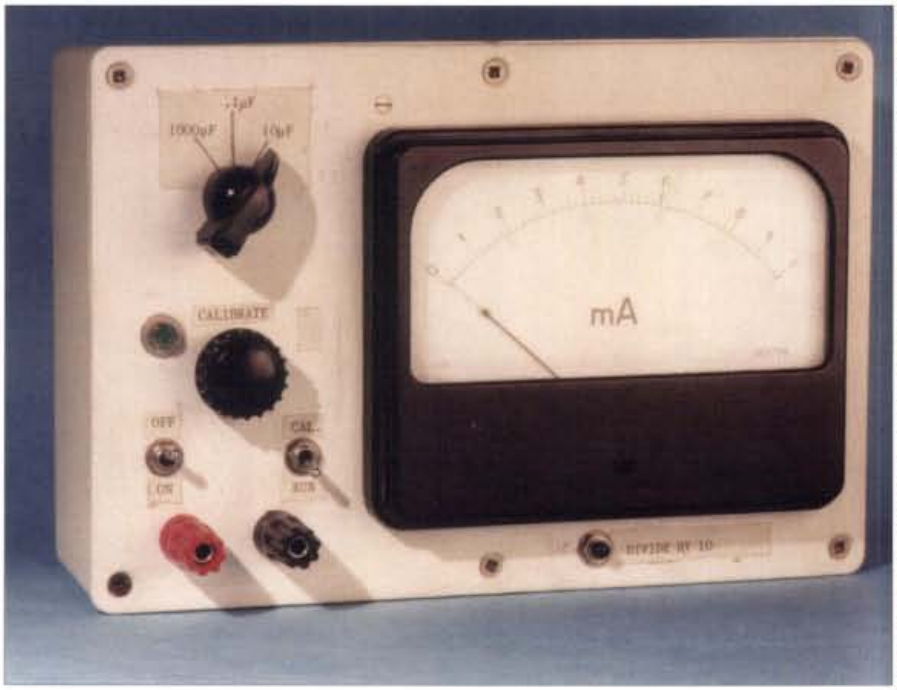


Fig. 1. The heart of this simple capacitance meter is IC1, the ever popular timer chip 555, which is configured to run as asymmetrical oscillator, with the 'clock' frequency set by the selection of C1, C2 or C3 and series resistor chain R1/2/3. The frequencies involved are approximately 480kHz for position 1, 4.8kHz for position 2 and 48Hz for position 3.

The output level from IC1 pin 3 is fed through either, the 'capacitor on test' or the range-selected 'standard' capacitor. The standard capacitor allows a calibration setting for the meter circuit. Overall, the accuracy is as good as the tolerance of the three standard calibration capacitors and the readability of the meter scale.

The bridge rectifier arrangement of D1 to D4, enables the d.c. moving coil meter to read the mean value of the alternating current being passed through the circuit. The meter has a 1mA movement but is shunted to enable it to read 10mA full scale. So, when S3 is pressed, the meter reading represents a capacitance value that is one tenth of the scale reading.

Before I start describing the project, let's take a (very quick) look at the theory involved. The reactance of capacitor C is $1/(2\pi fC)$. If we substitute in the current equation for Xc we get that the current, $I = E2\pi fC$. In other words the current is directly proportional to the capacity if E and f are kept constant.

In this design, the frequency source is a squarewave but this doesn't matter. All repetitive waveforms are made up from a fundamental sinewave and a succession of harmonic sinewaves. The fact that there are many sinewaves of different frequency but remaining in the same relative phase relationship doesn't matter so long as the result remains constant. This means that the current will still be in direct proportion to the capacity.

The Circuit

Now we've briefly examined the theory, it's time to look at the circuit that's shown in the diagram of

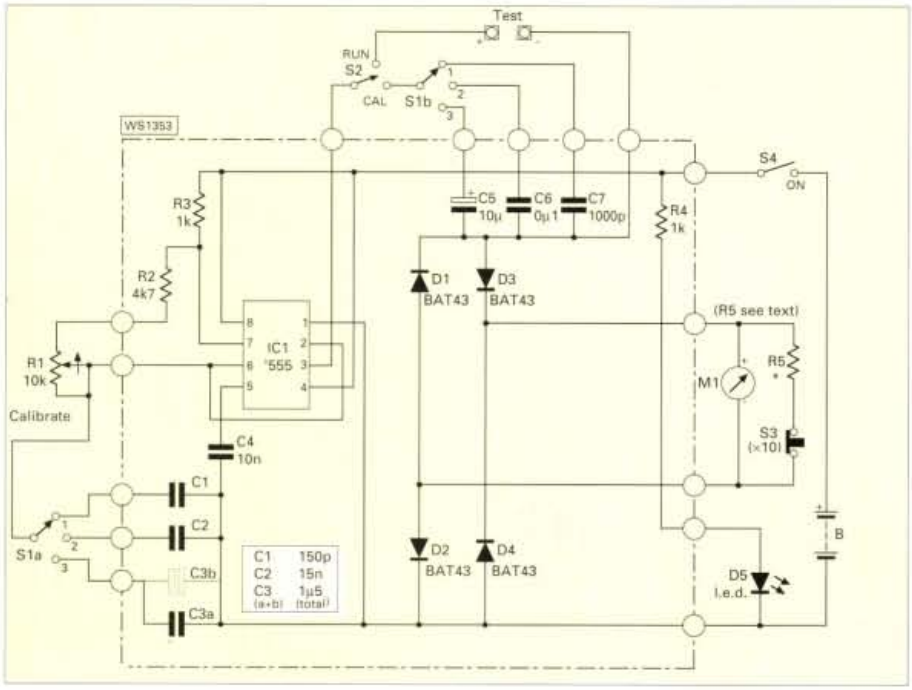


Fig. 1: The circuit diagram of the simple, but effective capacitance meter.

Construction & Layout

The construction is quite simple and the layout is not critical. Most of the components are wired on the strip board as shown in **Fig. 2**. A fairly large space is left for the capacitors as the sizes will depend on the types selected. Due to the comparative difficulty of obtaining 1.5µF non-electrolytic capacitors provision is made for the two

● Fig. 2: Most of the electronic components are mounted on a small piece of Veroboard. Don't forget to cut the tracks between the pins of IC1 before soldering it in place. The tracks run horizontally on the small piece of Veroboard.

lesser values in parallel.

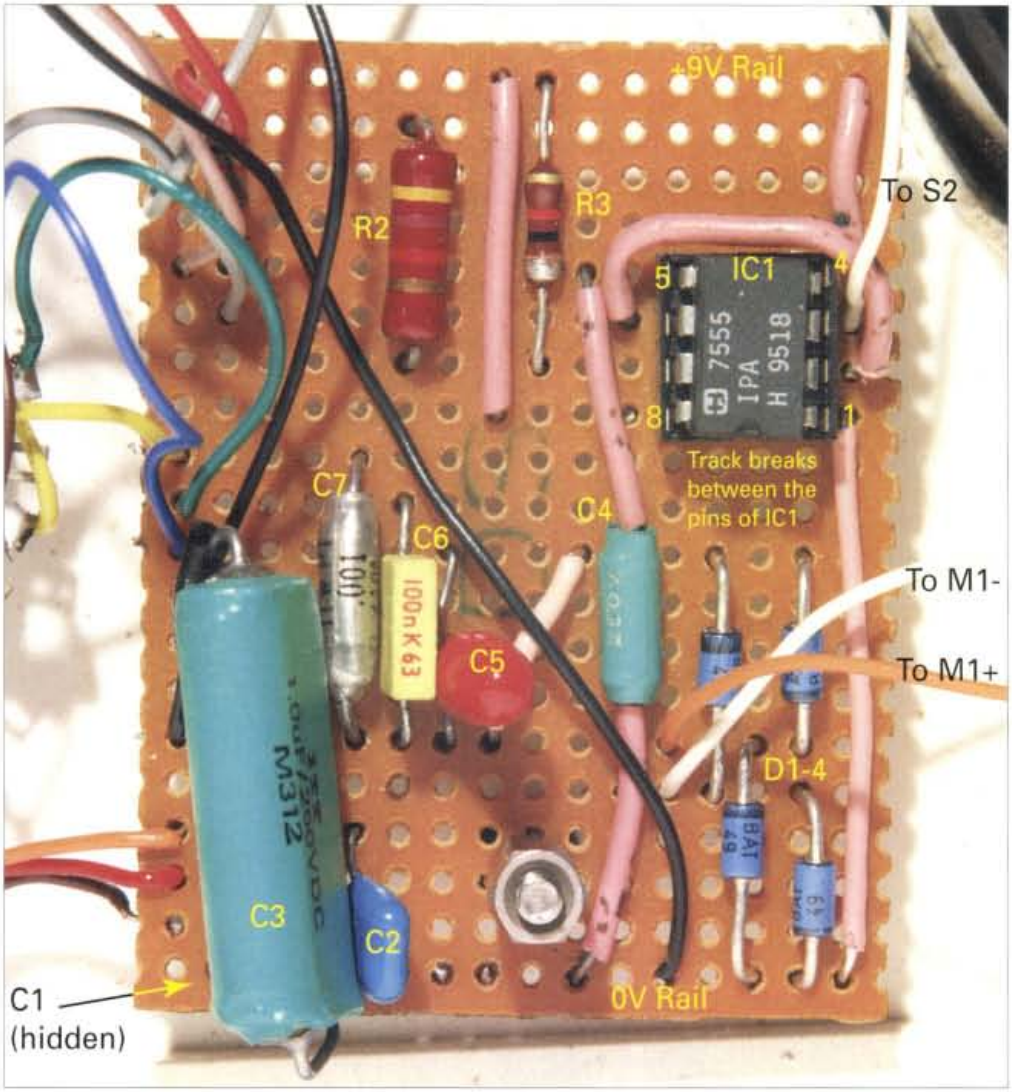
The wires from the circuit board to S2 and S1b should be kept fairly short and separated to avoid excessive stray capacity. The layout of my prototype is shown in the photograph of **Fig. 3**.

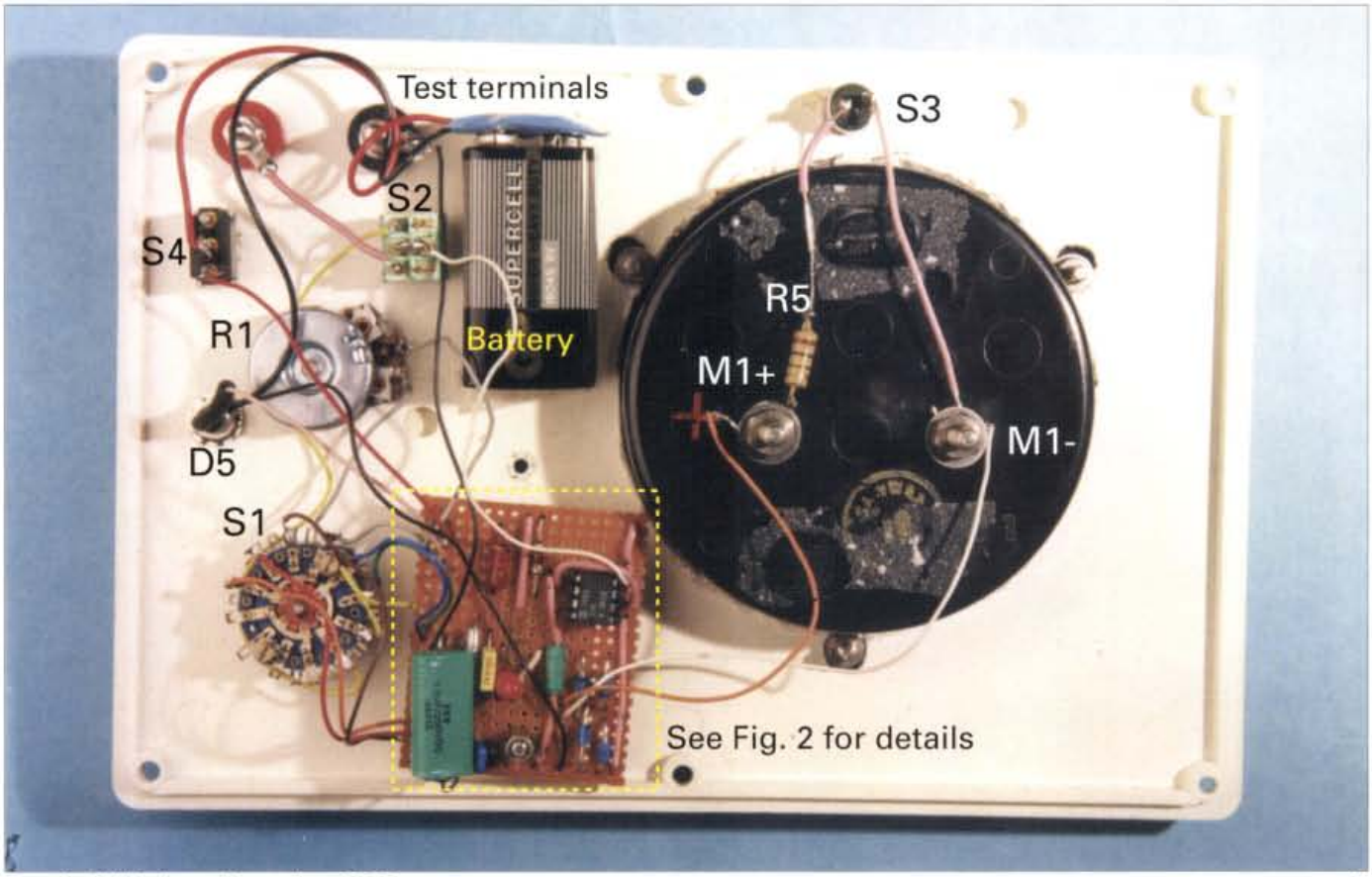
Since the 555 is generating a fairly high frequency squarewave, a very high level of harmonics will be present. In keeping with current EMC practice, a metal box is recommended to prevent any possible radiation of interference.

Select a suitable layout to suit the size of the meter and box an example as shown with components mounted on the lid. For convenience, R5 is mounted between the meter terminal and S3. The circuit board is mounted where convenient, and near switch S2.

The accuracy of the measurements are wholly dependent on the tolerance of the capacitors C6, C7 and C8 which are used for calibration. Good quality and close tolerance capacitors

● Fig. 3: The layout of Jim Brett's prototype capacitance meter. Yours may vary from this as desired, but try to keep all wiring as short as possible.





SIMPLE CAPACITANCE METER

should obviously be selected.

Since the battery will not be changed very often, it can be held to the side of the box by double-sided tape or a simple bent strip bolted to the box. (Alternatively, you could use a cheap battery holder).

Careful Check

Now, after a careful wiring check, let's look at the operation and calibration. Fit the battery but before switching on, ensure that S3 is in the closed position if a non-return switch or button hasn't been used. Set R1 fully anti-clockwise and S2 to the 'CAL' position and S1 to position 1.

Switch on and the meter should read somewhere in the upper half of the scale. Adjust R1 to bring the meter to full scale. The meter is now calibrated to read 1000pF (1nF) full scale.

Couple a capacitor of several hundred picofarads but less than 1000pF to the **TEST** terminals and switch S2 to **RUN**. The meter will now indicate directly the value of the test capacitor and C8.

Change the capacitor to be tested for one or less than 100pF and operate (open) S3 which now divides the full scale capacitance reading by 10. The direct reading will now be given (but remember to allow for the tolerances!).

In use (if the value of capacitor to be measured is totally unknown, start with the higher range first. As each range is selected the calibration operation must be carried out first.

Well, that's it - a working capacitance meter. Now you should never be caught out wondering what the value of that capacitor 'out of the junkbox' is - ever again! PW

Shopping List

Resistors

1k	2	R3, R4
4k7	1	R2
a.o.t.	1	R5 adjust on test. This will vary with the meter full scale current and resistance

Chassis mounted rotary (lin)

10k	1	R1

Capacitor (all 10V d.c. working or greater)

150pF	1	C1
10nF	1	C4
15nF	1	C2
1.5µF		C3 (may be made up from two or more capacitors)

Close tolerance units

1000pF	1	C7
100nF	1	C6

Tantalum close tolerance

10µF	1	C7

Semiconductors

NE555	1	IC1
BAT43	4	D1, D2, D3, D4
LED	1	1D5

Miscellaneous

Strip board 20 holes × 16 holes, metal box, size to suit meter and panel components, 1mA moving coil meter, potentiometer knob, test terminals, 8-pin socket, 9V PP3 battery and battery snap.

AR300XLT

Quality rotator for VHF/UHF. ~~£49.99~~

£39.99 each

AR-201 Thrust bearing for above.....only £12.99

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable.

ONLY £339.95

P&P £10

G1000	Heavy duty rotator	£499.95
GC-038	Lower mast clamps	£25.00
GC-065	2" thrust bearing	£48.00

YAESU G-650C

Extra heavy duty rotator for large HF beams, etc. Supplied with circular display control box and 25mtr of rotator cable. ~~£499.00.~~

ONLY £389.95

AOR AR-3000A

Wideband communication receiver (100kHz - 2036MHz) all-mode.

ONLY £679.00

AR-5000 Special Offer £1299.00

AR-8200 Series II

State of the art handheld receiver

only £379.95

AR-8000.....Special Offer £269.00

REALISTIC DX-394

★ Superb performance SW receiver ★ 0.2-30MHz (all mode) ★ Selectable tuning steps (down to 100Hz) ★ 240 or 12V ★ Digital S-meter ★ Attenuator ★ Key pad entry ★ 160 memories ★ Clock/timer ★ Noise blanker ★ Limit scan ★ Tape output. Was £199.00.

SPECIAL OFFER £149.95

RM-913

RADIO CONTROLLED CLOCK.

- 12/24hr alarm function
- Auto clock from "Rugby" RF signal
- Alarm function
- Backlight & more
- Incl's batteries

SPECIAL OFFER £11.99 P&P £2.00

GARMIN GPS SYSTEMS

STREET PILOT UK

The Street Pilot UK package includes dash mount, 8MB datacard, PC interface cable, 12V adaptor, UK metroguide map souce CD.

£549.00

Garmin Street Pilot mono Special offer £419.00

STREET PILOT COLOUR MAP UK

Package includes UK metro guide mapsource CD, 8 megabyte datacard, PC interface cable, cigarette lighter adaptor, portable antenna + dashboard mount.

SPECIAL OFFER £649.00

Garmin Street Pilot colour	£549.00
Carry case for Street Pilot	£14.99
8 meg-mem + mapsource CD	£139.95
16 meg-mem + mapsource CD	£169.95
Mapsource CD	£79.95
8 meg data card	£69.95
16 meg data card	£99.95

GPS-12 NAVIGATOR

(now with 24 hour battery life) 12 channel receiver. Includes:- UTM, ordanance survey, waterproof to IPX-7 standard).

SALE PRICE £129.95

GARMIN GPSIII+

Powered by AA cells or 13.8V, this compact navigational system gives detailed maps of the UK & Europe. Supplied with data lead and free on-board maps.

SALE PRICE £329.95

GARMIN ETREX SUMMIT

First combination GPS, altimeter and electronic compass in one small box.

SALE PRICE

£189.95

Etrex	Special offer	£109.95
Emap	Special offer	£199.95

SANGEAN ATS 909

A superb performance portable/base synthesised world receiver with tru SSB and RDS. UK's best seller.

ONLY £139.95

ATS 818 With built-in cassette - ONLY £199.95

SONY SW-100E

★ Miniature portable all mode SW receiver ★ Station presets for 50 frequencies ★ Single side band system ★ Synchronous detector ★ Tuning in 100Hz + 1kHz steps ★ Includes compact antenna/stereo earphones/carrying case.

RRP £229.95

SPECIAL OFFER £129.95 P&P £10

SW30...SPECIAL OFFER £39.95 . P&P £7.00

ICOM PCR-1000

Bring another world to your computer. The PCR-1000 connects externally to your computer and offers exceptional receiver performance. 0.5-1300MHz (all mode). Includes SSB. ~~£349.00.~~

UK's LOWEST PRICE £269.00

UT-106 Optional DSP unit.....£79.95

BEARCAT UBC-9000XLT

25-1300MHz wideband desktop scanner with turbo scan (AM/FM/WFM).

SPECIAL OFFER £249.00 P&P £10.00

YUPITERU MVT-7100EU

Wideband scanner (50kHz - 1650MHz) all-mode.

ONLY £199.95

Case £19.99

ICOM IC-R2

Miniature wideband hand-held scanner covers 0.5-1300MHz (AM, FM/WFM). Search banks memories and many more features.

£129.00

IC-R10 Wideband scanner £249.95

JM-838

JUMBO WALL/DESK CLOCK.

- Wide screen/2" digit time display
- Barometer
- Calender
- Temp
- Auto RF synch clock from Rugby.

£59.99 P&P £4.50

BA-888U

WEATHER/RADIO CONTROLLED CLOCK.

- Supplied with one remote (wireless) sensor
- Weather forecast
- Barometer
- 24 hr "radio" clock
- Thermometer

£69.95 P&P £4

The Practical Wireless 2000 144MH

Long serving QRP Contest Adjudicator Dr. Neill Taylor G4HLX presents the results of the Millenium event. And this year there's a chance for every entrant to receive a commemorative certificate thanks to Chris Rees G3TUX.

As usual, it's my very pleasant duty to thank Neill Taylor G4HLX for the amazing amount of hard work he puts into organising and adjudicating what turns out to be a very enjoyable event. Not only does he do an excellent job - he also thoroughly enjoys doing it and conveys his enthusiasm to everyone taking part. I'm only sorry that - due to being stuck in hospital - I couldn't support the competition this year. But I'll be there in 2001. Thank you Neil! **Rob Mannion G3XFD, Editor.**

A blistering hot Sunday in June saw v.h.f. enthusiasts taking to the hills for the 18th *PW* 144MHz QRP Contest. A total of 87 entries were received, the highest number since 1995.

Stations in many parts of the British Isles made the most of their 3W transmitter output power, with some good tropospheric conditions at the start of the day.

The group with the biggest success were the **North Wales Wafflers GW0NWR/P**, whose 268 contacts in a staggering 43 locator squares gives them the first place and the *PW* QRP Contest Winner's Cup. They also receive the **special prize** of a **Kenwood THG-71E dual-band hand-held, kindly donated by Kenwood UK Ltd**.

The 'Wafflers' group members are **Ted GW0DSJ**, **Mike G0HWK**, **Albert GW0RCZ**, **Rick GW0VMW**, **Dave GW4DMR**, **Barrie GW7EXH** and **Anna MW0CCS**. This is the group's second win, their first being in the 1997 contest.

The runners-up are the **Oldham Radio Club G1ORC/P** (winners in 1998), and their special prize is solar panels donated by **Bob Keyes of Key Solar Products**. The leading station in Scotland, for the second year, was **David Dodds GM4WLL/P.** David wins the **Tennamast Trophy in Memoriam to Frank Hall GM8BZX, donated by Tennamast (Scotland) Ltd**.

There's a new winner of the *PW* EI/GI Trophy Clock, donated by our Editor Rob G3XFD, to the leading station in the Irish Republic or Northern Ireland - it's the **Ballymena Amateur Radio Club, GI3FFF/P**.

And we have a new trophy this year, now that Novices are able to join in the 144MHz activity. I am very happy to donate the *PW* QRP Contest Novice Trophy, whose first winner is **Paul Walsh 2E0AUN/P**.

Congratulations Everyone

Congratulations to all the winners and to everyone who joined in this year's event. Details of all the other leading stations, and the positions of all entrants, are given in the tables, including, for the first time, the tabulation of the Novice stations.

The full detailed results list will be posted soon to all entrants who provided a stamped address envelope, and will be available on the contest Web site, which has a new easy-to-remember address: **www.contest.org.uk**

Silver Millenium Certificate

Normally, we issue certificates to the leading stations in all the categories listed, including the leader in each locator square. But as a special memento of the 2000 contest, a silver Millennium Certificate has been offered to every entrant.

A certificate will be posted to all who sent in the corner flash which appeared with the rules in June issue of *PW*. These certificates are sponsored by **Chris Rees G3TUX** of **The QRP Component Company** and on behalf of everyone I thank Chris for his generous gesture of support.

● Scarborough Amateur Radio Society - G2CP/P. Dave G4DAX on the mic and in charge of turning the antenna, while Miles G0ODS checks the logs and Peter G3FYP preparing the refreshments.

Fifth Year

The leading single operator, for the fifth consecutive year, is **Dave Hewitt GW8ZRE/P**, operating from a different location and with a larger antenna this year. This put him in joint third place overall, in a tie with the station of **Charlie** and **Sue Jordan** operating as **GW0PZO/P**. Very thorough scrutiny of both logs left the two stations on identical QSO and square counts, the first time this has happened so near the top of the table!

In fact, it was a struggle for Dave to operate in the contest at all, as he was due to return from a holiday in the USA just two days before the contest. But a succession of delays to his flights, due to severe weather in New York, problems with Air Traffic Control systems in the US and the UK, had him arriving at Gatwick on Saturday afternoon, with no shuttle flights to Manchester.

So what did Dave do! - he hired a car (at enormous cost) and arrived home just 10 hours before the contest started! "Which station", he asks, "hatched this devious plan to keep GW8ZRE/P off the air?" But, jet-lagged or not, he made it to his contest site near Llangollen in time to make his first QSO at the instant the contest started! (What a tremendous effort - well done Dave!).

New EI/GI Winner

There was a new winner of the EI/GI trophy clock this year. The winner of the last three, **Peter Lowrie GI7JYK**, evidently decided that three clocks was enough for any shack!

z QRP Contest Results

So, for a change, Peter took a cheap flight to Liverpool, met up with his former rival **Mike Baguley G7LQD**, and together they put on a station from Mike's usual portable location, but using Peter's callsign, i.e. GW7JYK/P.

Like many others, when I worked them I was mystified to hear the "wrong" prefix on this familiar callsign. In fact the planning for the venture had started months earlier, but Mike had not revealed to anyone that he would have Peter as a co-operator - all he would say was that he had a "secret weapon" prepared for the event. Hence their entry is under the name "Secret Weapon Contest Group", and they achieved sixth place in the results*. Mike comments "conditions on the day were fabulous, both from the point of the weather and the DX/QSO rate".

***Note:** What a marvellous combination! Peter was just as secretive when talking to the Editor and convinced me he might even be trying to join in from somewhere as far away as Spain! **Rob Mannion G3XFD**.

Propagation Conditions

The propagation conditions, while not exceptional, certainly started out with good tropospheric paths to Europe from most parts of Britain. It didn't last long though, and those stations who took the opportunity to work many DX locator squares in this period ended up with an advantage in multiplier totals.

Charlie GW0PZO/P was one: "at one point I was calling CQ contest DX only, as I had an opening into Europe". On the other hand **Graeme G3GGL/P** noted how things changed at his site in Shropshire (IO82) in terms of the strength of the beacon in Wrotham, Kent: "A dawn lift, which took GB3VHF up to S9+10dB at the start of the contest had dropped to S1 by the end".

The pattern was the same in Northern Ireland, at the **Ballymena Club's** station, **GI3FFF/P**: "Propagation in the early stages was, to say the least, superb, with big signals from all parts of the country. We were very surprised to work into Europe, it's a pity it didn't last". A series of problems on their way to the site put them on air late, and they realised: "we missed about 40 minutes of what seemed to be the best propagation of the day".

It was a similar story at **MM0CCC/P**, one of the two stations fielded by the **Cockenzie and Port Seton Club**, having misjudged the time it would take to carry all the equipment to their mountain top in the Cheviot Hills, in the Borders Region of Scotland, thus getting on air over hours late. They, too, realised "we missed the best of the tropo opening".

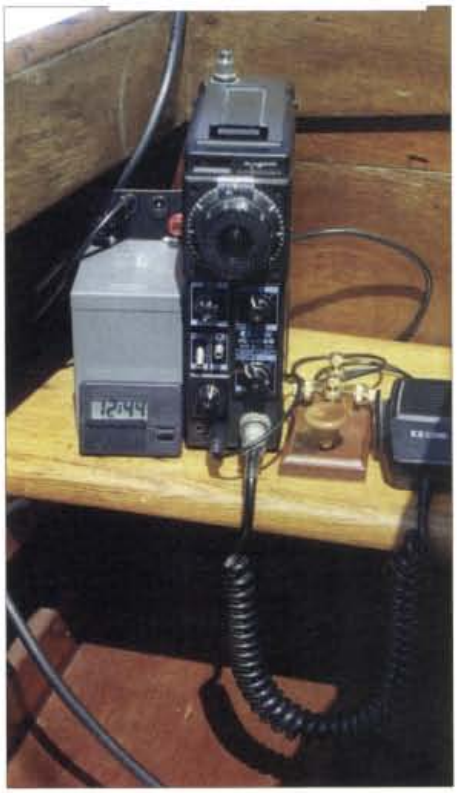
After the early opening subsided, there was still some DX later in the day. On the second occasion it was to Denmark, with many logs containing contacts with OZ stations around the middle of the day.

No Sporadic-E

It was perhaps disappointing that there was no sporadic-E opening, as there had been several days of spectacular propagation by this mode in the days before the event. But where Sunday the 18th was maybe an untypical June day in its lack of ES opening, it was also untypical in its weather.

After several weeks of miserable gloom in most parts of the country, for the contest day "the weather was exceptional", in the words of **Mark G8AWO/P**.

The sudden unexpected hot sunshine took many by surprise. As the Oldham club team ascended Kinder Scout to set up their station, G1ORC/P, it got hotter and hotter: "The temperature was in the mid-twenties at the start, but as we climbed so did the sun and also the temperature. By the time we reached the site we were all well parched".



● Robert van der Zaal PA9RZ/P's IC-202S on board his 20ft sailing dinghy.

Sunburn was a complaint at several stations, for example at GW7JYK/P, where Mike says "it was blisteringly hot, we both suffered from serious sunburn to arms, necks and, in Peter's case, legs. I had warned him about the perils of wearing shorts on contests"!

It was also windy on some of the summits occupied by stations, which at **G2HDV/P** caused a catastrophe: "When we were packing up after a marvellous day, the wind took the log sheets, one of them went into a storm ditch full of muddy water."

The overall winners, the North Wales Wafflers were not unhappy to see the weather pattern at GW0NWR/P: "The weather was excellent, if a little windy, which was very similar to the year we won - we're hoping it is a good omen!" (It seems it was!).

Noted The New

The Midland Contest Group G2HDV/P, were amongst several who noted the new addition to the activity this year: "Another thing we noticed was the whole event was entered into with great enthusiasm by all, and it was nice to hear Novice calls on the band as well".

Entries were received from seven novices, all single

● Peter Lowrie GI7JYK operating GW7JYK/P.

operator with only one, Paul 2E0AUN/P, actually going portable.

Dawn 2E1HVA was one of those having a first taste of v.h.f. contesting. "This is my first ever contest attempt", she writes, "I only passed my Novice course in March. Everyone I spoke to was very encouraging and I appreciated the camaraderie of the whole event".

So, let's hope this will be the first of many enjoyable contests for all these Novices, **plus those heard on the band during the contest but who didn't send in a log**. For Dawn, this is certain: "Since the contest, I have found out that I have passed the RAE. I hope to enter again next year, hopefully as an M5 station". Well done Dawn, and we all look forward to contacting you!

For **Andy M1DRN**, this was also a first entry in the contest, something he had long dreamed of doing. "It's almost like a life milestone", he explains, "I have been reading *Practical Wireless* since my youth and could only dream of participating in such a contest until I obtained my M1 callsign 18 months ago".

Well done Andy! The taking part, rather than the winning, is the important thing for many entrants (which is why they can all get a certificate this year!), for example the **Scarborough Club's** first entry into the contest, as **G2CP/P**, was "with little expectation of winning but high expectation of enjoying ourselves. The latter was achieved at 10 over 9"!

Standard Quite Good

The standard of entries this year was again quite good, although many lost at least a few points in adjudication due to errors in the logs. Please watch out for these problems.

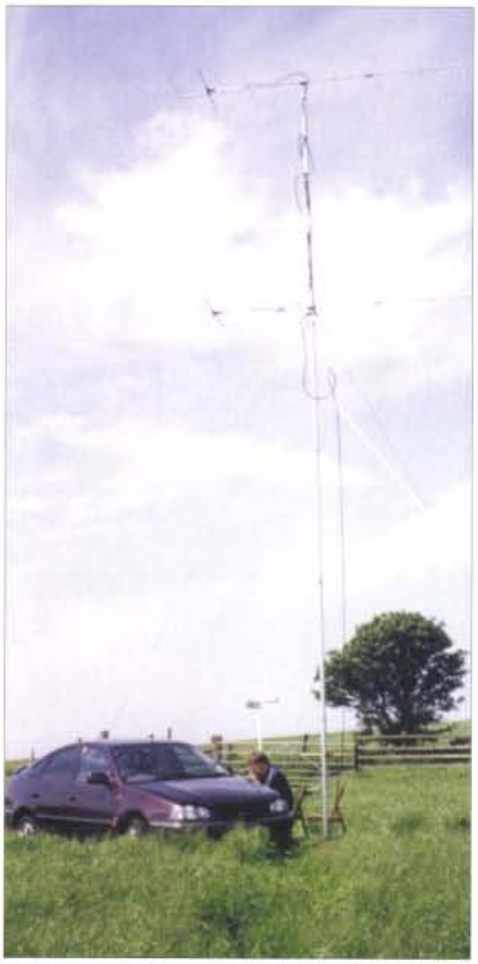
However, perhaps it's not surprising that some callsigns are logged incorrectly, as two groups actually got their own callsign wrong on the covering information sheet!

Incidentally, a growing number of logs are submitted by E-mail, and this is welcomed by G4HLX. Thank you for helping me to help you!

There were few problems with poor radiated signals during the contest, although a few isolated reports arose, mainly from the problem which **Graeme G3GGL** notes: "stations attempting to compensate for low power by compressing the modulation to a degree of limiting which ruined readability. **Will they never learn that good comprehension is achieved by a reasonable dynamic range"?**

Learned Something?

Well, whatever lessons were learned during this event, and most will have gained something, or spotted some improvement that could be made. And I'm pleased to say the opportunity to turn the experience into real performance will come again next summer, in the 19th *Practical Wireless* 144MHz QRP Contest. **The date to remember? - This is scheduled for Saturday 17 June 2001, 0900 - 1600UTC. So get the date in your diary and start planning now! Good luck everyone.** *PW*



● Station of Mike Baguley G7LQD and Peter Lowrie GI7JYK, the 'Secret Weapon Contest Group - GW7JYK/P.

Practical Wirel

Practical Wireless 144MHz QRP Contest 2000

Pos.	Callsign	Points	Pos.	Callsign	Points
1	GW0NWR/P	11524	45	G0WRS/P	616
2	G1ORC/P	6815	46	G0EYX/P	605
3	GW8ZRE/P	4928	47	G0UWS/P	574
3	GW0PZO/P	4928	47	G0PZR/P	574
5	G8DDY/P	4699	49	G3GGL/P	558
6	GW7JYK/P	4455	50	M0ROA/P	546
7	G6FQZ/P	4089	51	2E0AUD	481
8	GW4IDF/P	2850	52	GM0LWD/P	480
9	G0HDV/P	2593	53	G4JYN/P	468
10	GW0PSV/P	2420	54	GM0GMD/P	465
11	GI3FFF/P	2288	55	EI3ENB/P	464
12	G3RIK/P	2091	56	G8EQD/P	450
13	G2CP/P	2079	57	G6FLY/P	418
14	GX8SDS/P	2016	58	M0APX/P	377
15	GM4WLL/P	1817	59	GM0AYR/P	375
16	G3LQC/P	1664	60	G7TUA	352
17	G0TOO/P	1581	61	G0GAP/P	329
18	2E0AUN/P	1530	62	M1DRN	310
19	M0BAO/P	1440	63	GX7KDS/P	300
20	G7OVM/P	1430	64	G3NPB	264
21	G1POS/P	1428	65	2E0ATZ	216
22	G3KTC/P	1424	66	G3SBL/P	210
23	G4LQL/P	1328	67	GM0BWR/P	209
24	G7HXW/P	1298	68	G0OQE/P	196
25	G5ZG/P	1264	69	2E1FME	168
26	G4NVM/P	1188	70	G7NBE	161
27	G8AWO/P	1162	71	G7WKX	154
28	GW4KVI/P	1125	72	G1EFL	144
29	G1GQC	1122	73	G0CRW/P	126
30	MM0CCC/P	1116	73	G8PAD	126
31	G0VYJ/P	1092	75	G7XYZ	125
32	G6WIR/P	1044	76	G0VOK/P	120
33	2E0ATF	1008	77	G3UGG	117
34	MM0CPS/P	986	78	M1DVJ	98
35	G1WKS/P	966	79	MW0CFL	36
36	GX4MWS/P	960	80	GW6RNA	35
37	G2HDF/P	912	81	G6YYU/P	25
38	G3BPK/P	870	82	M5ABU	24
39	EI6ARB/P	836	82	PA9RZ/P	24
40	G6LNU/P	819	84	2E1HVA	20
41	G0DLR	806	85	2E1HSR	12
42	G1JDP/P	798	86	M5AIL	9
43	G0OKD/P	672	87	GM1YUH/P	6
44	G0RRC	660			

Leading Stations In Each Locator Square

Square	Name	Callsign	No. entrants in square
IN79	Radio Officers Association	M0ROA/P	1
IO62	Paul Norris	EI3ENB/P	1
IO63	John O'Sullivan	EI6ARB/P	1
IO64	Ballymena Amateur Radio Club	GI3FFF/P	1
IO66	Ken Jones	GM1YUH/P	1
IO70	Penzance Radio Club	G0PZR/P	3
IO75	Ayr Amateur Radio Group	GM0AYR/P	1
IO76	Tom Astbury	GM0GMD/P	1
IO80	South Dorset Radio Society	GX8SDS/P	5
IO81	Malvern Hills RAC 'B'	GW4IDF/P	4
IO82	North Wales Wafflers	GW0NWR/P	8
IO83	Dave Hewitt Charlie and Sue Jordan	GW8ZRE/P GW0PZO/P	10
IO84	Christopher Richmond	G0TOO/P	1
IO85	David Dodds	GM4WLL/P	3
IO86	L.A. McWilliams	GM0LWD/P	2
IO90	Peter Thompson	G8DDY/P	2
IO91	Colin Potter & friends	G6FQZ/P	6
IO92	Jon Page	G1POS/P	9
IO93	Oldham Radio Club	G1ORC/P	9
IO94	Scarborough Amateur Radio Soc.	G2CP/P	2
JO00	Jonathan A. Constable	2E0ATF	1
JO01	Bishop's Stortford Amateur Radio Society	G5ZG/P	10
JO02	Chris and Doug Rolph	G7HXW/P	4
JO22	Robert Van der Zaal	PA9RZ/P	1

less 144MHz QRP Contest 2000 Result Tables

Leading Stations Using A Single Antenna

Pos	Name	Callsign	Antenna
3	Dave Hewitt	GW8ZRE/P	12-element ZL-special
3	Charlie and Sue Jordan	GW0PZO/P	5-element quad
5	Peter Thompson	G8DDY/P	19-element MET Yagi
7	Colin Potter & friends	G6FQZ/P	17-element Tonna Yagi
8	Malvern Hills RAC 'B'	GW4IDF/P	19-element Yagi
9	North-East Ex-Pats	G0HDV/P	13-element Yagi
10	Triple S Contest Group	GW0PSV/P	17-element Tonna Yagi
11	Ballymena Amateur Radio Club	GI3FFF/P	10-element Jaybeam Yagi
12	Dave Carden & friends	G3RIK/P	14-element Parabeam
13	Scarborough ARS	G2CP/P	9-element Tonna Yagi

Leading Stations

Overall Winners	**North Wales Wafflers**	**GW0NWR/P**
Runners Up	Oldham Radio Club	G1ORC/P
Leading Single Operator	Dave Hewitt	GW8ZRE/P
Runner-up Single Op.	Peter Thompson	G8DDY/P
Leading Fixed Station	Mansfield Amateur Radio Club	G1GQC
Leading Novice Station	Paul Walsh	2E0AUN/P
Leading English Station	Oldham Radio Club	G1ORC/P
Leading Welsh Station	North Wales Wafflers	GW0NWR/P
Leading Scottish Station	David Dodds	GM4WLL/P
Leading N. Ireland Station	Ballymena Amateur Radio Club	GI3FFF/P
Leading Eire Station	John O'Sullivan	EI6ARB/P

Leading Multiple Operator Stations

Pos	Name	Call	Score	QSO	Squ	Loc	Ant	a.s.l.(m)	TX/RX
1	North Wales Wafflers	GW0NWR/P	11524	268	43	IO82	2x17Y	560	FT736R
2	Oldham Radio Club	G1ORC/P	6815	235	29	IO93	2x9Y	620	FT290R
3	Charlie and Sue Jordan	GW0PZO/P	4928	176	28	IO83	5Ω	550	FT290R
6	Secret Weapon Contest Group	GW7JYK/P	4455	165	27	IO82	2x9Y	360	IC275E
7	Colin Potter & friends	G6FQZ/P	4089	141	29	IO91	17Y	295	FT736R
8	Malvern Hills RAC 'B'	GW4IDF/P	2850	120	25	IO81	19Y	420	IC202S
9	North-East Ex-Pats	G0HDV/P	2593	105	26	IO93	13Y	150	TR751E
10	Triple S Contest Group	GW0PSV/P	2420	110	22	IO81	17Y	480	TR751E
11	Ballymena Amateur Radio Club	GI3FFF/P	2288	104	22	IO64	10Y	340	FT290R
12	Dave Carden & friends	G3RIK/P	2091	123	17	IO83	14Y	430	FT290R

Leading Single Operator Stations

Pos	Name	Call	Score	QSO	Squ	Loc	Ant	a.s.l.(m)	TX/RX
3	Dave Hewitt	GW8ZRE/P	4928	176	28	IO83	12Z	560	TR751E
5	Peter Thompson	G8DDY/P	4699	127	37	IO90	19Y	240	FT221R
15	David Dodds	GM4WLL/P	1817	79	23	IO85	8/8S	375	TR9130
17	Christopher Richmond	G0TOO/P	1581	93	17	IO84	11Y	130	IC706II
18	Paul Walsh	2E0AUN/P	1530	102	15	IO83	9Y	260	FT480R
19	Ashley Edwards	M0BAO/P	1440	90	16	IO80	17Y	250	IC706
21	Jon Page	G1POS/P	1428	102	14	IO92	10Y	300	FT480R
26	John Duddridge	G4NVM/P	1188	66	18	JO01	13Y	110	FTV707
28	Chris Dunn	GW4KVI/P	1125	75	15	IO81	9Y	455	FT480R
33	Jonathan A. Constable	2E0ATF	1008	72	14	JO00	10Y	185	FT736R

Leading Novice Stations

Pos.	Name	Callsign	Score	QSO	Sq	Loc	Ant.	asl,m	Tx/Rx
18	Paul Walsh	2E0AUN/P	1530	102	15	IO83	9Y	260	FT480R
33	Jonathan A. Constable	2E0ATF	1008	72	14	JO00	10Y	185	FT736R
51	Barry Carter	2E0AUD	481	37	13	JO01	12Z	70	IC706II
65	R.J. MacDonald	2E0ATZ	216	24	9	JO01	5Y	25	FT480R
69	A.D. Knott	2E1FME	168	21	8	IO92	17Y	150	C58
84	Dawn A. Bennett	2E1HVA	20	10	2	IO81	8Y	245	FT290R
85	Marty John Rogers	2E1HSR	12	6	2	IO70	5Y	200	FT100

Antenna Workshop

GROUND THAT WIRE ANTENNA

John Heys G3BDQ, says get out and "ground that wire antenna". It may become a more effective antenna than you imagine.

Before the invention and application of the thermionic triode valve radio receivers were no more than simple detectors which were coupled to a resonant antenna system. There was no kind of r.f. or a.f. amplification. To achieve an effective receiving system, signal losses had to be kept very low so good high resistance (many MΩ) insulators had to be used when installing antennas.

Much more sensitive receivers which had amplification were developed during the First World War so the need for very low losses on antenna wires diminished. So ingrained had this idea become, that even up until recently, the suggestion that a long wire antennas could be earthed at its far end and yet still be effective on the amateur bands would have provoked mirth.

The notion, that all antennas had to have superb insulation to prevent the r.f. from vanishing into the ground may have been believed. But this is not so!

Amongst my collection of early examples of QSL cards, is a particularly rare one from Tibet. It was sent to an Indian station just after the Second World War by the operator of the station AC4RF. On the card the operator describes his antenna as a 'grounded long wire'. I first noticed this comment about 35 years ago and that led to my own experiments with earthed wire antennas.

Normal Antenna

A 'normal' end-fed wire antenna has a very high impedance at its far end. From the far end along the wire back towards the receiver or transmitter the impedance falls, reaching a minimum at the quarter-wave point. It then starts to rise and fall again for every quarter wavelength.

In practice we usually adjust the wire length so that the impedance at the equipment end is neither too high nor too low to be matched easily at the operating frequency. A grounded wire also have high and low impedance points along its length back to the operating position but at the first quarter-wave point back from the ground connection there will be a high and not a low impedance.

Grounding the far end of the wire will give some advantages, the most important of course is safety. If the antenna wire is connected to an effective low resistance earth, there can be no build up of static voltage on the line. Receiver noise levels will reduce and the equipment will be well protected from the electric charges which often build up on high antenna wires under certain weather conditions.

The vertical (or near vertical) part of the antenna at its far end will perform as a vertical radiator and so give vertical polarisation. This last feature can be a great boon when aiming to contact DX on the lower frequency bands. The horizontal polarised radiation will occur on higher bands so, in effect we will have dual polarisation.

My long wire antenna when grounded gives me two S-points (10-12dB) of increase in received and transmitted signal strength on 1.8MHz ('Top Band') when using ground wave propagation. I've found DX working on that band and on 3.5MHz is much easier too. Using grounded wires, I gained 120 countries worked on 'Top Band' during a spell of two years, and that was some 15 years ago.

Basic Antenna

A Basic Grounded Wire antenna, as shown in **Fig. 1**, can easily be a simple modification of an existing end-fed antenna, just needing a descending wire to a good earth connection and an earth return wire which can lie on the surface of the ground. This wire can, for safety also be buried a little way under the surface.

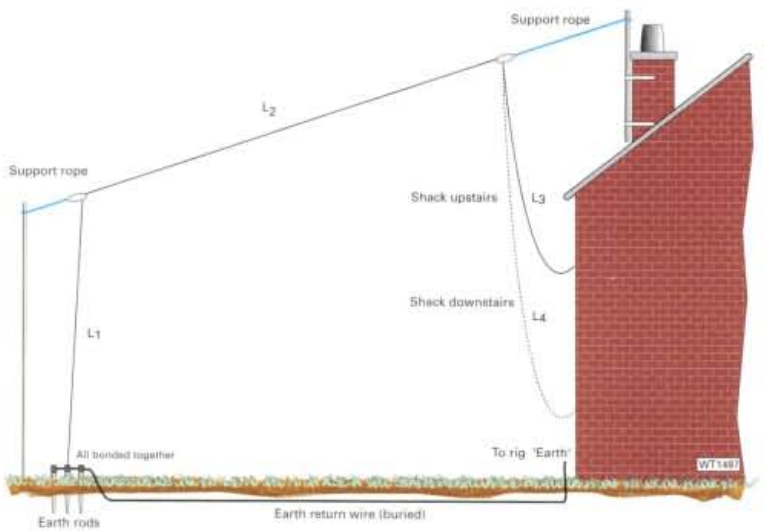
Without this return wire there would always be, regardless of the soil or its moisture level, a high resistance path from the antenna base, with its earth rods, to the station a.t.u. arrangement. This would result in a very inefficient 'lossy' radiating system.

Three earth rods are shown in Fig. 1 but to get a really good r.f. ground more rods and an earth 'mat' system are needed. The effectiveness of a grounded wire antenna is closely related to the provision of a good r.f. earth. To be effective it should be a very low resistance earth.

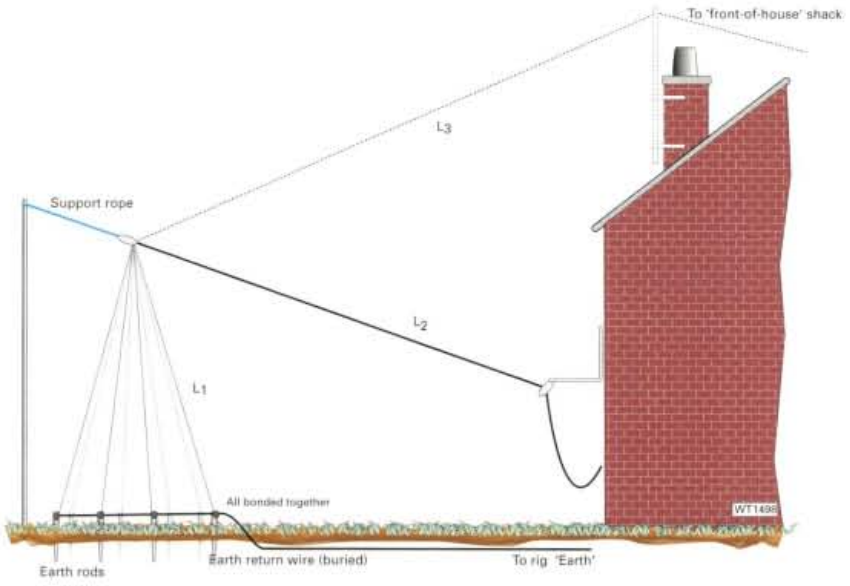
In the November 1998 issue of *PW* my 'Antenna Workshop' article explained in some detail how a very effective ground system can be arranged in an average sized garden.

The total lengths of the antenna segments L1, L2, and L3, shown in Fig. 1, should be between a quarter-wave and a half wavelength on the lowest frequency band to be used. The section, L4 must be considered a part of the antenna length if the operating position is on the ground floor.

Total lengths that are multiple λ/4 long should be avoided, for these lengths give impedances that can be difficult to match at the shack end. I've found that a total length of 56.4m (185ft) will work well on 1.8MHz and all the higher h.f. bands. The vertical section of the antenna L1 should be as long as is practicable and this



● Fig 1: By taking a vertical wire, from the 'far' end of a long-wire antenna, to a good r.f. earth the antenna may be turned into a grounded long wire that may be more effective radiator. (See text for details).



● Fig. 2: Increasing the number of vertical wires, turns the grounded loop into a 'Steeple' antenna with a lower Q and wider bandwidth. (See text for details).

will depend upon the available mast height.

A minimum height of L1 for use on 'Top Band' will be about 9m (30ft) but this can be reduced if the remainder of the antenna slopes at 45° or steeper upwards to the feed point. In Fig. 1 the dotted line L4 represents an alternative wire route to a ground floor operating position.

On the higher frequency bands such as 21 and 28MHz such a simple grounded wire will perform as well as a 'normal' ungrounded wire antenna. In fact, during some propagation conditions the vertically polarised radiation for the far end 'down wire' can enhance signal strengths to and from DX stations.

As an aside, my grounded wire has also been used successfully on 50MHz. So successful, it often seems as effective as a two or three element beam antenna.

The Steeple Antenna

The 'steeple' antenna design, **Fig. 2**, was derived from the basic single grounded wire and was an attempt to bring down the earth resistance. Initially four descending wires were used, each connected to the earth system. By the way, the antenna got its name because it looks a little like a church spire.

The wires were originally arranged as a square, the corners of which had individual ground rods. These were spaced about 2m (6.5ft) apart and connected together by a thick wire. This arrangement increased the signal strengths, both in and out. They also lowered the antenna *Q* giving a better, broader banded operating.

With the lowered *Q*, of the four wire Steeple, I was able to operate over most of the c.w. portion of the 1.8MHz band without re-tuning. Later on, the number of down wires was increased to eight, which gave better results than the five wired version I'd tried.

Five wires, I found in practice had little advantage over a four wire design. To achieve noticeable gain you must double the number of vertical wires. This is a rule when designing Yagi beams; you have to double the number of elements to get 3dB of gain.

My eight wire version had the wires coming down to a circle of earth rods (I used aluminium poles) all interconnected and joined to a big ground system. Aluminium 'greenhouse' nuts and bolts can be used for the earth rod connections when aluminium is used and if the junctions are liberally coated with a silicone rubber sealant they'll resist corrosion for several years.

In the illustration of Fig. 2, the section L2 slopes down to a ground floor window, and such an arrangement seems quite effective. I have also arranged for my wire to go up and over the roof via an insulator on a short chimney pole so as to reach a shack at the front end of the house (L3 in Fig. 2).

Raising the height of the end mast and so increasing the length of the steeple wires will increase the efficiency of the antenna. Before the great storm of 1987 my steeple antenna was supported by a 15m (50ft) mast but now my grounded antenna only has an 11m (36ft) support.

Both Modes

For the past year or so I have needed my long wire antenna to be used in both the grounded and 'plain end-fed' modes. Temporary ('crocodile' clip) connections are not really satisfactory connections at the bottom end of the vertical wires

So, to improve the connections to the ground rods, I've installed a tilt-switch at the bottom of each down wire. Mercury tilt-switches are used in some domestic appliances such as washing machines, though I obtained suitable switches from Maplin.

Described in Maplin's catalogue as a "Tip-Over Safety Switch", these tilt switches are encapsulated in a weatherproof polypropylene housing and each has a contact rating of 15A.

Changing over the antenna still entails a trip down the garden, but a simple push over arrangement allows a positive connection when the wire is grounded. The vacuum within the switch raises the working voltage and it has handled transmitter powers of up to 400W, working perfectly at this level.

Hopefully this article will help and encourage some readers to prepare for the 2000/2001 l.f. DX season. So get out and ground that wire!

"...get out and ground that wire!"

Antennas-in-Action

Hello and welcome to the November 2000 issue of Antennas-in-Action (AiA). in this session you'll find a quick report on the Barker & Williamson T2FD antenna, my request for help to find more information about a 'Bow Tie' antenna and, as this is our last meeting before Christmas, a few books to consider for your stocking!

I've had an E-mail from **Roy G0TAK**, who ran a special event station (**GB2WSM** the Steamboat Museum's event), where a Barker and Williamson terminated folded dipole was used. "**Robin G3NFV** of Sycom, who was kind enough to donate the antenna to the Museum, advised us not to take it out of the box until we were ready to erect it and, I can endorse that view. This American made antenna is solidly constructed from good quality materials and a thorough visual inspection revealed that all the joins and bits were properly connected. The instructions show you how to rig it for erection, it involves getting certain lengths of rope in the right place but the instructions are explicit and easy to follow. The object is to get the thing hanging vertically when it is aloft.

"We put the antenna up horizontally at 15m, but we had the advantage of a ship's mast at one end and a fire station at the other. The feeder drops vertically to the operating position and it hangs quite nicely. A quick check with an antenna analyser (3.5-30MHz) revealed that the highest mismatch was at 6-7MHz, where the s.w.r. was around 2:1. This is not as per the manufacturers plot but it was quite acceptable and it must vary with the particular circumstances of every installation. The antenna can in fact be used without a matching unit, though we used an Alinco DX-70TH and the EDX-1 for the operating sessions.

"We have operated from this site on two previous occasions using a 3.5/7MHz dipole on this occasion we operated on the 7, 10 and 14MHz bands. The antenna tuned easily on all bands, in any part of the band plan, and we achieved the best results yet from that site that we have ever done, including working a 'VK' on 100W at each end, in the gaps between particularly loud and (aggressive) contest operators. We did not get a single bad report. It occurs to me that this type of antenna is ideal for the man who has this space spare, wants to work on all bands, or to listen on any h.f. band, and does not want/cannot erect a more directional array."

Leicester show

I'm writing this column, just after returning from the Leicester show, where I had the pleasure of meeting many old and new friends. Just across the way from our stand was the stand of **G1MFG** selling 1.2 and 2.4GHz ATV transmitters and receivers. I was so taken with these single board units, that several of them 'followed me home'. But more of them later in an 'Electronics-in-Action' column. But for those of you with web access, you'll find, at **www.g1mfg.com** more information about availability and prices.

My main problem that has arisen from this weekend, is finding some design data to make myself some 'Bow Tie' antennas, which were recommended by **Giles G1MFG** the stallholder. I know the general shape of the antenna as shown in my illustration of **Fig. 1**. But what I cannot find, other than in a 1982 publication called *The UHF-Compendium*, are some more detailed and up-to-date plans for it.

I Need Help

Its' not often that I'm reduced to this, but I have to admit that I need help on this one for myself. It would appear that for once my library has proved to be almost without reference. Can you tell me where I can find the information to build Bow Tie antennas for the 1.2 and 2.4GHz bands. I have some information that will allow me to experiment on 1.2GHz, but it's the design data for the 2.4GHz band that I could use most. Help!

Well that's about all the space I have for this issue. And as it's my last AiA column for this year, I'll wish you all a very merry Christmas and a happy New Year.

Take care - I see you later.

Tex

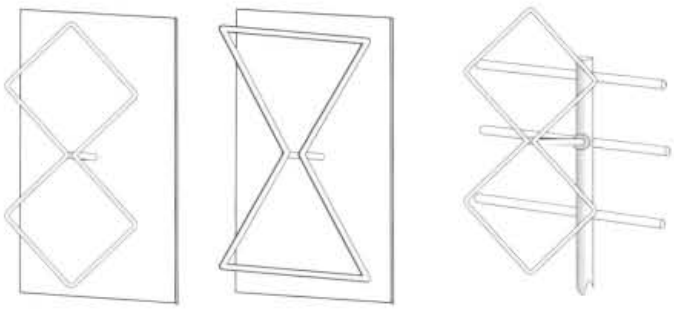


Fig. 1: Are these all variations of the same antenna, but known by a variety of names (including 'Bow Tie')? Do you have the design data for any of the antennas shown here, but for the 1.2 and 2.4GHz band? Do you know where to find it? If so, Tex needs your help!

Books For Consideration

As this is my last AiA before Ch opportunity to present some bo *Vol 6* from the American Radio articles, I have to say I'm impre

As with many books from the ARRL, most of the authors are American, but two names that *PW* readers will recognise are: **Richard Marris G2BZQ**, who describes a ferrite rod antenna design for 'Top-band', and **Peter Dodd G3LDO**, who presents an h.f. skeleton slot antenna for 10-28MHz. The callsign of **Les Moxon G6XN** appears in an antenna design that has much to offer. Each of the eleven sections includes between one (Antenna Modelling) and six new articles (most have four or five articles).

With over 240 pages, the book is broken down into sections, these being: '10 Meter (*sic*) Antennas', 40, 80 and 160 Meter (*sic*) Antennas', Antenna Modelling, "Measurements and Computations', Multi-band Antennas', Propagation And Ground Effect', 'Quad Antennas', Special Antennas', 'Towers and Practical Tips', Tuners And Transmission Lines', Vertical Antennas' with the final 'chapter' titled 'VHF/UHF Antenna'.

Electronic Models

There's a CD-ROM accompanying the new *Antenna Compendium Vol 6* on which may be found the electronic models of most of the antennas to be found within its pages. There are other files in '.PDF', the 'portable document format' for which there are free 'readers available from Adobe or on many front-cover mounted CD-ROMs.

Many of the computer models of the various antennas are in the EZNEC format. (a 'shareware' antenna element analyser). So, if you do not have a copy of this program you should try and get hold of it now to increase the usefulness of this CD-ROM and its information. *Antenna Compendium Vol 6* is an excellent choice for your library shelf!

Good Book

In the course of attending several shows, throughout the years, I'm often asked what's a good book to start with understanding antennas? My usual answer is that I feel there isn't one book that suits all. However, *W1FB's Antenna Notebook* is one that comes

r stmas, and as I haven't looked at any books for some time, I'll take this
k as for your stocking. I'll start with the recently published *Antenna Compendium*
Relay League (ARRL). With over forty new previously unpublished antenna related
sed with the new articles.

close to this ideal, and should be on everyone's bookshelf, especially beginners. With over 120 pages of information and note by the late **Doug DeMaw W1FB**, there's going to be something in this book whatever your level of knowledge.

As with most of Doug's books, *W1FB's Antenna Notebook* is written in a 'chatty'

notebook style with nine 'chapters dealing with topics such as: 'Some Fundamental Antenna Data', 'Building And Using Dipole Antennas', ' Single Wire Antennas', High Performance Wire Antennas', Limited Space - And Invisible Antennas' Matching Techniques', Special Receiving Antennas' and the final chapter of 'Simple Antenna Measurements'.

Looking at one chapter closer, I found that chapter two: 'Building And Using Dipoles' has discussions and notes about the performance, dimensions, single and multi-band versions, multiple-element dipoles trapped and dipole 'look-alikes' described in this seemingly short chapter. With illustrations used to simplify an explanation.This publication may be considered a book for everyone!

Right Antenna

The second book I have for you is called *The Right Antenna*. This book is sub-titled 'How To Select And Install Antennas For Entertainment & Communications Devices' and, it lives up to the subtitle very well. Although this is another American book, it contains many many pages of ideas and good sense for anyone with a wide ranging interest in antennas of all descriptions.

Each of the 12 'chapters' covers different aspects of antennas, from a little light theory to very practical fitting instructions. There are sections on TV, Satellite (dishes mainly) broadcast f.m., CB, shortwave and v.h.f./u.h.f. antennas. The book is copiously illustrated, as are many similar books, making the information contained within it easy to understand and digest. Excellent information about antennas and their installation, suitable for all levels of knowledge!

There's a useful glossary at the end of *The Right Antenna* which is a useful addition to anyone struggling to try and remember what the various terms mean. This publication is a useful starter, though it is aimed more at the person looking for more general information about antennas and may not be for those looking for particular installations. But, overall it's a good book.

Successful Partnership

From the successful partnership of **William Orr W6SAI** and **Stuart Cowan W2LX** there have been many books on the subject of antennas. The 'just too big to be pocket sized' *The Radio Amateur Antenna Handbook* is an excellent starting point, because within the 180 pages you'll find ten chapters covering most topics that will be of interest.

Topics dealt with in *The Radio Amateur Antenna Handbook* are: An Introduction To DX Antennas That Work, Antenna Location As A Factor Of Performance, Antenna Performance And The Famous SWR Meter, Antenna Towers And Rotors, All About Baluns, Popular Vertical Antennas, Quads Delta Quads And Other Loop Antennas, Horizontal And Sloping Wire Antennas, HF Beam Antennas and VHF Beam Antennas You Can Build.

Thoroughly practical (although of course the 'Tower and lots of real estate' approach reflects its American origins) the authors in their usual 'no nonsense and let's get on with it' style take the reader step-by-step through the topics discussed. *The Radio Amateur Antenna Handbook* a sensible volume, it does not overwhelm the reader but instead it's more likely to fire you with enthusiasm.

Antenna Compendium Vol 6.	£18.50
The Right Antenna.	£16.95
W1FB's Antenna Notebook.	£8.00
The Radio Amateur Antenna Handbook.	£8.95
Cubical Quad Antennas.	£8.95
Vertical Antennas.	£8.95
The Beam Antenna Handbook.	£8.95
25 Simple Amateur Band Aerials.	£1.95
25 Simple Indoor And Window Aerials.	£1.75
25 Simple Tropical And Medium Wave Band Aerials.	£1.75
Experimental Antenna Topics.	£3.50

Other Books

Other books from W6SAI and W2LX include: *Cubical Quad Antennas*, *Vertical Antennas* and *The Beam Antenna Handbook*. With 12 chapters, covered in over 260 pages, in *The Beam Antenna Handbook* there's a great deal of information, ranging from theory to actual antennas for h.f. to u.h.f. If your band of interest is outside this range of antennas, then there's a section on how to scale antenna designs for other bands.

If you prefer to contemplate a quad loop style of antenna, then *Cubical Quad Antennas* is the book to consider. With ten chapters, dealing with all aspects of quad antennas from the history to tuning and adjusting multi-band antennas, there's sure to something to fire your interest in the 110plus pages of this book from Orr and Cowan.

If you prefer the vertical style of antennas, then W6SAI and W2LX have this viewpoint covered as well in their book *Vertical Antennas*. There are slightly fewer chapters (eight in all) in this book on vertical antennas, but that does not mean it's short on ideas. Information covers from theory to practical designs for h.f. to v.h.f. There are designs for vertical 'beaming' antennas to designs for multi-band use in space limited locations. The final chapter is how to improve the working of your antenna. Now that's something we could all make use of!

Value For Money

At the lower end of the price bracket, but nonetheless good value for money is the Babani range of antenna books. Three books in the '25 Simple' range are as their names suggest simple designs in the bands as shown. The books are titled *25 Simple Amateur Band Aerials*, *25 Simple Indoor And Window Aerials* and *25 Simple Tropical And Medium Wave Band Aerials*. What more can I say? They're all interesting.

Now to a Babani book I've read several times and mentioned before, but still find interesting. *Experimental Antenna Topics* is not a mainstream book at all, but is one for those looking for the unusual antenna to 'play' with. The antennas and ideas presented in H. C. Wright's book are rather spartan but thought provoking. From an Abe Lincoln antenna that could be made from an old baked bean tin to a vertical antenna surrounded by water, Cold and Crossed field antenna designs are also included in the 28 short chapters.

Well those are just a few of the many books that we have available from our Book Service department. There's bound to be something to interest you over the festive season and give you something to ponder over as the surfeit of turkey digests when you read them at Christmas!

Tex

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Website:	www.shortwave.co.uk

The Albrecht AE 485 S 28MHz Single Band Multi-mode Transceiver

Rob Mannion G3XFD tries the Albrecht AE 485 S 28MHz Single Band Multi-mode Transceiver

Now that the law has changed regarding the import of 28MHz single band transceivers Rob Mannion G3XFD has tried a 'budget priced' transceiver. Read on to see what he discovered...

Personally speaking I'm delighted that the 'powers that be' have at last seen sense regarding the importing and use of single band 28MHz by removing the restrictions. In my opinion, the arguments that such transceivers (readily available to illegal operators) could be easily modified for use on 27MHz was fatuous indeed!

Any transceiver can be easily modified for use on 27MHz, although equipment already on nearby frequencies is of course easier to modify. But when I'm often told that illegal operators often boast of using 'top brand' 100W Amateur Radio transceivers **off the Amateur bands** - why do they need to bother to convert a low power transceiver?

Additionally, there's enough multi-mode 27MHz equipment in circulation to provide what the illegal operator requires! However, whatever the reasons for the change of Government Departmental minds - I'm pleased they've done so.

On an even more controversial note - perhaps we can now look forward to getting the opportunity of legally buying and owning 27MHz multi-mode transceivers once again so we can convert them for 28MHz. In that way we can assist in taking them off the 'black market' which continues to thrive. (**Radiocommunications Agency please note - I won't give**

Rob Mannion G3XFD has been the Editor of *PW* for nearly 11 years. He's a keen 'portable' operator on both the c.w. and v.h.f. bands

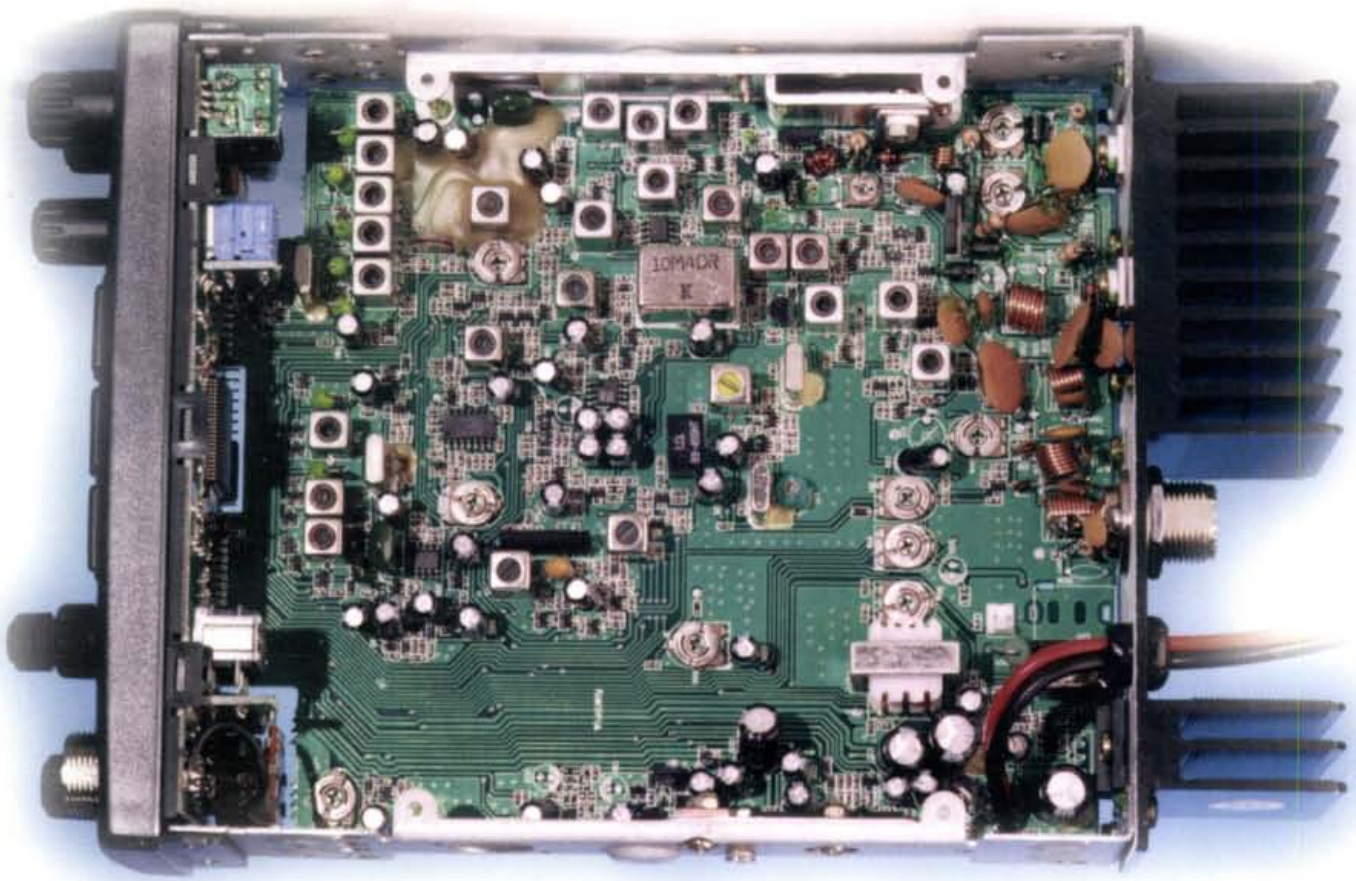

Fig. 1: Internal view of the AE 485 S, showing the neat and well constructed main p.c.b. (see text).

Ten metre mobile operation on a budget - the Abrecht AE 484 S transceiver.

up on this matter!).

Campaigning over now! Back to the matter in hand - trying out the Albrecht AE 485 S.

Originally Aimed At CB

Since the regulations were changed here in the UK, 'multi-mode' CB equipment originally aimed at the 27MHz operator has suddenly found a new lease of life. I don't know how many nations within the European Union (EU) allow amplitude modulation (a.m.) and single sideband (s.s.b.) equipment, but judging by the speed at which multi-mode transceivers were made available - the stock together with the facility to change frequency (on a mass production scale) were ready and waiting!

Of course, one look at the Albrecht 485 S immediately lets you know that **it is a CB transceiver** modified to work on the Amateur Radio 28 to 29.7MHz band. And, providing as it does, a.m., s.s.b. and narrow band frequency modulation (n.b.f.m.) one of these transceivers could prove very useful as a budget 'starter' rig and even as a driver for a transverter for other bands including 70MHz (one job I've got in mind).

Although no circuit is provided with the very simple manual - the transceiver appears to be a double conversion phase locked loop step tuned (note it's **step tuned**) design with ceramic filters. Audio output is 3W into 8Ω. (see Manufacturer's specification).

Good heat-sinking (like this) is essential for mobile use.

The manufacturer's specifications state that the transmitter output as 6W on a.m., 25W peak envelope power (p.e.p.) on s.s.b. and 25W on n.b.f.m. Not high power of course, but useful just the same. So, how did I get on with the rig on the air? To answer, I'll describe some of the features and explain how I enjoyed using the rig on holiday!

On The Air

As is often the case when I'm hoping to get good DX conditions during the loan period of a review - I was out of luck for the 'juicy' QSOs. However, despite the rather flat conditions on 'Ten' I had many inter-European QSOs and several really good West Coast USA successes to report.

The transceiver went with me to Ireland on holiday and it proved exceptionally simple to set up and use. All my QSOs from Ireland were using a 28MHz whip antenna, and took place (mostly) from beaches, or very near to the sea in Counties Wexford and Waterford.

In my car I had an empty slot the size of an older car radio in the dashboard and the Albrecht fitted snugly in there. Very convenient!

As the above photograph shows, the front panel and main display is clean and uncluttered. Of real interest to the Amateur Radio operator is the concentrically operated r.f. gain and microphone gain controls.

The main 'stepper' type tuning control is smaller than is found on 'standard' design Amateur Radio equipment and is located on the far right under the Squelch control. Immediately to its left is the 'Clarifier' control which provides

Single Band 28MHz Equipment: Important changes regarding the importation and use of single band 28MHz Amateur Radio equipment came into force on 1st May 2000. The announcement (see page 8 in the July 2000 issue of *PW*) brought the welcome news that Radio Amateurs in the United Kingdom can now legally own and operate '10 metre' only transceivers.

the necessary 'swing' of ±1kHz to 'fill in' the synthesiser stepping 'gaps'. The 'stepping' can be set to either 1, 10 or 100kHz

The 'scan' feature is simple and searches for active channels (it's so simple I used it quite often). The switchable blanker is only effective on ignition type noises - not much use on my diesel car but it proved effective in reducing noise from passing motorbikes and petrol powered vehicles).

There are five memories available (although I didn't use them they are extremely simple to use). Equipped with a tone-burst (1750kHz) and the transceiver has the ability to work via the n.b.f.m. repeaters on the band (but I didn't hear any during my holiday).

In use the transceiver proved to be extremely sensitive and reasonably selective. I can say this because despite a flurry of c.w. activity around (and actually on!) the International Beacon Frequency Project of 28.250MHz I was able to copy the various beacons despite the QRM - quite good bearing in mind that this transceiver is not aimed at the c.w. operator.

Incidentally, if I owned one of these rigs I'd be tempted to modify it to provide c.w. It wouldn't be difficult and the 'Clarifier' (in reality it's an RIT control), would allow the incoming c.w. beat note to be adjusted.

Manufacturer's Specifications

General

Frequency Range	28.000 to 29.699MHz
Frequency Control	Phase Lock Loop (PLL) synthesiser
Frequency Stability	±400Hz
Frequency Tolerance	0.003%
Emission Mode	A3E (a.m.), F3E (n.b.f.m.), J3E (s.s.b.)
Microphone	Plug in electret; push-to-talk
Input Voltage	13.8V d.c. nominal, 16V max, 12V min
Size (WDH)	2 3/64 x 6 1/2 x 7 41/64in
Weight	2.65lbs (1.2kg)
Antenna Connector	SO-239 50Ω unbalanced
Speaker	8Ω, 3W

Transmitter

Power Output	a.m. 6W, n.b.f.m. 25W, s.s.b. 25W p.e.p.
Spurious Emission	65dB or better
Current Drain No Modulation	a.m. <3.5A n.b.f.m. <6A s.s.b. <1A
Current Drain at Max Power	a.m. <3.5A n.b.f.m. <6A s.s.b. <6A
Modulation Freq. Response (1kHz, 0dB Reference)	Lower, at 450Hz, a.m. -63B, s.s.b. -6dB Upper, at 2.5kHz, a.m. -6dB, s.s.b. -6dB
Microphone Sensitivity	a.m.4mV for 50% mod. n.b.f.m. 4mV for 1kHz deviation s.s.b. 4mV for 10W p.e.p.

Receiver

Max Sensitivity for 6dB S/N	a.m. 0.5µV, n.b.f.m./s.s.b. 0.25µV
Sensitivity for 10dB S/N	a.m 0.5µV, n.b.f.m./s.s.b. 0.25µV
Overload Audio	
Fidelity at 6dB Down	450Hz-2100Hz
Adjust Channel Selectivity	a.m./n.b.f.m. 60dB, s.s.b. 70dB
Image Rejection	Typically better than 90dB
IF Rejection	70dB or better
Max Audio Output Power	2.5W
Squelch Range	Adjustable from 0.5µV to 1mV
Receiver Clarifier Range	±1kHz variable
Dynamic Range	65dB (s.s.b.)

Fig. 2: The transceiver is supplied with an electet insert microphone rather than the more common moving coil type often found on CB radio equipment.

Using a modified Nevada CB antenna (shortened to resonate on 28MHz) I found no difficulty in working all over Europe during my holiday in Ireland. Audio quality is reasonable - and it would have been better to use an external speaker in my car as the speaker aperture was screened. Audio output was more than adequate for mobile use and it could have coped with a much noisier vehicle.

Transmitted audio quality reports, received from other stations were particularly pleasing. The majority of other stations said the 'communications' quality was particularly effective. Several friends who know (and have known me for many years) said that they recognised my voice immediately when they heard my transmissions on 28MHz. I put this down to the sensitive electret microphone - and the impressive results have made me consider one for my Alinco DX-70 transceivers!

In My Car?

So...would I buy an Albrecht 485 S for my car if looking for a budget-priced rig? In answer, I would say "Yes". The transceiver, and any of the many similar re-tuned CB transceivers will provide a good value-for-money rig for anyone on a tight budget.

And (again) "Yes", it is obviously a CB transceiver retuned to 28MHz - but at the same time performance isn't bad at all bearing in mind the price. (The CB fratenity often benefit from really large scale 'mass production' in this way). The only reservations I have involve the limited tuning increments and the obvious 'switchy' feel of the tuning although the controls and basic operation are delightfully simple.

An excellent 'starter' rig in my opinion for budget mobile use (possible modification for 50MHz perhaps?).

Product

The Albrecht AE 485 S 28MHz multi-mode transceiver.

Pros & Cons

Pros: *Good value for money rig, clear and uncluttered display and delightfully simple operation.*

Cons: *Limited tuning increments and 'switchy' feel of the tuning.*

My thanks go to the Shortwave Shop of 18 Fairmile Road, Christchurch, Dorset BH23 2LJ. Tel/FAX: (01202) 490099 *for the loan of the AE 485 S*

Summary

The display is excellent and clear and the rig is well made and I'm left wondering just what sort of interest could develop if the (I assume the transceiver is made in Taiwan) manufacturers re-worked the transceiver for - let's say - 7MHz with c.w. replacing the n.b.f.m. mode. Now that would be even more interesting!

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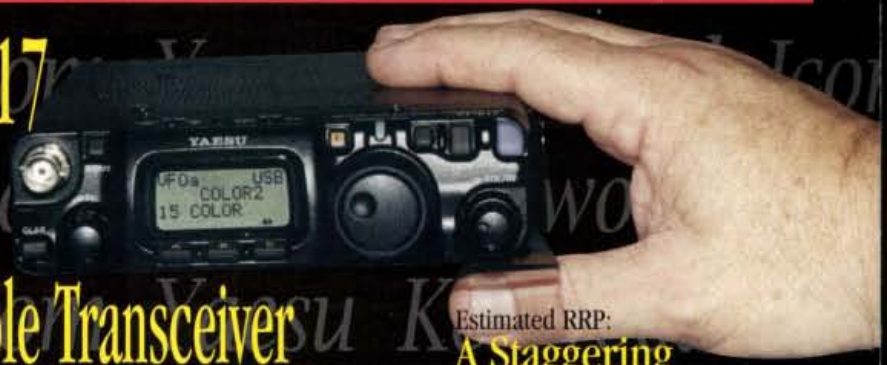

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Power Output:	5 Watts SSB/CW/FM with 13.8V External DC: 1.5W AM Carrier 2.5 watts SSB/CW/FM with 9.6V NiCad or 8 "AA" batteries (AM: 0.7W)	Case Size: Weight:	5.31"x1.5"x6.5" (WHD) 2.6lb (with alkaline batteries, aerial but without microphone).

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WEATHER EFFECTS ON LF PROP

Robert Connolly GI7IVX has been studying the possibility of weather effects on skywave low frequency propagation. Robert's article poses some interesting questions regarding day-to-day effects from the weather on frequencies lower than v.h.f.

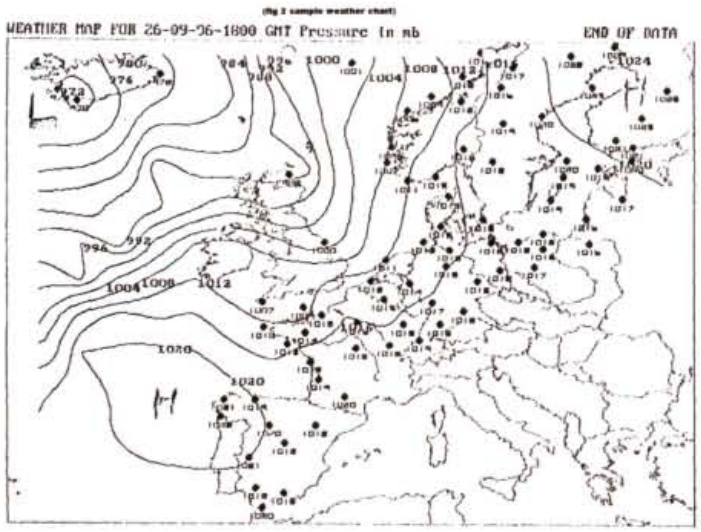
For several years I've been an ardent listener of Non Directional Beacons (NDBs). And a few years ago I became aware of the probability of a link between the prevailing weather conditions and the skywave reception which occurred after dark.

However, at that stage I must admit I wasn't a propagation expert, especially with the lower frequencies.

Two events occurred in 1996 which made me decide to have a much closer look at my theory. Firstly, several class 'A' Radio Amateurs mentioned that weather has no effect on the h.f. or l.f. bands - this made me think that perhaps I was wrong.

However, during the late Spring of 1996 other class 'A' Amateurs mentioned in letters to various publications that they thought that there was a possible weather effect on h.f. frequencies. This was the main event which made me decide to try to prove or disprove my theory.

So, that's how I began a very steep learning curve on propagation. I believe this is the first study into this possible weather effect on skywave propagation at the frequencies below 300kHz.



● Fig. 2: Example of a weather chart as provided by the decoding system used by GI7IVX (see text).

Looking At Fundamentals

As part of my steep learning curve I looked at the fundamentals of propagation, its various types and the make up of the atmosphere. There was much to learn!

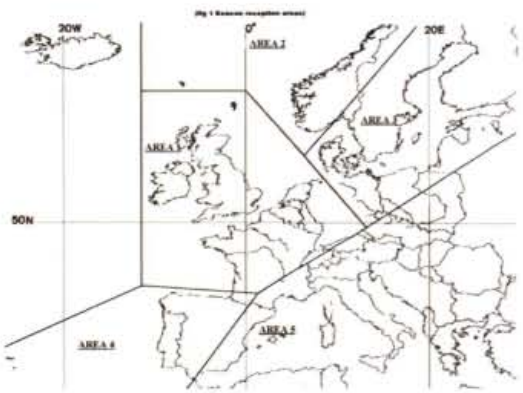
I found of course that it's already known that there are various layers or regions in the atmosphere - D, E and F respectively.

It's also known that electron production occurs only during daylight within these layers and concentration can fall between ten and 100 during darkness resulting in the D layer disappearing.

The E layer also gives the impression of disappearance at night but can still reflect low frequency signals during darkness. However, these signals can also pass through the E layer at night and be reflected by the F layer.

From my research I've learned that when a warm air mass (such as a high pressure system) meets a cooler air mass (such as a lower pressure system) it must, as a result of the first law of thermodynamics, expand and cool.

In doing so the high pressure air mass begins to cool without any heat exchange with its surroundings but by vertical convection in the atmosphere. This causes a temperature inversion which, in turn, eases the radio signal's path to the F layer during darkness.



● Fig. 1: For his research Robert GI7IVX began by dividing Europe into five areas. Basically these were: Area 1 British Isles, Area 2 Norway, Area 3 Baltic, Area 4 Spain, Area 5 Mediterranean (see text).

Regular Signals

For the study I decided that I would need a regular supply of signals from all over Europe and these signals must be of constant output and continuous transmission in order to reduce variables. This meant that I couldn't use received Amateur Radio transmissions due to them not meeting these parameters.

With this in mind, I decided to use the Marine Non Directional Beacons (MNDs) as a receive source. I had an extensive database of these beacons which I had received over previous years and I could easily divide Europe into sectors with a total number of receivable beacons for each sector to be used as a base line.

I did was done by dividing Europe into five areas. Basically these were: **Area 1 UK, Area 2 Norway, Area 3 Baltic, Area 4 Spain, Area 5 Mediterranean** (**Fig. 1**).

Weather Data

I also required a accurate system of producing weather data, particularly pressure readings which I believed were the 'magic' factor. After discounting 'Volmet' reports, due to their lack of inclusion of pressure reports, I opted for a comprehensive computer synop decoder system, namely Skyview Synop.

With Skyview I could receive and decode weather information transmitted from Bracknell or Offenbach before each listening session and print out the pressure charts.

The decoding system would produce the weather charts for me by drawing the isobars and plotting the reported

AGATION?

Date	Area 1(56 NDB) QNH	Rcvd.	Area 2(21 NDB) QNH	Rcvd.	Area 3(31 NDB) QNH	Rcvd.	Area 4(21 NDB) QNH	Rcvd.	Area 5(14 NDB) QNH	Rcvd.	High Pressure Area
7/7/96	1012+	68	1003+	52	1008+	32	1020+	48	1008-	7	W. Spain
13/7/96	1015+	79	1000-	38	1018+	39	1020-	76	1020+	36	S. UK/Spain/N. Med
25/7/96	1025-	89	1016=	52	1012-	35	1012-	67	1014+	14	S. UK
30/7/96	1017-	52	1010+	33	1012+	32	1018+	38	1016+	21	Germany/Nw Spain
4/8/96	1014-	52	1024-	33	1024-	42	1014-	5	1012-	7	Baltic/Norway
11/8/96	1012+	62	1017+	43	1015+	35	1019-	38	1014+	14	W.Spain
21/8/96	1010=	55	1017-	24	1014-	35	####	14	1014-	0	Iceland
26/8/96	1016+	68	1016+	38	1016+	13	1017+	71	1009-	14	W. Ireland/W.Spain
31/8/96	1030+	73	1019+	48	1017+	13	1020-	48	1014-	14	W. Ireland
5/9/96	1022+	64	1028-	76	1018-	55	1017+	19	1018+	14	N.Sea/Norway
10/9/96	1022-	66	1014-	57	1005-	26	1013+	43	1009+	28	W. Ireland
15/9/96	1023+	64	1025+	57	1019+	58	1020+	19	1019+	21	UK/Norway/Baltic
22/9/96	1015-	53	1018-	38	1019-	39	1017=	14	1007+	14	Norway/Baltic
26/9/96	998-	55	1009-	57	1019+	42	1022=	29	1018+	14	W.Spain/N.Baltic
3/10/96	1013+	55	997+	52	1011+	16	1025+	43	1022=	7	W.Spain
13/10/96	996+	55	1018+	52	1019+	42	996+	43	1004-	7	N. Sweden
20/10/96	1005+	53	1010-	38	1010+	39	1026+	48	1024=	21	Spain
27/10/96	1000+	61	999-	43	1018-	42	1024-	62	1022=	21	Spain
7/11/96	1015+	62	991+	57	996+	26	1029+	90	1027+	14	N.W. Spain
17/11/96	1012-	53	1003+	33	1010-	26	1020-	43	1018-	7	N.W.Spain
26/11/96	1017-	62	1020+	43	1017+	32	1024+	51	1021+	14	W.Spain/Norway
8/12/96	1023=	68	1012+	43	1025-	45	1021+	51	1016=	28	E. Baltic
23/12/96	1016-	59	1020-	29	1020+	29	995-	29	1000-	7	Norwegian Sea
8/2/97	1020-	64	1004-	29	1009-	13	1029+	48	1028+	28	S.France
16/2/97	999+	75	1014-	48	1028+	68	1028+	71	1024+	50	Spain/Baltic
23/2/97	989-	59	969-	43	1004-	23	1021-	67	1022-	28	Spain Med.
8/3/97	1033-	59	1024-	62	1033+	48	1024+	52	1026+	36	N.Sea
15/3/97	1025+	61	1014+	38	1008+	29	1026+	67	1024+	21	France
30/3/97	1024=	93	995+	52	1008-	35	1017-	29	1015=	28	UK
8/4/97	1024+	59	1018-	62	1031-	42	1016+	29	1014=	21	N.Europe

● Table 1: When #### appears - this is included to show a barometric pressure for that area was not available, all Rcvd figures are given as percentages, (see text).

pressure at various stations (**Fig. 2**). It would also give me the trend and other weather details if I wished, and the facility to keep the data on computer.

Listening Sessions

With the system in place I decided to keep my listening sessions on a regular basis at a regular time of around 2300UTC and run the study over at least six months from the beginning of July to the end of December. This would cover summer and winter conditions and again keep possible variables to a minimum.

Log sheets showed details of the various sectors, maximum number of receivable signals, dates, time of weather reports. They also included pressure reports for each sector, pressure trend, location of high pressure areas, and the number of beacons received. These, shown as a percentage of the possible total, were drawn up and put on a spreadsheet.

I made every effort to eliminate variables which might have effected the end result. Solar data was obtained on a monthly basis for several months until it became apparent that this was not an influencing factor in the results that I was obtaining.

The receiver, a NRD 525, and antenna, a Datong AD370 active, were also kept as a constant. This meant that the only variations in reception should come from weather effects.

Theory Watertight

It rapidly became very obvious during the early part of the study that my theory was beginning to hold water - it was watertight. And this was very apparent on several occasions when a high pressure area was rapidly building up within a sector.

The number of beacon signals received from the sector effected by a 'high' showed a steep rise. Conversely when a low pressure system was entering a particular sector there was a decrease in the number of beacon signals being received from it.

For example in the Spanish sector, which had a total of 21 receivable beacons, on the 13th July 1996 a high pressure area was rapidly building covering the Iberian Peninsula a total of 76% of possible beacons were received. (This was compared with the norm of about 15% during normal conditions).

A similar result was obtained on the 7th November in that sector during another high pressure build up, resulting in 90% of possible beacons being received. Solar data for these dates produced no activity which could have effected the result. The other sectors showed similar results when high pressure areas were building in them.

Spectacular Results

Spectacular results were obtained during high pressure build-ups. However, it's worth noting that when these weather systems were established there was still some improvement in reception but not as good as during the pressure system build up.

The results had led me to believe that the high pressure build-ups were causing a temperature inversion enabling the transmitted signals to be reflected from the F layer. Also the fact that enhancement was obvious both during summer and winter would indicate that seasonal variations are not involved (See **Table 1**).

Note: Table 1 below shows the results over six months; but please note that where #### appears, it indicates that a pressure for that area was not available.

A Definite Link?

As a result of my initial study I now feel that there's definite link between the weather effects and skywave propagation within the low frequency band. We know that frequencies above 26MHz are subject to weather effects and I feel that there's now proof that the l.f. bands are subject to weather effects.

I also feel that this could have a similar effect on the old 73kHz and the 136kHz Amateur Radio allocation, and possibly even on the h.f. bands. If bands above and below are subject to weather effects, I feel that there is no reason why the h.f. bands should be different at night-time or possibly even during daylight.

Of course, I have no doubt that this evidence will arouse a lot of controversy, however I believe that I have tackled my theory from a completely new angle, which eliminated most of the possible variables in order to obtain an accurate result.

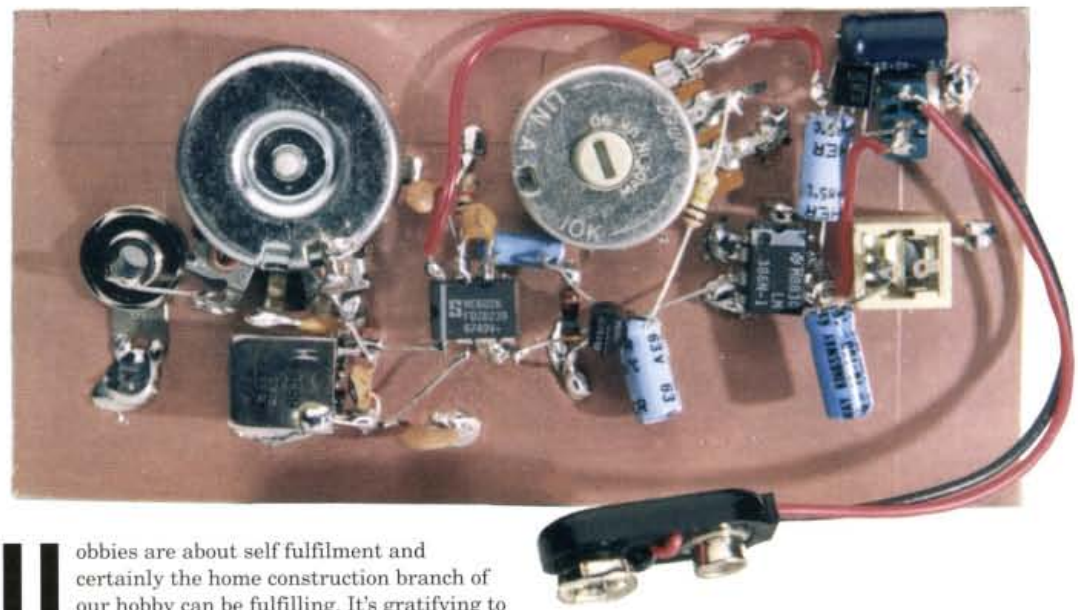
I'm continuing my research on this and as the solar cycle begins to rise a clearer picture may emerge. A more detailed report, including the weather charts for the dates concerned is available.

If you are interested ... please contact me for details. And I'll be very pleased if you could join me in researching this fascinating area of our branch of science. PW

Carrying On The Practical Way

The Rev. George Dobbs G3RJV tells us he's 'Describing the minimum' this month - by presenting a 'minimalist' receiver for his enthusiastic followers. But first there's the usual appropriate quotation!

"When true simplicity is gain'd
To bow and to bend we shan't be asham'd,"
From *Simple Gifts* :
A Shaker Hymn



● This month's project - minimum work for the evening!

Hobbies are about self fulfilment and certainly the home construction branch of our hobby can be fulfilling. It's gratifying to go to bed knowing that you have completed a piece of construction ... and better still if it works!

By their very nature, many Amateur Radio construction projects take many evenings or weekends to complete. The gratification comes from little milestones along the way to completion.

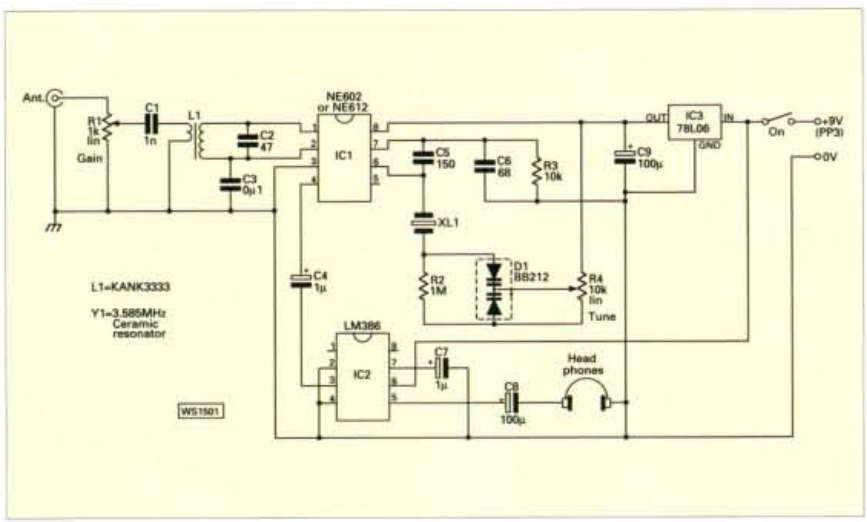
Over the years of contributing to Amateur Radio publications, I have found that many readers enjoy simple little projects which can be built in an evening or a weekend. To be able to plug in the soldering iron, gather the parts and then complete the whole project in one session has a certain appeal.

It may not produce complex, sophisticated, projects but it does wonders for the soul. What a marvellous hobby!

Therefore I enjoy being able to offer 'one evening projects' in the hope that readers will enjoy such satisfaction. It's easy to assume that these are beginner's projects but I know many seasoned Radio Amateurs who simply enjoy settling down for an evening of construction with an end product.

So, this month I offer another little direct conversion (d.c.) receiver, which can quickly be put together and made to work. I have attempted to use the minimum of components that will allow reasonable results. (Although I will suggest additions which may improve performance).

This month the receiver I'm describing is based on a version of the Sudden Receiver suggested by **VK5BA**. Enjoy the project!



● Fig. 1: Circuit of the basic 'Minimalist' receiver - G3RJV also suggests improvements (see text).

Complete Circuit

The complete circuit of the receiver is shown in **Fig. 1**. The chosen band is 3.5MHz - a popular band for a little monitor receiver. It's yet another version of the NE602 - LM386 combination.

Although the NE602 is being phased out of production, the current NE612 chip is a direct replacement in this circuit. The pin connections are the same for both devices.

The NE602 acts as mixer and local oscillator (l.o.) in this direct conversion receiver and requires a 6V supply which is provided by a 78L06 three terminal regulator chip.

Following the minimalist approach the front end has a single tuned circuit provided by a TOKO KANK3333 inductor. The simple input attenuator, a 1kΩ linear potentiometer, is the only gain control for the receiver.

The tuned input goes to the balanced input across pins 1 and 2 of the NE602. Since the one tuned circuit is all that separates the receiver input from the whole radio spectrum, the connections around the input should be as compact and short as possible to avoid pick-up of

unwanted signals. The oscillator circuit of the NE602 is around pins 6 and 7 and the oscillator circuit uses the capacitive divider feedback principle of the Colpitt's Oscillator.

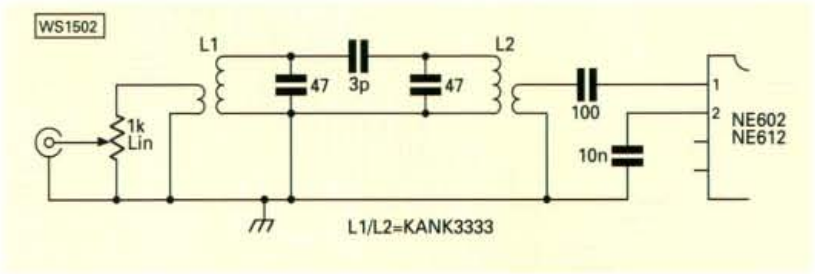
One of the problems of receiver building is finding a suitable high quality variable capacitor. This requirement is avoided in this circuit by the use of a ceramic resonator tuned by a pair of varactor diodes (varicap tuning).

The 1MΩ resistor supplies bias to the upper diode, the voltage control for the tuning being taken from a 10kΩ linear potentiometer fed from the stabilised 6V supply. Using the values for feedback capacitor shown in Fig. 1, my prototype tuned the range 3.535 to 3.602MHz. (Readers may like to experiment with the capacitor values but try to keep the ratio of the values about the same).

The resultant audio output from the mixer is fed via a coupling capacitor to the LM386. This is a versatile little audio amplifier with a low external component count and an internal gain of some 26dB.

As will be shown later, the LM386's gain can be increased to 46dB with an additional capacitor. For those wishing to make the component count even lower, the bypass capacitor at pin 7 could probably be omitted without encountering stability problems.

The output will probably drive a small loudspeaker but is really designed for a pair of low impedance headphones. A pair of portable cassette type headphones worked well on my prototype receiver.



● Fig. 2: Circuit of the improved 'front-end' (see text).

Well - that's the basic receiver. It works well for a circuit with so few parts. Enjoy building the receiver!

Common Weakness

A common weakness of DC receivers is broadcast breakthrough, which is aggravated in this circuit by the use of a single input tuned circuit. And in practice, L1 requires careful tuning to eliminate unwanted signals.

The input attenuator control is **vital to the success** of such a simple receiver. Use the minimum amount of input required to read the desired signals. (It is truly amazing how effective this simple attenuator can be).

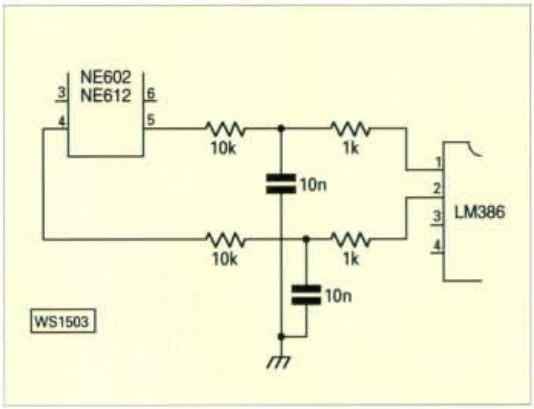
With this design the audio stages are run at full gain all the time to allow the effective use of the input attenuation. I think that when building a simple receiver with modest front-end filtering, using an input attenuator as the sole gain control is a good tactic.

Improvements & Limitations

It's easy to offer a whole set of improvements for such a simple receiver but remember there's a limitation to such improvements. **The receiver is what it is – a simple one evening project.**

You cannot expect to build a Rolls Royce by adding Rolls Royce spares to a Ford (Apologies to Henry!). So I offer a few ideas that readers might like to follow.

The circuit, **Fig. 2,** shows an improved band-pass filter for the input tuning of the receiver. It's a double-tuned band-pass filter with two tuned circuits lightly top coupled.



● Fig. 3: 'Balancing' the audio input can be beneficial (see text).

As with the original single-tuned circuit, TOKO KANK3333 inductors are used but this time with a single-ended input to pin 1. This circuit should give considerable improvement in input filtering but careful adjustment of the cores in L1 and L2 is required for even filter performance over the whole tuning range of the receiver.

The NE602 has a balanced output provided by pins 4 and 5 and the LM386 has a balanced input at pins 1 and 2.

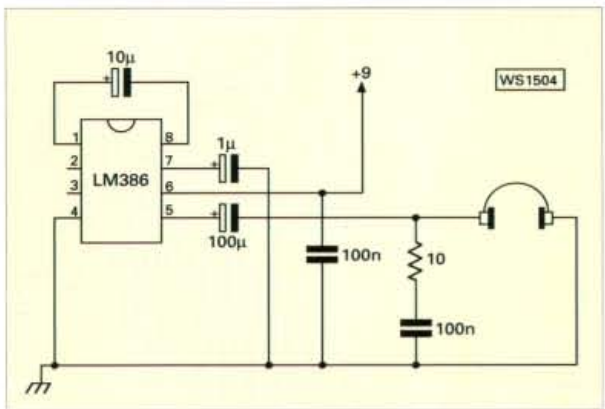
An alternative way of coupling the NE602 to the LM386 using the balanced ports is shown in **Fig. 3**. Although this adds several components, albeit cheap parts, it does provide a better match between the two devices.

Basic Configuration

The basic receiver circuit of Fig. 1 uses the LM386 in its basic configuration. **The overall gain of the receiver is only on the edge of usefulness when used with headphones.**

Usefully, the voltage gain of the LM386 can be increased to some 46dB by the addition of an external capacitor between pins 1 and 8. The circuit to achieve this increase in gain is shown in **Fig. 4**.

Incorporating the increase will probably be enough to make the use of a small loudspeaker worthwhile. However, the increased gain may need increased decoupling of the power supply to the LM386.



● Fig. 4: Circuit to increase the gain of the receiver (see text)

Adding a 100nF capacitor between pin 6 and ground and a small value resistor, let's say 100Ω, in series with the power supply can do this. Mount the capacitor as close to pin 6 as possible.

So .... a little, one evening, project with a few extra suggestions. Have fun! PW

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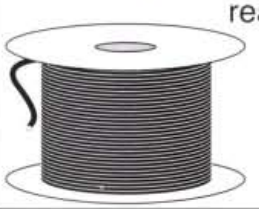

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Alinco DX-70TH h.f. 6m (50MHz) transceiver with mic., mobile bracket, manual, original box, good condition, £389. Tel: N. Lincs (01652) 618658.

AR-88D s.w. comms RX. HRO MX s.w comms RX. Signal gen. (Marconi) 995B/5 a.m./f.m. with manual Oscilloscope (HP) mod 141A with manual. Two boxes assorted valves. Taydor valve tester mod 45C with manual. Anthony Coleman, 174 Rotherwood Avenue, Knightswood, Glasgow G13 2AR. Tel: 0141-950 1647.

ATV collectors item cox R-G-B to PAL coder type 153WS with manual, needs alignment, £50 o.n.o. Tel: (01604) 700979.

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Drake desk mic., very good condition, £35. One pair of Synchro control transformers, 90V (new), made by Vernitron Controls, San-Diego, CA, £5 the pair. Tel: 01771-623654.

Eddystone 680X comms receiver 1955, 15 valve, full working order, lovely original condition, buyer to collect, £195. Stewart M1EVZ, Essex. Tel: (01621) 858043.

Eddystone 888 amateur band RX, £125 o.n.o. Must be collected. Ron, Berks. Tel: (01635) 867444 after 6pm please.

Eddystone 940 receiver, nice appearance, full working order with manual, £140. Larkspur leads and connecting boxes, £5 to £15. Wanted *International Radio Tube Encyclopaedia* by B. Babani. Tel: (01692) 630285.

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Hoka-3 Gold h.f./v.h.f. decoder, all modes, complete with DOS computer, keyboard, 12in colour monitor and manual, will operate from any communications receiver, fully operational, £300 o.n.o. Tel: (01483) 861293.

HRO p.s.u. case with rebuilt unit inside, £10 plus postage. David Busby G4HFL. Tel: (01844) 346274.

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Icom IC-746 h.f. 2/6, a.t.u., c.w./s.s.b. filters, mint, boxed, £950 o.n.o. Swap modern h.f. radio and cash. Wanted Tokyo a.t.u. and rotator and cage. Mick M1KEY, QTHR. Tel: Barnsley (01226) 742971 after 6pm or E-mail: mrhardy@lineone.net

Icom IC-R70 RX, good clean condition, working, £225. Three WWII Multiminor fore runners, £75 each, working, maintained by instrument maker. Revox tape recorder reel-to-reel, working on headphones only. Stanley, Cricklewood, London, Tel: 0208 450 4045.

Kenwood 79E hand-held, ext. RX, as new, £100. Icom 2350H dual-band mobile, ext. RX, £210. Kenwood TH-G71E dual-band handy with case, £140 - all boxed with sales invoices. Bob, NE Wales. Tel: (07833) 993366.

Kenwood 430S, AT230, SP230, 30A p.s.u. All mint with boxes and hand books, £500 o.v.n.o. Icom 71E receiver, boxed, mint. £325. Lowe HF-150, AP150, keypad, Lowe rack, mint, £375. Tel: (01903) 859712.

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Kenwood R-820 receiver, c.w. filters and manual, £300 o.n.o. Mike on 0161-681 3209.

Kenwood Trio h.f. s.s.b. transceiver, 120S in good working order, with manual, books, £250 - no offers. Selling due to health reasons. Tel: (01634) 712270.

Kenwood TS-140S 100W transceiver, £385. 30A p.s.u., £70. Yaesu FRG-100 includes p.s.u., £275. All perfect, all boxed, will consider exchange for a medium format SLR camera outfit. Tel: Southampton 0238-073 7715.

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Kenwood TS-950S/SD workshop service manual, £15. Bremi power supply, 13V 5A, £10 - collect or plus postage. Max G3WMB, QTHR. Tel: 901920) 463564.

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Quad f.m. tuner, quad 22 pre-amp and two Quad II amplifiers, but not valves. Totally original, un-restored, also photocopies of article on re-building Quad II amplifiers, £200 the lot. No offers please. Tel: Buxtow (01298) 73492 evenings.

Racal RA17L receiver, 0.5-30MHz with handbook, some spare valves, good condition, £125 - buyer to collect. Tel: Wirral area 0151-336 4239.

Realistic DX-394 receiver, excellent, very good condition, comes with manual and antenna, must sell, £100 o.n.o. Darren, Herts. Tel: 0208-449 7446.

Silent Key G0BEM: 2m 9144MHz) Yaesu FT-290 Mkl, all-mode, compete with mic., charger and instructions, £99. Black Star 5/100MHz frequency counter, with probe, power lead and instructions, £45. 2m (144MHz) 5/8 mag-mount complete, £7.50, 12V 2A regulated p/s, £2. Sensible offers considered. Several QRP/home-brew books and test gear, items cheap to interested persons. Tel: Havant 0239-248 2539, E-mail: john@fisher1923.freeserve.co.uk

Silent Key Sale G4RGJ: Altron SM30 mast, SX200 scanner, Datong FL3, home-brew p.s.u., home-brew ZX81 RTTY unit, home-brew speech processor, assorted components and circuit boards. Contact G6FRB, QTHR. Tel: Worcester (01905) 421182.

Sony ICF-2001D, boxed, £140. Yaesu FRG-100, keypad, f.m. unit, FRT-7700 a.t.u., boxed, £370. Commtel 215 scanner, £60. Zetagi SWR CB202 and M27 matcher, mint, £35. Maplin, aerial, activator, 325. Tel: Derbys (01298) 78268.

Spectrum analyser Marconi TF2330 (a.f.), Still for sale due to illness, £125. BC221-AF, charts, manual , p/u spare valves, £40. Drake R4-B, MS-4, manual, £260. Drake RV-4C v.f.o., £70. Tel: 0141 562 4571.

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TS-830 h.f., WARC bands, £250 o.n.o. IC-730 h.f. with mic., p.s.u., £180, also WARC bands, both with manuals, Tel: Coventry 0247-672 1930.

TS-830M h.f. transceiver, spare p.a. valves, manual, £270. TenTek Centry 21 c.w. h.f. transceiver, £70. Drake SSR1 h.f. receiver, 0.5-30MHz, £70. TR2300 2m (144MHz) handie, £50 - all plus postage. Terry G4OXD on (01462) 435248 after 6pm.

Two Pioneer powerful hi-fi tuner amplifiers. One 250W r.m.s. per channel, the other 300W per channel, £50 each, both fully working.

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Yaesu FC102 a.t.u., 1.8-29MHz, wire and coax connections, twin meters, 1.200W output, £135. Jaybeam 2m parabeam, 13.7 gain 14-element, £45 o.n.o. Alan G4YYD, Lancs. Tel: 0161-797 7893.

Yaesu FT-1000MP with MD100 desk mic. plus extra filters, original boxes and packing, £1400. FL21002 h.f. amplifier, immaculate condition, plus spare pair S70Bs, £450. Buyer collects or carriage extra. Tel: Sussex (01892) 662931.

Yaesu FT-708R 70cm (430MHz) hand-held with book and box, £70. Yaesu FT-208R 145MHz hand-held with book and box, £70. Trio TR-2200GX 10 channel with book, £100. AKD 7003 70cm (430MHz) with book, £100. PMY 3 channel converted to 70cm (430MHz), £45. Realistic DX-394, .2 to 50MHz, with book and box, £95. Tel: Morecambe (01524) 414820.

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Yaesu FT-780R 70cm (430MHz) all-mode, £190. Yaesu FTV-107R transverter, 50/144/430, 144 board fitted, £125. Yaesu FV-107 external v.f.o., £60. Yaesu SP-107, £25. Trio 9R/59DS receiver, £30 g.w.o. Buyer collects or pays postage. Tel: Waterlooville 0239-226 4587.

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Wanted

7 and 14MHz elements for Yaesu RSE mobile antenna, I have spare 21 and 28MHz elements (unused) available for disposal. Alastair MW0CFL, Rhyl. Tel: (01745) 331464.

12V h.f. transceiver, no need to look mint or pristine as intending going overseas as aid worker, plus wire aerial and a.t.u. wanted. David Ludlow G4ETX, Milton Keynes. Tel: (07947) 488958.

Battery case FBA5 for Yaesu hand-held FT-203R. Tel: Bill on Looe (01503) 263495.

Beginners publications re: the RAE. Any FT-243 crystals working or not for re-cashing project, postage refundable. Exchange/sell Heathkit GC-1U plus SG Brown headphones (grey PVC type), would be interested in FT-290R or sell, £85 inc. P&P. Evans, 85 Hillside Road West, Bungay, Suffolk NR35 1RH.

Can anyone help with a fault I have on a Hewlett Packard 'scope Model HP1741, it appears to be a timebase fault but I have no circuit or info. Roger Luke GW3XJL. Tel: (01656) 733729 or E-mail lukes@btinternet.com

Circuit and/or service sheet for Hacker Sovereign, model RP18, also AR88D S-meter circuit, all costs paid. Redfern GW4RZU, Pembrokeshire. Tel: (01437) 710544.

Circuit diagram and/or components for regenerative receiver using valve IC5 - costs paid. J.R.D. Brown, 17 St Ursula Grove, Pinner, Middlesex HA5 1LN.

Codar CR70A receiver in good working condition, unmodified receiver and cabinet. Cash waiting, callers only please. David Sykes, 30b Bridge Street, Louth, Lincs LN11 0DP.

Creed teleprinter. E-mail: scryfa@hotmail.com or FAX: 0870-055 7640.

CW filter for Trio TS-520. Tel: (01427) 611160.

Eddystone 1650/3 with f.s.k. demodulator or 1837/2 with FSK, must be as new condition, state price. Tel: Dublin 014536452.

Eddystone receiver - any early Eddystone wanted, any condition, please give details to Pete G4IXY, St. Albans on (01727) 839908.

Ezitune tuner to match SEM transmatch. Richard M0BJH on 0151-724 5649.

For cash 1 Standard C510A double-band f.m. transceiver or Standard C188 f.m. transeiver. Tel: (01903) 210485.

Front panel and both case halves for TS-530S or scrap 530S, also need manual or photocopy - your price! Tel: 0115 9175 728.

Howes CTU9 antenna tuner, also decoder for RTTY, c.w., AMTOR, etc., must be fair price for disabled pensioner please. Also wanted Libretto notebook. Frank on (01608) 662488.

KPC3 TNC - looking for a Eprom - any version - if you can help please. Peter M0BKZ. Tel: (01202) 695350.

Manual for Standard C468 70cm (430MHz) hand-held, photocopies accepted, all expenses, etc. paid. Dave on (01273) 566178.

Marconi TF2170 and TF2016 sychronisers for 2016 and 2002 signal generators. Also Eddystone 504, 910, 770S, 960 receivers. Not working but complete ok, will pay cash and collect. Tel/FAX: (01869) 347504.

One 4m transverter. Tel: (01698) 815565 with details including P&P in price please.

RX4 multi-mode receive program for Spectrum +3 software on 3in floppy disk by Technical Software. Steve on (07944) 923473.

Service manual for Racal 1784, 1072 Combi, Collins, good quality working order receiver, also wanted h.f. only solid state. Tel: (01772) 704009.

Tuning cord kit for Hacker Sovereign IV radio. Ray Morgan, Carmarthen. Tel: (01267) 231022.

Valves: 884, 27 CV611, CV647, CV1815, 56 6Q5. Tel: 0287-131 2729.

W9GR DSP III (Quantics) digital signal processing unit (as reviewed in June 1999 *PW* by me!). Model no longer made - have you got one to sell? Contact Rob G3XFD at *PW* office.

Yaesu YM-40 hand mic. for FT-780R part 3090028, Icom HM-10 or Icom basic mic. for IC-290D, Yaesu YM-30 hand mic., FTS-2 or FTS-9 CTCSS units for Yaesu FTC-4610. Richard Perzyna G8ITB, QTHR. Tel: Bromley (01689) 602948.

Exchange

Any receiver worth £340 for my Pontins holiday worth £440. Vouchers for 5 people, 2 adults, 3 kids, Torquay vouchers are transferable to any Pontins camp up to November, phone for more information. D. Holdsworth, 11 Star Farm Close, Bradwell, Great Yarmouth, Norfolk. Tel: (01493) 300955/302440.

Grundig International Satellite short wave radio, model 650, in good condition, lone wave, medium wave, v.h.f., short wave, 1.6-30000MHz. Hugh McCallion, 8 Strathard Close, Coleranie, Co. Londonderry BT51 3ES, Tel: 028703 43793.

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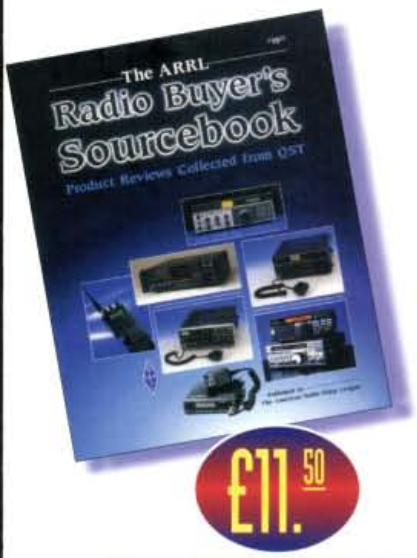


£11.50

As the shorter evenings of the Northern Hemisphere's approaching Autumn brings us indoors that much earlier – the PW Editorial team present a selection of books to keep you occupied. Several of them look as though they might end up as Christmas gifts!

The ARRL Radio Buyer's Sourcebook

This book has a misleading title - it should read *Amateur Radio Buyer's Sourcebook* - because in effect the entire contents are of course dedicated to reviews published in the ARRL's *QST* magazine. Covering h.f., v.h.f. and accessories reviews from manufactures including Alinco, Ameritron, Azden, Collins, Drake, ETO, Heath (Heathkit), Icom, Kenwood, Ten-Tec, Yaesu, the book offers excellent research for anyone looking for opinions on equipment via published reviews.

Interestingly, the *PW* Editorial team found that the *QST* review authors' often ended up with the same opinions as our own reviewers. And bearing in mind just how respected the American reviews are here in Europe - it encourages us very much! An excellent reference source - ideal for anyone looking for a new rig or contemplating a 'Classic' collection.

Highly recommended.

Transistor Radios - A Collector's Encyclopedia & Price Guide

David Lane & Robert Lane

Who would believe just how collectable those old transistor portable have become? You only need to look in the *PW* 'Bargain Basement' adverts to see how enthusiastic those collectors are! And although this book is specifically aimed at the American collector a few of the receivers have been available on this side of the Atlantic.

Famous names such as Philco, Zenith, Motorola and other American manufacturers are well represented. he majority of the illustrations are in black and white - but the relatively small colour section brings the subject to life - especially with the fascinating 'novelty' (mainly radio receivers made to promote products such as soft drinks and even tomato ketchup!) making the European reader realise just what's been missed! An interesting reflection on modern social history - and also something for the collector. Don't break up that old transistor portable - it could be worth something!

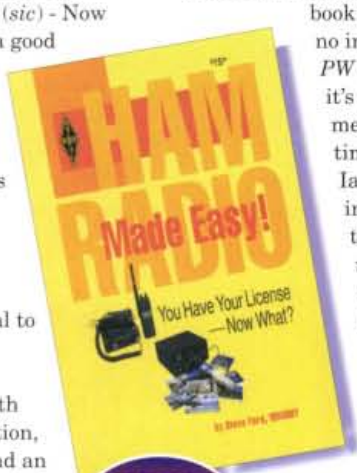
A good reference source.

£19.95

Ham Radio Made Easy

Steve Ford WB8IMY

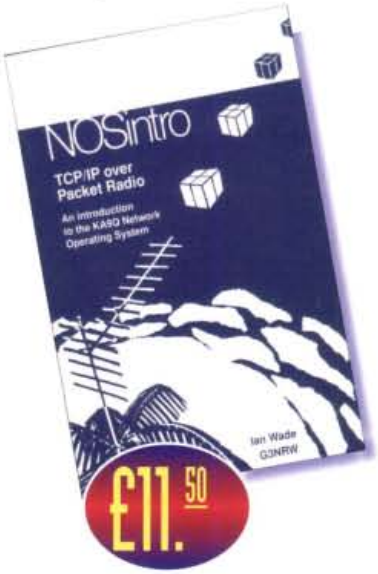
This book is, in reality, aimed specifically at the American Amateur Radio market. however, the subtitle "You have your license (*sic*) - Now What"? provides a good clue as to how useful it could be to any Radio Amateur visiting the USA from this side of the 'pond'. In fact you can regard this little book at being a short form manual to our hobby in the USA.



£11.50

It's packed with information, ideas and an 'overview' of the hobby in the USA. Contest details, rallies, you name it and it;'s there - including American band plans. One aspect of the hobby I'd like to see available is airborne ATV cameras - yes there's even a still photograph from a camera mounted on a model aeroplane.

The ideal companion for an American Amateur Radio holiday.



£11.50

NOSintro TCP/IP Over Packet Radio

Ian Wade G3NRW

Long a popular book for NOSintro enthusiasts this book really needs no introduction to *PW* readers as it's been mentioned man times before. Ian Wade's introduction to the KA9Q network operating system has been a popular publication for some years. With its no nonsense, technicalities and 'computer speak' keep-to-the-minimum approach it has deservedly kept its place on many a bookshelf. Emphasising 'hands on praticalibility' Ian explain explains how to install NOS on a PC, how to set up the control files, how to check up basic operations off air before going live, how t use NOS commands for transferring files, logging on to remote systems, sending mail, etc.

A useful 'start up' guide.

Valve & Vintage

Ben Nock G4BXD swops his usual military uniform for a civil airline pilot's this month. He's taking a look, along with some other interesting items, at equipment originally made for British European Airways.

I hope you all had a good summer, the nights are drawing in so its time to get on with all those projects and restorations that have no doubt piled up over the summer months. And one clutch of units that arrived here in Kidderminster during the summer months formed an ex aircraft set, one of the units still has a British European Airways (BEA) servicing tag on it, and all arrived in good cosmetic and electrical condition.

The units are part of the STR18 set made by Standard Radio, the full station comprising a receiver and transmitter driver unit, power amplifier (p.a.) unit, antenna tuner unit (a.t.u.), modulator and power supplies. The STR18 operates in any of 24 crystal controlled channels between 2.8 and 18MHz, phone, modulated continuous wave (m.c.w.) and c.w. modes with a power of 100W output from a pair of QV1-150A tetrodes.

● Fig. 1: The STR18 units showing receiver/driver unit on the bottom, with the transmitter p.a. stage above left and the a.t.u. above right. The crystal controlled channel sockets are located behind the warning sign on the receiver (see text).

Leap Forward

The STR18 applications included being used as a replacement for the old T1154/R1155 mentioned in my last column and represented a big leap forward in technology. This set is crystal controlled and as such is far more stable than the old T1154.

The equipment has more power and was probably a little more reliable than the older unit. However, it has to be said that the designers did not take the easy option.

I say this because there are a lot of relays and motors in this set and there's also an auto-tune facility. This features means that when the channel is changed the set will retune itself. (But relays and motors increase the failure rate and make servicing more complicated).

I seem to have the transmitter unit and the a.t.u. from the STR18 model A and a receiver/driver unit. This is obviously, to me from its appearance, from the same Standard Radio stable but a slightly different set, a model C which has 100 channels available.

A Dutch friend, **Pieter Lamers**, kindly sent me a whole load of information for the SRT18 which will be very handy in getting the transmitter and a.t.u. sections going. **Despite this I still need information on this particular model C receiver/driver unit so would be pleased to hear from anyone who could help.** I also need a lead on a supply of suitable plugs and sockets.

● Fig. 2: The rear of the STR18 units showing the various connectors, the 28 pin, 20 pin and four pin plugs and sockets, with Pye type r.f. connectors.

One of The Joys!

One of the joys of messing about with older equipment is that you can have a go at returning it to something like its original condition. I described a 'before and after' treatment in *PW* August 1999.

Last time it was the rather rare Wireless Set No. X32D, showing it before and after restoration. This time I have another 'before and after' on another wartime item, the R3090 set.

The R3090 (24V d.c. powered version) and the R3067 (12V version) are airborne Identification Friend or Foe (IFF) sets which would receive radar pulses and transmit a return signal which identified the operating aircraft as 'friendly' to the ground radar station. In this way it would not, hopefully, be shot down by the anti-aircraft guns or the night fighters.

The set operated in the band 157 to 187MHz. In operation it continuously tuned across this band, with rapid 'flyback' to the start as the receiver searched for a radar signal.

When a radar transmission was detected the set would transmit on the same frequency with a pulse which could be varied in width to indicate different conditions. A very long (in radar terms anyway!) pulse of around 120 microseconds could also be sent to indicate a distress or Mayday condition.

It's strange that the set has the R designator, considering it transmits as well. Other transmitter-receivers have a TR designation, the TR9, TR1196, etc.

The transmitter has a quoted power output of 5W. And from an aircraft high in the sky, this would provide quite a decent range. The set uses 11 valves in total.

The tuning of the receiver, and the transmitter, is via a very clever mechanical arrangement connected to the rotary

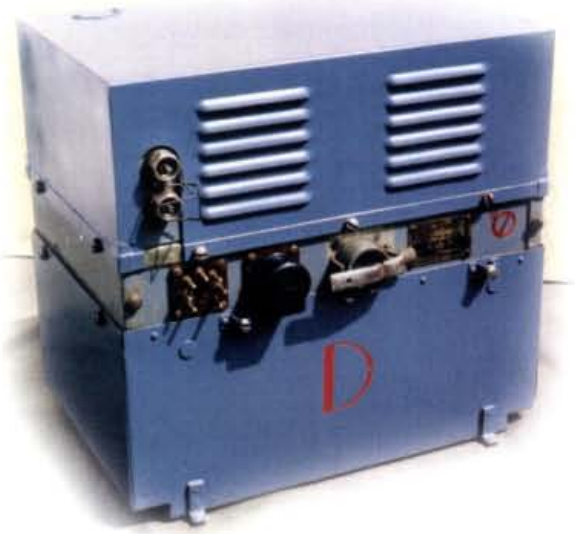


Fig. 3: The R3090 nearly finished. A little more artwork to add and the set will be ready for display.

transformer (dynamotor) used for developing the h.t. supply. Here, a gearbox reduces the r.p.m. and a linkage to the main tuning capacitor is used to sweep the band.

The large hole visible in the front of the set held an explosive charge so that in the event of the aircraft being forced out of the sky over enemy countryside the set could be destroyed. After the Second World War some of these sets were modified to cover the 144MHz Amateur band but I don't think they would have been of much use.

By coincidence, a short time after obtaining the receiver I obtained the matching test set, Type 74, that was used to service the set. The test set is basically a simple receiver, oscilloscope and simple transmitter and works in reverse to the R3090.

Fig. 4: The French ER-504N h.f. set, modulator on left, the transmitter in the middle and receiver on the right, with an odd onlooker perched above. **(That's 'Reggie' G4BXD/R (Stroke Rodent) the Nock family's pet Rex rat who has a natural interest in radio equipment of course!). Editor**

In use the Test Set 74 sends a small pulse which the receiver under test 'replies to' and this subsequent signal is displayed on the cathode ray tube (c.r.t.) display. The shape and duration of the transmitted signal from the R3090 can then be checked.

French Collection

Another recent input to my collection is a post Second World War French set, the ER-504N. This is an h.f transmitter-receiver covering the 2.5 to 5MHz and was used by the French Police in the 1950s.

The ER-504N is a fairly standard tuneable superhet receiver with a four channel crystal controlled transmitter with an 807 in the p.a. The receiver is either tuneable or can be set to one of four 'click stop' positions selected from the front panel. The modulator and power supply are housed in separate cases and the set operates on c.w. or a.m. modes.

The modulator unit can also serve as a public address unit, there being a big loudspeaker fitted to the front of the vehicle for crowd control. The power supply is derived from a rotary transformer (dynamotor) operating from a 12V vehicle supply.

Power output of the transmitter is around 15W or so and the transmitter crystal frequency operates on half the output frequency required (i.e. a 1.80MHz crystal for an output of 3.6MHz. (Although I have tested the units and they are working I've not had the set on the air yet, so do listen out for me working it).

Anno Domini Award

There's good news about the 'Anno Domini 2000 Award, the international event started by **Mario IK0MOZ**, which has been in operation during the year.

The aim was to promote interest in military gear in Amateur Radio use and make contacts between operators of such equipment, scoring points for each contact, aiming at getting 2000 points during this millennium year.

Many logs have been submitted to Mario during the year including my own. In fact I've had something like 200 plus QSOs at the time of writing and have managed to fire up nearly 30 different h.f. military sets and have reached my 2000 point goal.

Other Amateurs active and scoring for the award include IK0MOZ himself of course and stations from the UK, Belgium, Norway, Canada and Italy amongst others. Many stations have operated vintage military equipment during the year and given out many points.

Rigs such as the B2 and other spy sets have been on the air. There have also been many T1154, Command Sets, 19 Sets and a few more recent military units such as the Clansman, Larkspur and others.

Despite a poor response by the UK clubs whose main area of interest this award catered for, there has been a small band of dedicated individuals in this country who are helping the event on its way with many rigs activated. It has been fun to take part never the less, and Mario must be given a big hand for all the effort he put into organising the event.

Thank You Milton Keynes!

I must send a big thank you to **Dave M0BZK**, and the members of the **Milton Keynes Amateur Radio Society** (MKARS) for the welcome at the Bletchley Park BP) rally that I attended in August.

Rallies like that at BP that have an added attraction, in this case the famous Secret De-coding Establishment Station X now a very interesting museum site, which add to the hobby in that it allows other members of the family to go along with the 'mad' Amateur and have a great day out. So, watch out for news of next years events there in the pages of *PW*.

Well that's all I have space for now. As always I can be contacted at: **62 Cobden St, Kidderminster, Worcestershire DY11 6RP**, (s.a.e. please) or via E-mail at **G4BXD@qsl.net** and have a look at my web pages via **www.qsl.net/g4bxd** *PW*

VHF DXER

BY DAVID BUTLER G4ASR

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID BUTLER G4ASR INVESTIGATES AURORAL PROPAGATION AND HAS REPORTS OF AN EXCELLENT GEOMAGNETIC EVENT.

In my opinion one of the most exciting forms of v.h.f. propagation is auroral scattering. Aurora is a phenomenon usually observed as a glow coming from the upper atmosphere in the northern sky. In the northern hemisphere it is referred to as the 'Northern Lights' or aurora borealis and in the southern hemisphere they are the 'Southern Lights' or Aurora Australis. However, when the ring-shaped areas surrounding the Earth's magnetic poles become ionised they are also able to scatter back signals in the v.h.f. and u.h.f. region.

The ionisation has its beginnings in something called a coronal mass ejection (c.m.e.). As this ejection rises off the surface of the Sun it draws out magnetically opposed field loops which subsequently reconnect and produce a solar flare. But the flare is a secondary effect which, compared to the coronal mass ejection and the tremendous shock wave it propagates into the solar wind, is of little consequence.

The output of the solar flare covers only a narrow cone angle whereas the output of a c.m.e. can cover up to half of interplanetary space. This solar material is made up of charged particles (ionised hydrogen, electrons, protons) and is carried towards us via the solar wind before becoming trapped in the earth's magneto-tail.

An increase in the particle flux by a mass ejection or to a lesser extent by a coronal hole stretches the magneto-tail until it snaps and reconnects. When this happens some of the trapped particles are propelled towards the earth by the contracting magnetic field lines leading ultimately to an auroral event.

The auroral activity is centred in a doughnut shaped region surrounding the magnetic poles. These zones are termed the auroral ovals and are normally located around 65-70° of geomagnetic latitude.

To make contacts via the aurora you need to beam at the auroral oval itself. So, regardless of your station location always beam north when auroral activity is suspected. This pre-supposes you have a directive antenna such as a Yagi. If you don't then you won't experience the magic of auroral openings.

When signals are heard swing the beam either side of north to maximise the signals. Signals propagated via the auroral curtain will always be badly distorted because of a random doppler shift imparted to the signal by the wave-like motion of the aurora. This produces a characteristic hissing sound making voice signals very difficult to copy.

Morse on the other hand is easier to copy with the signals sounding like keyed white noise. Because of these characteristics it is essential that auroral back-scatter contacts be attempted using s.s.b. or c.w. modes.

I like auroral propagation so much beacuse it enables me to make many DX contacts on the 144MHz band and with a mode (c.w.) that I really enjoy using. It's similar to Sporadic-E (Sp-E) propagation insofar that contacts up to 2000km away can be achieved. But that's where the similarity ends.

It's very rare for Sp-E propagation, at the 144MHz band, to occur on path lengths shorter than 1000km or so. With auroral contacts it's possible during very strong events to work stations in the same locator square with fully auroral signals.

Propagation during Sp-E openings is also very geographically selective. A station just 10km away from you may be having a fantastic opening but you may not hear anything.

Auroral openings on the other hand generally favour everyone (less so the further south you are located) and you do have some control over the specific areas you wish to contact. Generally speaking stations in central England need to beam due north to contact stations in Scotland and northern England.

Moving the beam eastwards, say 20° or so will bring in the Scandinavian stations and 40° might bring you the eastern European stations in the Czech Republic, Slovakia Poland or Hungary. Obviously each and every auroral opening is completely different but you do need to be aware of the need to keep moving the beam around to optimise signals strengths for stations in particular regions.

Whenever I participate in an opening I always ascertain where the Scottish stations peak up with the greatest signal strength. I then move the antenna 30° more to the east and start listening for DX stations further afield.

YOUR REPORTS

Now I'll take a look at your reports of an excellent opening that occurred on Saturday August 12. On the previous day the Solar Terrestrial Dispatch (**http://www.spacew.com**) issued an Astro-Alert giving a warning of mid-latitude auroral activity.

The warning stated that auroral activity had intensified to minor storm levels following the arrival of a solar coronal mass ejection at 1810UTC on 11 August. This disturbance was preceded earlier in the day by a smaller mass ejection impact that had a fairly substantial effect on high and upper-middle latitude auroral activity.

The arrival of this second stronger coronal mass ejection was expected to re-intensify auroral activity to storm levels over the following 18 to 24 hours and was expected to last through much of August 12. Now, as any 'switched on' v.h.f. DXer will tell you, August 12 is a very special date because it's when the peak of the annual Perseid meteor shower occurs.

Activity levels, particularly on the 144MHz band, are normally very high with many fixed stations and expedition stations making meteor scatter (m.s.) contacts during the shower. It was therefore hoped that auroral activity might provide an additional bonus to the Perseid devotees. However, what actually occurred was quite remarkable and certainly something that I've never experienced during an annual meteor shower.

Many reports indicated that the activity during the Perseid meteor shower was not particularly exceptional. Most operators mentioned that it was similar to that experienced in recent years. In general terms meteor showers exhibit the same characteristics year after year.

Meteor trails, through which the Earth passes on the same date each year, tend to be fairly constant and evenly distributed. (The Leonid shower, expected to peak on November 17-18, is an exception, as every 33 years it exhibits an enhanced peak in meteoric activity.) This year the Perseid meteor shower had two distinct peaks in activity, an early peak at about 0530UTC and a more normal broad peak around 1000UTC.

Stations reported a large number of very long, strong bursts of ionisation allowing numerous c.w. and s.s.b. contacts to be made on the v.h.f. bands. Some of the DX worked

Dave Edwards G7RAU - well known 144MHz VHF DXer

from the UK on the 144MHz band during this period included the stations of ES2QH (Estonia), HA5OV (Hungary), LY2MW (Lithuania), OH5LK (Finland), RU1AA (Russia), YU7EW (Yugoslavia) and 9A3B/P (Croatia).

Throughout the evening of August 11 and the early hours of August 12 many operators were successfully making m.s. contacts on the 50 and 144MHz bands. Suddenly at around 0245UTC the meteor scatter activity was dramatically interrupted by an interplanetary shock wave from the Sun as it struck the Earth's magnetosphere triggering a powerful geomagnetic storm.

An auroral back-scatter opening occurred which continued through to around 0415UTC before fading out. The aurora then reappeared at 0545UTC waxing and waning in intensity before finally disappearing around 0945UTC.

This is the first time that I've ever encountered auroral activity on the 144MHz band at that time of the day. I've caught events at 0630UTC but never as early as 0300UTC.

However, what made this event really special for me was the sound of aurorally enhanced meteor scatter bursts. Forward-scattered signals from meteor trails being back-scattered via the auroral curtain. It was really amazing!

It didn't end there. The v.h.f. bands opened up again with the return of further auroral activity between 1400 to 1815UTC and later in the evening from 2200UTC. Quite a remarkable day.

I started my day at around 0230UTC on August 12 with an experiment to see what could be heard on a hand-held Yupiteru MVT-7100 multi-band scanner. Standing in my garden I listened for possible activity on 144.200MHz, the s.s.b. meteor scatter calling frequency.

Using the supplied 540mm telescopic whip I was surprised to hear some bursts of s.s.b. signals from S52EZ and S57EA (Slovenia). Incidentally if you use a scanner (or similar receiver) to pick up weak s.s.b. signals such as these, it's essential to turn the squelch control to minimum.

Moving into the shack at 0300UTC I prepared for a few hours of m.s. operation but discovered immediately that an auroral opening was commencing. Running 400W into an 18-element DL6WU Yagi I made a number of c.w. contacts on the 144MHz band including the stations of DH8BQA/P (JO73), SM5FRH (JO88) at 1425km and LY2SA (KO14) at 1739km. I also heard the station of LY1DQ (KO25) but couldn't break the pile-up of the many German operators he was working.

At 0415UTC the aurora faded out with me and I then went on to make some meteor scatter contacts with the stations of I8MPO, LA0BY/P, OE6IWG, S50C and 9A2RD before going QRT at 0500UTC. Later in the day between 1400-1810UTC I made 30 more c.w. auroral contacts with stations located in the UK, Belgium, France, Germany, Holland, Hungary, Latvia, and Sweden.

The best DX of the session was SM1HOW (JO97) at 1504km, HA0HO (KN07) at 1805km and YL3AG (KO26) at 1819km. Not a bad day at all with 16 countries in the log book.

METEOR SHOWER

"Who would expect to get up in the early morning for the Perseid meteor shower to be greeted by an excellent aurora" remarked **Ian McCabe G0FYD**. In the early morning session he made a number of c.w. contacts, the highlights being the stations of G0KZG/MM (IP81), OH1XT (KP01) and OH0/DL1UU (KP00) an expedition station operating from the Aland Islands.

Ian, located in Blackpool runs 100W into a 9-element G4CQM Yagi. This is a relatively small antenna but shows what can be worked by using certain propagation modes and c.w. of course! In the afternoon he made further Morse contacts including the stations of OK2BLE (JN99) and YL3AG (KO26).

Stefan Heck LA0BY reports that operating from his portable QTH (JP30) he made 60 meteor scatter contacts and 203 auroral contacts on the 144MHz band. The UK stations contacted via m.s. included G0CUZ, G1WPF, G3IMV, G4AEP, G4ASR, G4SFY and G7RAU.

Contacts during the auroral opening included UK stations G0FYD, G0KPW, G0PES, G0RUZ, G3BJD, G4LOH, GM0BQM, GM0CLN, GM0GMD, GM0HTT, GM3WOJ, GM4ILS and GM4YXI. Those interested in more details can view his log at **http://www.qsl.net/la0by/result00.htm**

Our regular maritime reporter **Andy Adams G0KZG/MM** onboard the *RRS Charles Darwin* was again in the thick of the action. He reports that he was active on the 144MHz band in the run up to the peak of the Perseid meteor shower.

Andy's best DX on August 8, whilst located in IP81 and IP91 squares, was with the station of OK1KF. This contact and five others made that day were accomplished via high speed c.w. at 400 words per minute. The keying signal is derived from a laptop running the 9A4GL m.s. program and received signals are decoded with the use of a digital tape recorder designed by DF7KF specifically for m.s. use. In the period August 10-11 whilst operating from locators IP70, IP80 and IP81

Andy completed a further 18 m.s. contacts with the best DX being I2FAK at over 1900km. On August 12 he was expecting to make many more m.s. contacts but the aurora 'clouded' the issue!

Calling CQ at 0330UTC from a location between the Shetland Islands and the Faroe Islands he was immediately answered by the station of GM0BQM. Andy then went on to work many Scandinavian stations via the aurora before closing down at 0600UTC. At 1330UTC he discovered that the aurora had reappeared and he then went on to make 35 c.w. contacts with stations in northern Europe.

His best DX during the afternoon event was with ES2RJ in Estonia. Andy remarks that next time someone whinges that the 144MHz band is dead reference should be made to his logbook - over 200 QSOs completed from a location in the north Atlantic Ocean in the last month!

DEADLINES

That's it for this month. Pay special attention to the 50MHz band for the next few weeks for trans-equatorial events to southern Africa and don't forget the Leonid meteor shower on November 17-18. More news of this annual event next month. Please forward any news, views, comments or photographs to the address and by the date given at the top of the column.

Thanks for your letters and good luck with the DX. See you again next month.

73 David G4ASR

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ICOM IC575H	10M/6M MULTIMODE BASE	499.00
ICOM T8E	2/6/70CM HANDIE	225.00
ICOM ICW2E	2M/70CM HANDIE	129.90
STANDARD C8900	2M FM MOBILE	125.00
TRIO TR2200GX	2M FM PORTABLE	59.00
TRIO TR751E	2M MULTIMODE TRANSCEIVER	325.00
TRIO TS711E	2M MULTIMODE BASE	299.00
YAESU FT23R	2M HANDIE	125.00
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YAESU FT726R	2M/70CMS BASE	499.00
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YAESU FT3200	2M/70CM MOBILE TRANSCEIVER	299.00
YAESU FT708R	70CM HANDHELD TRANSCEIVER	69.00
YAESU FT709R	70CM HANDIE	69.00
YAESU FTL2014	VHF PMR TRANSCEIVER	75.00

AMPLIFIERS

TOKYO HL700	SOLID STATE HF AMP	599.00
TOKYO HL100B	100W AMP 21 - 28MHZ	129.00
TOKYO SAGRA 600	2M 700W AMP 2 x 4C x 250R	799.00
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ICOM ICR7100	WIDE COVERAGE BASE RECEIVER	599.00
ICOM ICR72	HF RECEIVER	399.00
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JRC NRD535	HF RECEIVER	799.00
JRC NRD535/LOWE	HF RECEIVER + LOWE MODS	829.00
REALISTIC PRO2025	BASE SCANNER	125.00
REALISTIC PRO37	HANDHELD SCANNER	75.00
REALISTIC PRO 2035	BASE SCANNER	125.00
YUPITERU MVT9000	HANDHELD SCANNER	249.00
YUPITERU VT125 II	AIRBAND SCANNER	99.00
YUPITERU VT225	AIRBAND SCANNER	159.00
SONY ICFSW77	SHORTWAVE RADIO	189.00

ACCESSORIES

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AMDAT ADC60	FREQ STANDARD CLOCK UNIT	99.00
AMTRON UK552	FREQUENCY COUNTER	69.00
DATONG PC1	HF CONVERTER	59.00
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144/430/1200MHz

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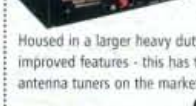

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GP-6	144/430MHz 6.5/9.0 3.07mtrs 200W	£89.95
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CA-UHV	HF/VHF, 7, 21, 28, 50, 144, 430MHz 1.9 mtrs	£89.00
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HR-50	50MHz centre loaded , length 2.13 mtrs	£39.95
SBB-2	Dual band Mobile 144/432 length 0.46 mtrs	£19.95
SBB-4	Dual band Mobile 144/432 length 0.92 mtrs	£29.95
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MG-4M	Heavy duty mag mount/4mtrs /PL259	£27.95
RS-700	Gutter Mount fully adjustable	£17.95
RS-730	Hatch/Trunk Mount fully adjustable	£18.50
TBR	Hatch/Trunk Mount standard model	£14.95

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CF-706	For IC706/CA-HV 1.3-56Mhz/75-320MHz	£39.00
CF-360A	1.3-30MHz/49-470MHz SO239/PL/PL	£37.95
CF-530	1.3-90MHz/125-470MHz SO239/PL/PL	£39.95

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R7000	10,12,15,17,20,30,40m	£369.95
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A3WS	12, 17m 3 el. Yagi	£299.95
A743	30/40m add on A3S	£129 £99.00

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A50-5	6m 5 el.Yagi 10.5 dBi	£149.95
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DJC5	Dual Band Pocket	H/Hinc. Lith Ion Battery	£189.95
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DJX10	H/H Scanning Rcvr	0.1 - 2000Mhz no gaps	£295.00
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DR135E	VHF FM H/Held	TX 50W w/optional TNC	£235.00
DR140E	2M FM Mobile	Transceiver 50 Watt	£219.95
DR150E	2M FM Mobile	Transceiver 50 Watt	£279.95
DR605E	2/70Cms FM Dual	Band Transceiver 50W	£299.00
DR610	2/70 Cms Deluxe	Dualband TX 50 Watt	£399.00
DRM06T	6M FM Mobile	Transceiver 20 Watt	£249.95
DX701	Commercial Style	HF Transceiver 100W	£599.00
DX70TH	HF+6Mtr	Transceiver Transceiver 100W	£599.00
DX77E	Desktop HF	Transceiver 100 Watt	£599.00

ALINCO ACCESSORIES

EBP12NA	Nicad Pack 12V	£39.95
EBP22N	Nicad Pack 12V for DJ180/480/580	£49.95
EBP24N	Nicad Pack 7.2V 1200mAh 1200mAH	£49.95
EBP28NZ	Nicad Pack 12V 700mAh	£39.95
EBP31N	Nicad Pack 7.2V 1200mA for the DJ-G1	£49.95
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EBP36N	Nicad Pack 9.6V 650mAh - DJ190/191/GS/X10	£49.95
EBP45N	Nicad Pack 6V 700mAh - DJ-V5	£26.95
EBP46N	Nicad Pack 9.6V 600mAh For DJ-V5	£39.95
EBP48N	Nicad Pack 9.6V 700mAh For DJ-195	£34.95
EBP50N	Nicad Pack 9.6V 700mAH for DJ-195	ETBA
EBP51N	Nicad Pack 9.6V 1500mAH for DJ-195	ETBA
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EDC37	12V DC Cable for DJ190/191/491/GS/X10	£6.95
EDC61	Rapid Charger 33N/4/5/6/7- DJ190/191/GS/X10	£69.95
EDC64	240V Trickle Charger - DJ190/191/491/GS/X10	£22.95
EDH11	Dry Cell Case AA x 6 for DJ180/480	£7.95
EDH16	Dry Cell Case 4 x AA cell for DJ190/191/GS/X10	£12.95
EDH29	Battery Case AAx4 for V5	£7.95
EDH30	Dry Cell Case For DJ-195	£9.95

ICOM

706MkIIG	DSP HF/UHF/VHF Base Transceiver	£899.00
746	HF/6M/2M Base Transceiver	£CALL
756PRO	HF + 50Mhz DSP Base Transceiver	£1,995.00
AT180	Automatic ATU for IC706	£379.95
IC-718	HF Transceiver multimode 101 Memories	£699.99
SM20	Desk Microphone	£120.00
SP21	Loudspeaker for 756	£71.67
T81E	Handheld TX 6m 2m 70cm 23cm	£369.00
UT106	DSP Unit	£79.95

YAESU

FT1000MP	MARK V All mode HF Transceiver	£1,999.00
FT100D	Multi Band TX HF plus 6/2/70cms	£TBA
FT1500M	VHF Mobile TX 50W TX 144-146 RX 137-174	£229.00
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FT8100RC2	Dualband VHF/UHF Mobile QR Front	£349.00
FT847	All Mode Transceiver HF/6/2/70	£1,349.00
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FT920	HF Transceiver with 50MHz	£1,249.00
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VXSR	3 Band Transceiver	£299.00
QUADRA	1kW Solid State Linear Amp & Power Supply	£3,599.00

YAESU ACCESSORIES

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MH19A2B	Earpiece/Tie Clip Mic	£22.00
MH26D8	Speaker Mic w/ Toneburst	£48.00
MH34B4B	Speaker Mic for FT1D/40/VX10	£27.00
MH35A2B	Handheld Speaker Mic	£34.00
MH37A4B	Earpiece Mic for FT10R/40/VX10	£22.00
YH1	Headset with Boom Mic	£31.00
YH2	Headset with Boom Mic	£27.00
YH77STA	Stereo Headphones Lightweight	£56.00
XF117A	AM Filter 6kHz for FT100	£88.00
XF117C	500Hz CW Filter f/FT100	£98.00
YF110CN	455kHz 250Hz CW Filter	£106.00
YF110SN	455kHz/2.0KHz SSB N.Filt	£95.00
YF112C	2nd IF CW 500Hz Filter	£84.00
YF114CN	8.2Mhz 250hZ CW Narrow	£84.00
YF114SN	8.2MHz/2Khz SSB Filter Narrow	£84.00
YF115C	455kHz/500Hz CW Filter	£99.00
YF115S-02	2.7Khz SSB Filter FT847	£99.00
YF116A	6kHz AM Filter for FT920	£49.00
YF116C	500Hz CW Filter for FT920	£49.00

KENWOOD

THD7E	2m/Dual Band Transceiver with TNC	£259.00
TMD700E	Dual Band Mobile Transceiver with TNC	£469.00
TS570D	HF DSP Transceiver	£799.00

GARMIN GPS

00217	StreetPilot UK RX w/Atlantic Intl Database	£499.00
00275	StreetPilot ColorMap UK RX w/Atlantic Intl	£629.00
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10263	Map Source CD ROM	£76.38
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GPS12XL	Receiver + European City Point Database	£189.95
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PMR446

ALINCO DJSR1	PMR 446 H/H Transceiver	£89.95
GOODMAN GPMR114	Tracker PMR 446 (Pair)	£99.99
MOTOROLA HANDI-PRO	Euro 446 Vox Handi-Pro	£199.00
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PALSTAR G5RVH	GSRV Half Size (40-10m) Flex Weave	£24.95
PALSTAR G5RVH/E	GSRV Half Size (40-10m) Economy Model	£24.95
PALSTAR WIN4010	40-10 Mtr Windom Antenna	£49.95
PALSTAR WIN8010	80-10 Mtr Windom Antenna	£59.95

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PRO AM PHF10	10m Mobile Whip 3/8	£19.95
PRO AM PHF12	12m Mobile Whip 3/8	£19.95
PRO AM PHF15	15m Mobile Whip 3/8	£19.95
PRO AM PHF160BE	160m Mobile Whip 3/8	£54.95
PRO AM PHF17	17m Mobile Whip 3/8	£19.95
PRO AM PHF20B	20m Mobile Whip 3/8	£19.95
PRO AM PHF30	30m Mobile Whip 3/8	£19.95
PRO AM PHF40	40m Mobile Whip 3/8	£22.95
PRO AM PHF6B	6m Mobile HF Antenna	£19.95
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OUTBACKER 100	Outbacker 80-10 Mob (6ft)	£159.00
OUTBACKER 195	Perth Plus (HF + 2/6M)	£179.00
OUTBACKER OBS8	Q Split) HF Mob. Antenna	£169.00
OUTBACKER OTR	Outrunner 3Fl(160-10m) Mobile	£169.00
YAESU ATAS100	Active AntTuning System	£249.00

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FORCE 12 C31-XR	Multi-band HF Yagi 3el/20 4el/15 7el/10	£1,095.00
TITANEX V160AFS	5Kw Ant Tuning Unit for 160/80/40 Mtrs	£365.00
TITANEX V160S	87ft Titanium Vertical Ant	£575.00
TITANEX V80S	67ft Titanium Vertical Ant	£399.00

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20B55	23cms 55 Element 21.5 dBi	£79.95
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Remote 2 Way Antenna Switch

Freq: ..... (0 - 475MHz)

Power: ..... 1kW PEP

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PALSTAR B400/4	Balun 4:1 400W (3-30Mhz)	£23.95
PALSTAR B400/6	Balun 6:1 400W (3-30Mhz)	£23.95
PALSTAR DL1500	Dummy Load	£59.95
PALSTAR DP300	DiPole Centre (with Feeder Clamp)	£5.99
VEC DL2500	2.5kw RF Dummy Load	£179.95
VEC LP30	1.5kw Low Pass Filter	£59.95
MOONRAKER MTP40	40 Metre Traps	£21.95
MOONRAKER MTP80	80 Metre Traps	£21.95
MFJ 259B	Digital VSWR 1.8/170 Mhz	£229.95
MFJ 269	HF/UHF/VHF Analyser	£299.95
MFJ 912	Remote Balun Box	£39.95
MFJ 914	Auto Tuner Extender	£59.95
NIE CX201N	2 Way Switch N (0-1Ghz)	£26.95
30 Ft Retractable	Lightweight Mast	£69.00

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PALSTAR 300LCN	300W Cross Meter Tuner	£139.95
PALSTAR AM30	Active Antenna Matcher	£69.95
PALSTAR AT300	150 Watt Antenna Tuner	£99.95
PALSTAR WM150	3Kw HF/VHF SWR Meter	£59.95
MFJ-989C	3Kw Roller Antenna Tuner 1.8 to 30 MHz	£299.95
SGC SG230MK2	150 Watt Auto A.T.U	£329.00
SGC SG237/PCB	HF-VHF PCB Smartuner	£219.95
VEC VC300M	300W Mobile Tuner	£121.95

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YAESU G10000XC	Rotator 1100kg/cm w/p.set	£599.00
YAESU G450C	Ant Rotator w/25m Cab	£379.00
YAESU G650C	Ant Rotator Med. Duty	£499.00
AR300XL	Lightweight Rotator	£46.00

MORSE KEYS

HIMOUND HK705	Morse Key	£29.95
HIMOUND HK708	Deluxe Morse Key	£39.95
MFJ 418	Morse Code Tutor	£69.95
MFJ-557	Morse Key and Oscillator	£29.95
VEC CK200	Curtis Auto CW Keyer	£59.95

COMMUNICATIONS RECEIVERS

JRC NRD345	HF Comms Receiver	£399.00
JRC NRD545G	DSP SW Receiver	£1,299.00
JRC NVA319	Extension Speaker	£159.00
JRC ST3	Communication Headphones	£69.95
ICOM R75	Communication Receiver 0.03-60 MHz	£599.99
YAESU FRG100	SW Comms RX 50KHz-30MHz w/o AC adaptr	£369.00
ICOM R8500	Wideband Comms RX	£1,289.00

POWER SUPPLIES

DM330MVZ	Power Sup 32A Max Switch Mode + inter	£119.95
PALSTAR PS04	2-4Amp 13.8V PSU	£19.95
PALSTAR PS06	4-6Amp 13.8V PSU	£29.95
PALSTAR PS15	12-15A 13.8V PSU	£59.95
PALSTAR PS30M	30A Variable Voltage PSU	£99.00
PALSTAR PS50	40-50A 13.8V PSU	£169.95
SAMLEX 23A	Switch Mode PSU	£99.99

SCANNING RECEIVERS

YUPITERU		
MVT3300	H/Held 66-80,108-170, 300-407, 806-1000	£129.00
MVT7100	H/Held Scanner 530kHz-1650Mhz 1000mem	£199.00
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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

CARL GW0VSW ROUNDS-UP THE ACTIVITY ON THE H.F. BANDS HIGHLIGHTLING YOUR LOGS AS HE GOES.

Dennis Egan GW4XKE starts us off this month with news of a highly successful special event station celebrating the 74th anniversary of Air Formation Signals. The AFS were formed during 1924/5 by the War Office to cover Royal Air Force communications commitments world-wide and is now known as 21 Signals Regiment (Air Support).

The callsign **GB75AFS** was used by members of the RSARS and RAFARS during their combined operation in July at the Regiments Open Day at Colerne, Wiltshire. There was plenty of space for antennas to be erected alongside 244 Squadron's Training School. Squadron members helped to put up a 40m long doublet, two G5RVs and a full-wave 14MHz dipole between four 40ft masts. Contacts were made all over the globe using s.s.b, c.w. and RTTY.

Dennis and the crew apologise to all those who failed to make a contact through all the pile-ups and also for the fact that they were unable to complete the planned five day operation. This was due to unexpected problems with a member of the crew (Glad to hear you're feeling better Dennis) and the loss of an h.f. station. Further information on 21 Signal Regiment can be found on their website at **www.royalsignal.army.org.uk/museum**

Some of the GB75AFS operators. Left to right: Hasso Eesemann G4BYJ, Stan Saines G3RNB, Peter Fletcher G0RGB, Roy Clark G7FCK and Dennis Egan GW4XKE.

HELP NEEDED

Bob Seabourne G0UHN is having a problem and says "It appears to me that the PSK31 mode seems to be non existent outside of the 14MHz band. Despite many CQ calls, I have yet to make a contact on any other bands. I would have thought that the 18 & 28MHz bands would be very productive for the PSK31 operator".

I am sure that many of you will be able to offer some help or advice to Bob. He can be contacted at **g0uhn&aol.com** or alternatively you can send any information to me and I will make sure Bob receives it!

DX NEWS

Some stations to look out for this month include **Harry 7Q7HB** who will be active from Malawi for the next few months and has been heard on 21/34MHz around 1500UTC. He hopes to try some slow scan TV while he is there. QSL via G0IAS direct only.

Hasnet AP2HA has been active from Pakistan using RTTY on 21.085MHz. Look for him between 1300 to 1500UTC. **Roland DK3GI** has been heard on 7MHz c.w. around 2000UTC from the Philippines as **DU1/DK3GI**. QSL via DL2MY.

Conny 5R8GS has been active from Madagascar on 10.103MHz around 1800UTC. QSL via DL1DA. A little closer to home now and the special event station **SN600UJ** will be active from Poland until 20 October. The station is celebrating the 600th anniversary of the re-founding of 'Jagiellonian University' in Cracow. Operation will be on all bands c.w., s.s.b., and RTTY. QSL via SP9PKZ.

Newly licensed amateur **Houssein J28FH** is now currently active from Djibouti on 28MHz. QSL via WA2VUY.

YOUR REPORTS

First off this month is **Leighton Smart GW-20049** from Trelewis, Mid-Glamorgan who has been putting his Sangean ATS-909 portable receiver to good use. On 3.5MHz and using a 70m long wire, Leighton heard VO1FG (Canada) working M0AGV and PY2ZP (Brazil) working LA6EIA (Norway) both s.s.b. around 2230UTC.

Sean Gilbert G4UCJ in Milton Keynes who is "looking forward to the winter months and more activity on the lower bands" was pleased to work two new countries on 3.5MHz using 30W of c.w. He worked VK6HD (Australia) and 9M2AX (West Malaysia) at 2300UTC, both contacts were made despite the patchy conditions and high levels of noise on the band.

THE 7 & 14MHZ BANDS

On 7MHz and despite finding band conditions generally 'pretty awful' the c.w. of **Ted Trowell G2HKU** on the Isle of Sheppy reached out to OH0/DH2FW (Aland Island) at 0500 followed a little later on by E4/G3WQU (Palestine) and 5B4AGC (Cyprus) at 2100UTC. At 1900UTC Ted tried 14MHz where worked V51AS (Namibia), TF/LA7SI (Iceland), 9K2MU

(Kuwait) and 4L0DXP (Georgia).

Also active on 14MHz was **Robin Trebilcock GW3ZCF** in Bishopston near Swansea, who used his 40m horizontal loop and PSK31 to work CP6EP (Bolivia), FG/F8CMT (Guadeloupe) and ZS6BTE (South Africa) and LU9MBK (Argentina) between 1900 and 2230UTC.

Using 100W of s.s.b. and a 4-element Mosley beam, **Brian Parsons GW0KZK** in Skewen worked UA2FJ (Kaliningradsk) and SH2KA (Sweden) at 1600UTC. Brian followed this a little later with HB0/PI4TUE (Liechtenstein) at 2034UTC.

Meanwhile Leighton GW-2009 heard FY5FU (French Guiana) working a huge pile-up of US stations at 2316, CO6UW (Cuba) working KC2BWQ (U.S.A.) at 2330 and TI4ALF (Costa Rica) working GWs at 2340UTC.

THE 18 & 21MHZ BANDS

Despite not being very active over the last month or so, yours truly, GW0VSW, spent a little time on 18MHz working s.s.b. with an IC-737a, 80W and half-size inverted G5RV. I was pleased to work a few new one's despite a noisy band. First in the bag was V26FM (Antigua & Barbuda) 0727, VK3JSM (Australia) 0757, JA7DYJ (Japan) 1719, VP2V/IZ1DLV (British Virgin Islands) 2129 and YB0DX (Indonesia) at 1806UTC.

Sean G4UCJ made all c.w. contacts with FO0PT (French Polynesia) at 0923 and later in the day OX3VC (Greenland) 1221and JW7M (Svalbard) 1501UTC.

A warm welcome now to **Christopher Young MW0KRS** in Swansea. Christopher has just received his new callsign at the **grand old age of 12** and is enjoying his first ventures on the h.f. bands.

Despite being involved in Mid-Glamorgan Amateur Radio Group's special event station **GB2NPL** (Nash Point Light) and experiencing his first 'pile-ups', Christopher found time to work KP4ES (Puerto Rico), 9M6AAC (East Malaysia) and 9M2TO (West Malaysia) with s.s.b. between 0635 and 1822UTC. Operating mobile with father **Bryan MW0TYO/GW6TYO** he has already worked European Russia (UA3), Iceland (TF) and Andorra (C3). Well done Christopher.

● The callsign GB75AFS was used by members of the RSARS and RAFARS during their combined operation in July at the Regiments Open Day.

Also on 21MHz was **Robin GW3ZCF** whose PSK31 reached VU2TRI (India) 1638, CP6EB (Bolivia) 1924, ST0P (Sudan) and PJ2MI (Netherlands Antilles) at 2312UTC.

THE 24 & 28MHZ BANDS

The 24MHz band provided a rare s.s.b. contact for **Ted G2HKU**. Using 70W and a HF6 vertical antenna Ted worked the Tromlin Island Dxpedition, FR/F6KDF/T at 1300UTC.

Ted say's "With all the activity on the 50MHz band you might expect the 28MHz band to have been very good. However, when I have been around it has been pretty dead with noise levels so high that listening has been very difficult"! However, Sean G4UCJ managed to scrape a few contacts in the morning on this band between 1000 and 1200UTC with YI9OM (Iraq), IA0KM (Sovereign Military Order of Malta) and 6W/DK8YY (Senegal).

Also active on 28MHz was **Jon Wheeler G0IUE** in Melksham who says "I have spent the last few weeks working the usual crop of European stations via sparodic-E and very little DX. However, I have just acquired a new 28MHz mono band rig, the Albrecht AE485s which has netted me some good n.b.f.m. contacts that includes IK2VPD (Italy) at 0904 and DL2DRD (Germany) at 1506UTC. This was using 25W and a 2-element beam". Jon then connected his FT-920 to the beam and worked CE1LYF (Chile) using s.s.b. at 2044UTC.

QSL CORNER

Some more QSL information for you now: 3A2K via 3A2ARM, 9A1DC via 9A7K, 9M6AAC via N2OO, 9V9HQ via AA5BT, ED2VDB via EA2URV, EM0HQ via UX2MM, FY5FU via F5PAC, IA0KM via IK0FVC, IQ3V via IV3LNQ, J75KG via N2AU, R3K via RX3DOX, SY2T via SV2CWY, T98JV via HA8JV, V26EU via PA5ET, VK9XY via DH1SGS, YI9OM via OM6TX, YJ0AXC via JE1DXC and ZK1NNP via DK6NP.

SIGNING OFF

Despite the h.f. bands not living up to expectations and the generally poor conditions, our reporters have once again proved that DX can still be found and worked. Many thanks to you all for this month's reports.

73. Carl GW0VSW

PW Listening & operating Watch List. (All times UTC)

Sean Gilbert G4UJC operates: around 0700-1100 and 2100-0000 7 days a week on all bands using an FT-307 and Alinco DX-70 tranceivers at 3/30 watts into a loft mounted G5RV dipole antenna.

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

Carl Mason GW0VSW listens and operates: on 14.060MHz most mornings at 0630UTC with a Ten Tec Argonaut and half-size inverted G5RV.
Don McLean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz using a Kenwood TS-950 and trapped dipole antenna.

Leighton Smart GW0LBI operates: on 14.060MHZ c.w. mornings at 0800 and weekday evenings between 1900 and 2230 using a MFJ 9020 QRP transceiver and 3W into a dipole antenna cut for 14MHz.

George Woods G3LPT operates: an open net on 29.630 n.b.f.m. 0830 Tuesday to Friday.

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

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

Trader's Table

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BY ROGER COOKE G3LDI

TEL: (01508) 570278

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With the proliferation of world-wide communications at a relatively inexpensive and usually extremely fast turn-around, the magic of Amateur data comms, with virtually no sponsorship, or funding from commercial sources, is in jeopardy. While it might not be so 'cool' these days, it's still a very good way of making friends, keeping skeds, increasing your technical skills and swapping mail using **radio** as distinct from the land-line. I don't see too many contests on the Internet - RTTY contests are as popular as ever, in fact more so now that computers have provided an easy way of data communication via Amateur radio.

What better way of sparking the imagination than to encourage them to use Amateur satellites. Recently I exchanged mail on UO-22 with **Bill Magnusson VK3JT**. Although this is at 9k6, he was espousing the delights of using 38.4kB.

Bill kindly sent me details of this project, originally written for the WIA's *Amateur Radio Magazine*, and I am including them, almost verbatim, and with grateful thanks to him. This has to be the way forward, and with a possibility of using 115kB as well, this is progress! Read on and stimulate **your** imagination.

HIGHER SPEED

The launch of UoSat-12, now known as UoSat-Oscar-36 (UO-36) in April 1999 saw a number of 'firsts' for satellites carrying Amateur Radio equipment. An Amateur Radio satellite in the sense that it is the latest in the series of educational and scientific satellites from the University of Surrey, UO-36, has down links and command facilities in the Amateur Radio satellite bands.

From the outset the Surrey group have put a great deal of emphasis on the scientific and educational applications of their spacecraft. That was their initial purpose and it's still high on their agenda.

We are fortunate indeed that **Martin Sweeting G3YJO** who headed up the program, saw in the early days, several advantages in making the UoSats 'Amateur Radio satellites'. This decision has meant that Amateur Radio satellite operators have been able to take part in the march-of-technology that has been associated with the UoSats.

It also meant that many schools and colleges were able to elicit the help of local Amateurs to use the satellite telemetry for educational purposes. The Surrey team have also benefited from the large number of 'beta-testers' out there in 'amateur-radio-land'. So Martin's original idea to include amateur radio satellite operators in the team turned out to be a resounding success all round.

Earth-imaging cameras have long been a feature of the UoSat program. The first satellite, UoSat-1as it was, became known as UoSat-Oscar-9 or UO-9 to Amateurs when its beacon was turned on in the 144MHz band.

The UO-9 satellite carried a CCD camera into space in 1981. Decoding and display of the images was a daunting task.

Home computers of the day were mostly monochrome, CP-M devices. Routines and programs often had to be keyed-in by hand as hard drives and floppy drives were something of a luxury.

Pictures were printed in strips on thermal paper and joined together to get the final image. The images were rudimentary but the effort required to retrieve them was monumental.

UO-9 received so much acclaim that it became the forerunner of a stream of more sophisticated educational satellites and many more CCD imaging projects on a host of different Oscar platforms. Indeed it seems these days that no Amateur Radio satellite is complete without an imaging experiment.

IMAGE FILES LARGER

As CCD chips became more capable, with ever increasing pixel counts, the final image files became larger. You can't get something for nothing.

Better resolution results in larger image files. It wasn't long before this began to pose a problem as the larger the file, the longer it takes to download and even the longest low-earth-orbit satellite passes rarely last more than 18–20 minutes or so.

The Surrey satellites have long been using a standard download speed of 9600baud. This has proven to be quite satisfactory for normal satellite BBS, personal mail and even satgate work where files up to 100k – 200k in length are commonplace. Such files can usually be downloaded in one pass. But things are changing and it's a different story these days.

The newer CCDs can produce original 'off-the-chip' files that are many megabytes long. New compression algorithms have been devised to minimise the file size that is transmitted by the satellites but even so, the file size from the high-resolution cameras is such that it would take several passes to successfully download each file using 9600 baud down links.

As a result, UO-36, the latest from the Surrey stable, was designed with experimental high-speed download capability. Currently the 38.4 kilobaud (38k4) downlink is turned on. It solves the problem of download time but like most innovations, it imposes more stringent requirements somewhere else along the line, in this case, on the ground station.

ROGER COOKE G3LDI HAS A VISION OF THE FUTURE INVOLVING AMATEURS AND SATELLITES.

Years ago when downlink baud rates went up from 400 to 1200 and then to 9600 we found that it wasn't possible to feed the audio signal into the microphone socket as the bandwidth of the audio section of Amateur receivers was far too narrow for the job. Even using direct frequency modulation of the carrier rather than Audio Frequency Shift Keying (AFSK) was not sufficient at 9600 baud to allow the data to be fed in via the microphone socket. That meant modifications to the transceiver.

It was not until very recently that you could buy a transceiver 'off the shelf' that would cope with 9600baud satellite work. The IC-821 and the FT-847 still have the field to themselves. Most operators undertook modifications to their transceivers, including tapping points at the balanced modulator and discriminator sections for the input and output of the data. Even the ubiquitous Yaesu FT-736R, which found such favour with satellite buffs, needed this treatment to cope with 9600baud data from the satellites.

IMPOSES REQUIREMENTS

Increasing the baud rate to 38k4 imposes requirements that cannot be met in the same way as the 9600baud solution. The i.f. bandwidth of Amateur Radio transceivers isn't wide enough, nor do they have the pass-band shape to cope with the passage of 38k4 data.

In the world of commerce, specially designed data transceivers are available but

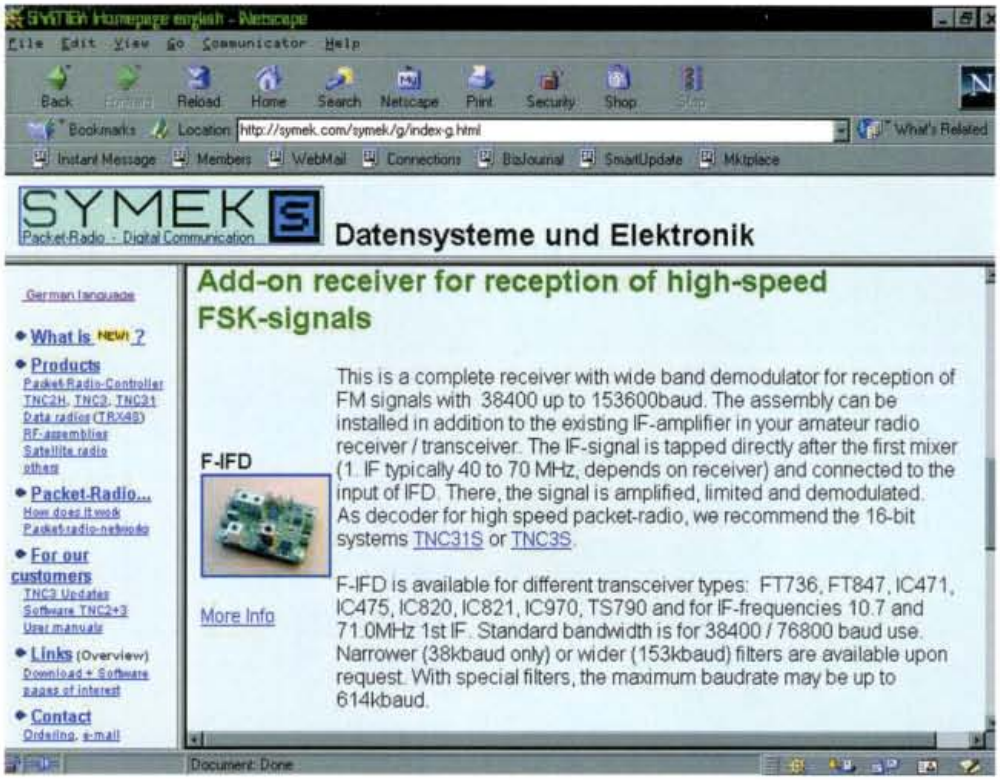

Fig. 1: Example of SYMEK pages.

these are very specialised and expensive. Another problem is that they are designed for point-to-point operation and satellite operation introduces an additional problem in compensating for Doppler shift.

As most Amateur ground stations use automatic Doppler correction it would be very desirable to retain the front-end of your transceiver for this purpose. Using a fixed frequency data receiver could make it difficult to implement auto-tuning.

A German company, SYMEK have come up with a solution. They produce data transceivers and have introduced a product into their range that neatly addresses the 38k4 situation.

The SYMEK solution is called an IFD board. Essentially it is the i.f. strip of one of their data receivers, and is inserted into the signal path prior to the normal i.f. strip in your transceiver and introduces a wide-band, flat-topped response to suit the higher speed data. Output to the 38k4 modem is taken directly from the IFD board.

MODEM CAPABLE?

Of course you need a modem capable of working at or above 38k4. If you are using a G3RUH modem in conjunction with a packet TNC, as many present digisat operators do, it's possible to do some mods to achieve 38k4 operation.

I chose a high-speed modem available from SYMEK. My modifications went smoothly and the station is now happily downloading megabytes of data on each UO-36 satellite pass including individual picture files of well over a megabyte each.

The download rate is quite startling. My connection to the Internet ISP (theoretically) allows 56k download rates. In practice I can download at the rate of about one megabyte every 10 - 12 minutes.

Some will better my system, but mine is a pretty typical installation and that's all I need. It seems to compare favourably with other Internet friends who have a 'normal' ISP account. By comparison working with PacSat Broadcast Protocol rather than TCP/IP as on the Net, I can achieve a download rate of up to 1Mb every 4.2 minutes from UO-36, expensive dedicated lines (and it's all happening on Amateur Radio!). I certainly feel the effort was well worthwhile even though it is imposing strains on my equally ancient computer to adequately store and process the image files.

Even higher baud rates are planned, so the future of Amateur Radio satellite imaging seems certain to remain a source of fascination for more and more operators around the world. The current state of the art in the Surrey satellites produces images that are stunning. Their narrow angle cameras have an on-the-ground pixel size of some 10 metres square. Compare this with the NOAA HRPT pixel size of about 0.9km square, remembering of course that the NOAAs are designed to take cloud pictures and make no claim to great ground detail.

On UO-36 pictures taken over large metropolitan areas, streets and individual properties are discernible. In images of coastal areas, piers and marinas and larger boats become visible. Many of these pictures looks more like high altitude aerial photographs than satellite images.

The multi-spectral images allow almost natural colouring to be achieved by marrying together three images from different parts of the light spectrum. This feature would have been quite impossible using even 9600-baud download rates. It involves downloading three quite large files and their associated thumbnail images to reconstruct the final picture.

KEY FIGURE

Colin Hurst VK5HI, has been a key figure in the download sequence of events. His editing and display programs have become the 'industry standard' in amateur radio satellite imaging.

Colin has spent countless hours developing his programs to the stage where they are so intuitive and reliable that we almost take them for granted. In fact we would all be lost without them.

We owe people like Colin and Chris and Martin and the team at Surrey a huge debt of gratitude for the marvellous educational tools that these satellites are ... and have been since the very early days. Many teachers, myself included, used UO-9 and UO-11 telemetry downloads back in the early 1980s in the teaching of lab electronics and maths. Things have certainly come a long way since then but the Surrey satellites are still playing an important role in schools and colleges and in University education.

The Surrey satellites have been used by humanitarian aid agencies, supporting technical and medical services, working with highly portable, compact ground stations capable of being taken into remote, problem areas with no service. Surrey, through its commercial arm Surrey Satellite Technology Limited (SSTL) has pioneered this form of affordable satellite communication.

The UoSat series has spawned a very successful venture called 'technology transfer' where students from overseas universities go to Surrey and become involved in the design and construction of their own UoSat-based communication satellite. Back in their own country they arrange for launching and commissioning and establish the control facilities. The idea being that these people will go on to form the backbone of their country's emerging communication industry.

The SYMEK company maintains a website, **www.symek.com** containing information on their modems and IFD board. Wouldn't it be great to see more callsigns in the broadcast queue of UO-36?

Plenty of help is available for those contemplating a move to the high speed down links. They appear to be the way of the future.

AND FINALLY.....

A little light heartedness....

Customer: "I have problems with your software".

Advisor: "Send me a copy of the disk and we will investigate the problem".

Next day on opening the mail he received a very nice photocopy of a program disk!

That's all for this month, so until next time have fun on your keyboard!

Roger G3LDI

TUNE-IN

BY TOM WALTERS

PO BOX 4440
WALTON ESSEX CO14 8BX

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

I begin this time with the news that someone, somewhere, has seen sense at last. It has been recognised that there **are people** out there who actually want to listen to international broadcasts! It's all change 'down under' in a big reverse-gear shift, the Australian government has announced that it will give **Radio Australia** an extra nine million dollars (4 million pounds) over the next three years.

Radio Australia, which used to be heard from time-to-time in Europe on short wave, suffered a huge funding cut in 1997. This meant that short wave transmissions from the Darwin facility ceased, with the transmitters being leased to other broadcasters. Radio Australia continued, but with a much smaller coverage area, and, as so often in these circumstances, put more effort into Internet broadcasts.

Now the Aussies can spread their wings a bit more. There's even talk of resuming an international television service. Watch this space. Meanwhile, have any *PW* readers been hearing Radio Australia lately?

Some RA frequencies, actually directed to Asia, but sometimes audible in Europe, are: 9.475, 9.500, 11.660, 15.415, 17.750 & 21.820MHz. There are also broadcasts on 5.995, 6.020, 6.080, 7.240, 9.660, 9.815, 11.650, 13.605, 15.240, 17.580, 17.715 & 21.725MHz, but as most of these are directed to countries in the South Pacific, they probably won't reach Europe. If you're on the Internet go to **www.abc.net.au/ra/hear/hear_us_gbieurope.htm** to listen direct, or switch to **World Radio Network**, or get shortwave listings from elsewhere on Radio Australia's site.

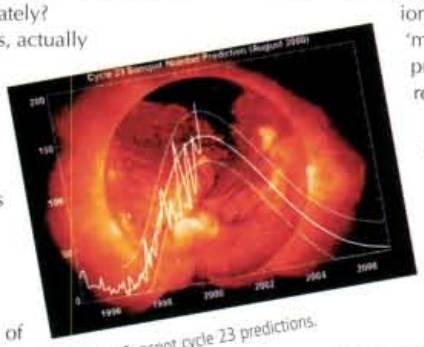

Fig. 1: Sunspot cycle 23 predictions.

SPOT THE MAX

Writing this column in August, for publication in the November issue, I can't give you precise information about the current crop of sunspots, but probably by now we will be past the peak of Cycle 23. As those of you who've studied this aspect of radio transmission and listening will know very well, each sunspot cycle lasts 11 years, and we have records of sunspot counts going back two and half centuries to 1749!.

The 'Solar maximum' for Cycle 23 was expected to give a sunspot number of about 150, and at the time of writing the number was 187. This could mean that maximum was already past, but on the other hand, there could still be another 'kick' to come.

The picture, **Fig. 1**, gives a colourful view of the predictions. Sunspot activity is of course good for international listening on short waves, as the ionosphere reflects signals better, so readers should have been getting some good listening over the past few months, barring the occasional solar storm.

Life may have not been so good if you have been listening to international stations on medium and long wave. The changes in the ionosphere during the 'maximum' period will probably have made for a reduction in quality.

For the Internet-rich among you **www.SunspotCycle.com** from NASA is a wonderful playground of images, movies, predictions and archives. There are also some excellent articles in the current *World Radio & TV Handbook* (available from the PW Book Store £19.95).

Another positive move is that, **The Voice of America** (VOA), scene of so many negative actions recently, has resumed transmissions in English to Africa. Kim Elliott of the *Communications World* programme now has an extra transmission at 2130 on Saturdays, and asks for reports, from anywhere in the world.

Try 6.035, 7.375, 7.415, 11.975, 15.410, 15.445, 15.580 and 17.895kHz s.w. Really dedicated medium wave enthusiasts could just possibly pick up 909kHz, if the sun is sleeping. *Communications World* continues to the Middle East, North Africa, and Europe on 6.040, 6.095, 9.535, and 9.760, plus 1.260 and 15.48kHz m.w. And to the Pacific region on 9705, 11870, 15185, 17735, and 17820. Kim Elliott is asking for reports. Send them to me please, and I will pass them on to Kim.

Unfortunately Radio Yugoslavia had ceased transmission. The four 500kW transmitters at Bijeljina, which is on Bosnian territory, had fallen silent, following an ultimatum from the Republika Srpska.

Radio Yugoslavia had been heard on 6.100, 6.185, 6.195, 7.230 & 9.720 amongst others. Will they find a way to get back on short wave? Meanwhile, the **web site www.radioyu.org** will bring you some programming.

TOM WALTERS SAYS THINGS ARE LOOKING UP AND THINKS HE'S DISCOVERED THE FUTURE OF BROADCASTING.

HEARD THE FUTURE?

And has anyone invested in a WorldSpace satellite receiver yet? Or even heard one? Manufacturers Hitachi, JCV, Panasonic and Sanyo are making these ground-breaking satellite receivers, which incorporate other bands as well.

WorldSpace intends to cover the globe around the equatorial zones - where 80% of the world's population lives - with three satellites. The first two of these - AfriStar and AsiaStar - are now flying, and carrying a wide range of programming - from the BBC World Service and the Bloomberg financial news to some fairly far-out music and entertainment.

Reception of AfriStar is surprisingly good in western Europe, with good audibility, at least in some locations, and high-quality digital sound. I heard them at Telecom '99 in Geneva. The radios are good lookers as well, but they are expensive for their intended users - around £300. For this, you can get up to 96 channels of radio, with data and video to come in future. Read all about it at **www.worldspace.com**

Is the WorldSpace concept the way international broadcasting will go in future? The transmitters are free from government interference and difficult to jam. Very nice to have - but what a cost. Only for the very well-heeled, at the moment, I think.

That's all for now so until next month good listening and keep your news, views and thoughts coming to the address at the top of the column.

Tom

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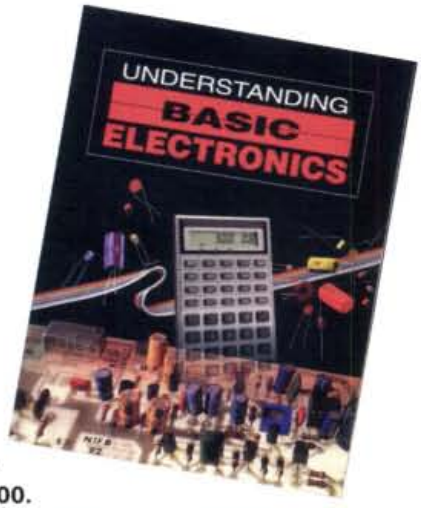

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Our Rob is never lost for words, read his thoughts about the Leicester Show this month

rob mannion signs-off

Rob G3XFD rounds off this month's issue and provides a sneak preview of what's coming next time!

As I write this I've just returned from the Leicester Show, which took place on Friday and Saturday 22 and 23rd of September. And although it appeared that the number of visitors was well down on previous years (presumably due to the lingering effects of the fuel shortage) I came back with a hoarse voice after talking to a great number of readers.

From my point of view the show was a real success and I met many readers who came to the *PW* stand to say how much they're enjoying *PW* (especially, so it seems, the October issue).

Incidentally, I must say at this point how delighted I was to meet many new friends, including those who literally 'popped in' to my little 'Editor's Corner' - shook my hand, paid compliments and disappeared. It's a great morale booster to meet you all and I can only apologise for those of you who gave up when a queue developed. Perhaps (to repeat an old joking suggestion first made at the old Granby Halls a few years ago) I should take up the idea of issuing tickets such as those used at Tesco's and Sainsbury's delicatessen counters!

'It's A Classic'

One very popular topic with readers chatting to me was the recent review of the Kenwood TS-830 transceiver in the 'It's A Classic' series. And to be quite honest **Donna G7TZB**, **Tex G1TEX** and I were rather taken by surprise at the interest. In fact, due to the interest shown we're now planning to take a look at many more 'classic' h.f., and v.h.f./u.h.f. equipment. Everyone on the *PW* team hopes you'll enjoy reading them.

Finally on this topic I'd like mention a rather amusing (and pleasant end to the story) finale to the TS-830 'It's A Classic' review story. It took place on the Saturday of the show when the GW Radio Amateur who's bought the transceiver from the **Shortwave Shop** immediately following the review - brought the instruction book for me to autograph for him! I did this with pleasure and felt my head beginning to get (even more) larger - swelling with pride. His simple request - granted with much pleasure - cheered me up. But don't worry I won't let it inflate my ego any more - I'm balloon shaped enough as it is!

Club Visits

If you missed chatting to any of the *PW* team or myself at the Leicester Show why not try to join me during a club visit? I'm due to attend the **Reading Club** on the 12 October, and the **York Club** on the 19th. Hopefully Tex Swann G1TEX will be with me on the York visit and from there we'll be going on to **the G-QRP Club's Rochdale 'Mini Convention'** on Saturday 21st. We'll be delighted to meet you if our visit is in your area.

> "It's a great morale booster to meet you all"

Normally my club visit schedule finishes with the Rochdale QRP event due to the Christmas publishing schedule demands. However, because my planned visit to meet everyone at the **Swindon Club** was postponed from earlier in the year, I've now been invited to Swindon on Thursday 2 November. I hope you can make it too!

So, with that I'll say cheerio for now and I can promise you a superb issue next time - it'll be crammed with news, views and reports. I even had some fun with a bottle of Irish Whiskey - donated by the **Irish Radio transmitters Society** - but you'll have to wait until next time for the full story! See you next month.

Rob G3XFD

next month

Looking forward to the next issue of *Practical Wireless*? Take a look at what's on offer!

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REVIEWED

* It's a Classic - **Rob Mannion G3XFD** - always on the look out for a good second-hand buy takes a look at the Yaesu FT-707

CLUB SPOTLIGHT

* If your club entered this year's competition see how you fared as we 'spotlight' the winners.

THEORY

* **Joe Carr K4IPV** looks at the different types of variable capacitors and explains their uses and differences

ALL IN A YEAR

* Another 12 issues of *Practical Wireless* have been published - so to help you remember what we did when read the full 2000 Index

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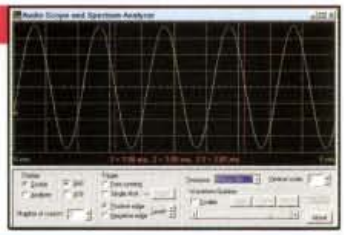

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Construction of externals	WR-1000e/WR-1550e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning resolution	100 Hz (5 Hz BFO)	10 Hz (1Hz for SSB and CW)	10 Hz (1Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	6-8 cards (please ask)
Dynamic range	65 dB	70 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software		YES (ISA card ONLY)
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Class A 75 W PEP IMD

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MARK-V FT-1000MP

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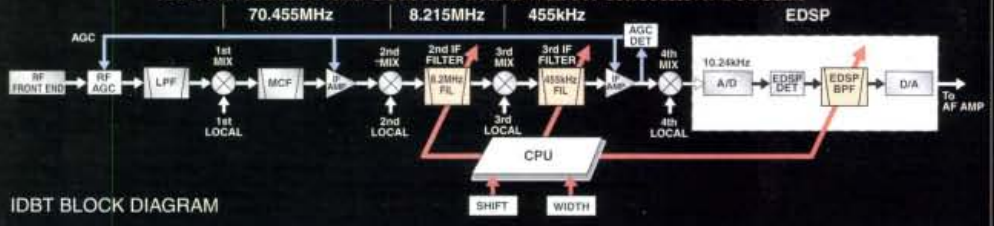

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