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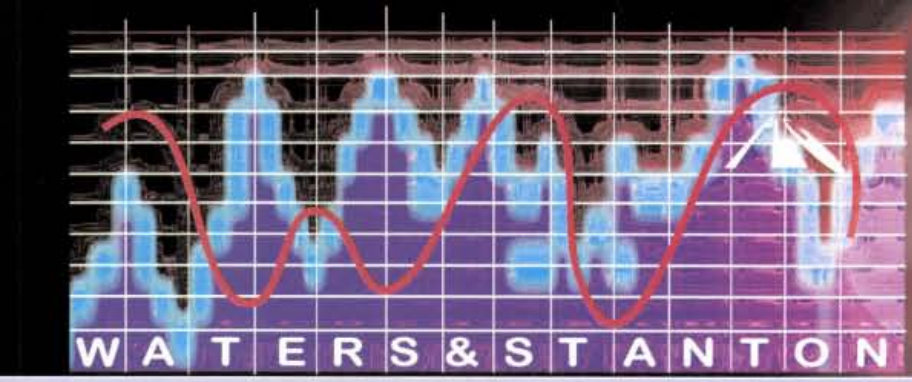

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* AM Airband Receive
* Lithium Cells & Charger

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* Wideband RX AM & FM 208 Memories
* 7 Tuning Steps DTMF Remote Front panel
* Very compact, supplied with all hardware.

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* CTCSS Encode / 1750Hz tone
* 25 / 12.5kHz Steps
* 30 Memory Channels
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IC-706 IIG Icom 1.8 - 70cms Transceiver

5 - 100W RF output 1.8 - 50MHz * 2 - 40W RF output AM * 1 - 50W² RF output 144MHz FM * 1 - 20W² RF [illegible]30MHz FM * Receive: LSB, USB, CW, RTTY, [illegible]20kHz - 470MHz Enhanced * Transmit: [illegible]mories * Narrow FM [illegible]t * Sub dial second [illegible]le front panel * 13.8V [illegible]1.9A * Audio: 2W (8 [illegible] Weight: 2.5kg

[illegible]ed version of this popular [illegible] features but in the same physical size. New fe[illegible] include 70cm, crossband split, band stacking register memories. It has a sub dial for easier access to RIT/ second VFO and high quality transmit audio. Power has been increased to 50W on 2m² and 20W on 70cm² as well as narrow FM cabability with the FM deviation set for 2.5kHz, ideal for the new

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Front cover photograph:
The family Newton on holiday at Longleat, Wiltshire, where Richard G0RSN put the AT-11MP through its paces.
Photograph by: Tex Swann G1TEX

REGULARS

68 RadioScene

Our monthly round-up of what's been happening across the bands.

- VHF DXER
- HF HIGHLIGHTS
- KEYBOARD COMMS
- TUNE-IN
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In the news report on my recent Irish trip entitled 'Busman's Holiday' there was so much that News & Production Editor **Donna G7TZB** couldn't find room for it in her limited news space. One photograph I had to leave out is that showing that of EI5IW lolling next to his car was taken by **Oliver Norris**, my Host in County Mayo. Oliver took me to a beach almost at the foot of the famous Croagh Patrick mountain near Westport, where the sea was on either side of us.

We made many contacts on 7 and 14MHz although h.f. DX conditions weren't that good. It was the first outing for my portable trapped dipole antenna (using the *PW* Tennamast 'Tenna-Tourer' mast base to support it as shown).

Another photograph, we didn't have room for, shows the details of the magnificent Kilkenny Marble clock presented to me by the **South Eastern Amateur Radio Group (SEARG)** based in Waterford. It's a lovely clock isn't it? I'm extremely proud and it's something which will forever link *PW*, Amateur Radio and personal friendship across that short (but expensive to cross!) stretch of water. What a wonderful hobby - and way of life for me - we share.

Railway Station Meeting

Everyone jokes about my fascination for anything to do with railways (**Tex Swann G1TEX** bans me from discussing the subject when he's travelling with me!) but such interest and knowledge helps sometimes. I say this because Oliver Norris and I arranged to meet up with old friend **John Doherty EI9GB**, new friend **John Toland EI6FKB** and well known 136kHz operator **Finbar O'Connor EI0CF** in Ballina, County Mayo, **at the railway station**!

Ballina station seemed a good idea at the time - so I could see some trains. But I didn't work out that way as the Irish Republic was suffering from a very long train driver's dispute. There **was a train** in the station but it wasn't going anywhere, although there proved to be an excellent restaurant exactly opposite the station!

Following our friends' 150 mile drive from the far north of County Donegal, we all met up safely - thanks to the railway station - and had an enjoyable afternoon. It was good to see old friends - and meet John EI6FKB (He holds an EI 'B' class licence - so good luck with the Morse training at the Foyle & District Club in Londonderry/Derry John) before they set off back to the north again.

We had a thoroughly enjoyable time together, and one of the reasons for mentioning the occasion in detail is to invite anyone in Ireland, in the same way I've invited individuals or groups on this side of the Irish Sea, to contact me if they too would like the opportunity of meeting up for a chat as I travel through their district. I'd be delighted to respond, and such occasions always seem to end up being events to remember!

Radio Scene Changes

The *PW* Editorial and Art Department teams hope you'll enjoy the 'new look' for the specialised regular columns. Titles have been changed where appropriate to reflect the topics of our specialist authors more accurately.

Whilst on the subject of specialist authors I'd like to formally welcome **Tom Walters** to the 'control desk' of our newly retitled h.f. broadcast bands 'Tune-In' column. And if you listen regularly to the BBC's 'World Service' you may well hear Tom in his 'Announcer's' capacity.

Another hearty welcome is extended to new 'Antenna Workshop' author **Joe Carr K4IPV**. Already an internationally known author, Joe will be a 'regular' on antenna-related topics n the future. Glad to have you aboard Tom and Joe!

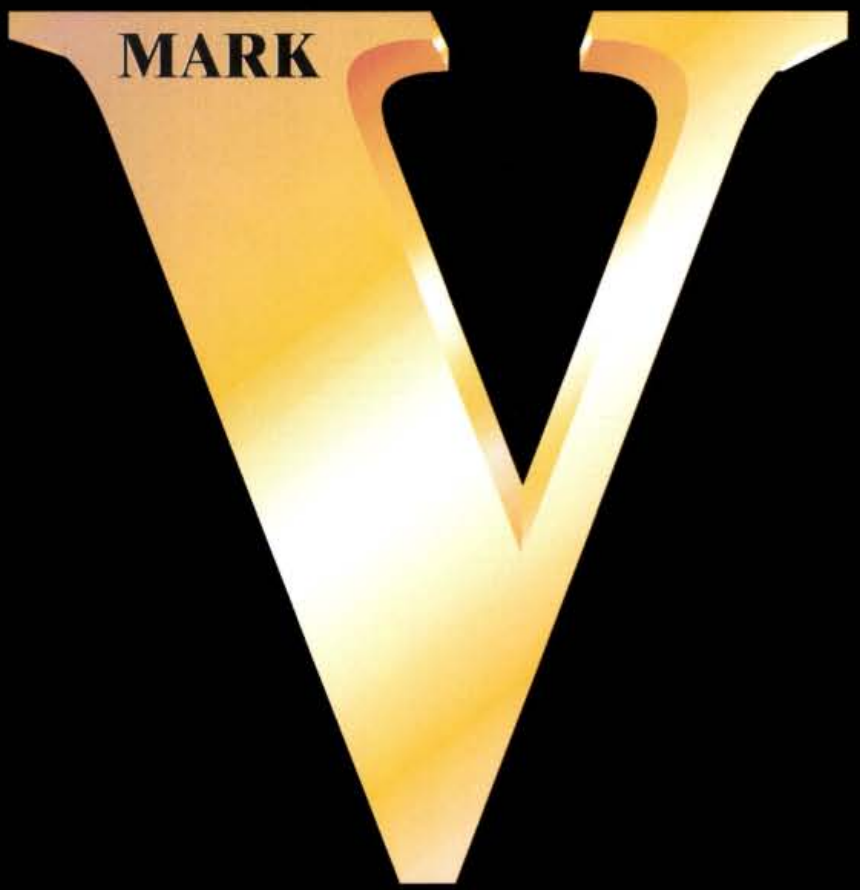
Bumper Issue & Front Cover

Everyone on the *PW* team is delighted to bring you this 'bumper' issue of the magazine. We've worked hard and hopefully our featured 70MHz constructional article will encourage more readers to 'have a go' on this under-utilised band.

On behalf of the *PW* Editorial/Art team I'd like to say I'm very pleased indeed with our latest front cover! However, despite the work of photographer Tex G1TEX and the co-operation of **Longleat House Camping** site, we couldn't have done it without the full and magnificent co-operation of **Richard Newton G0RSN**, his wife **Diane** and sons **Thomas** (the taller) and **Oliver,** who were on holiday and reviewing the AT-11MP automatic antenna tuner at the same time.

We're putting 'everything we've got' into making the front covers as interesting as possible. Your comments on our efforts are always appreciated, so don't hesitate to telephonre, write or E-mail them to us!

Rob G3XFD



Transmitting soon ...

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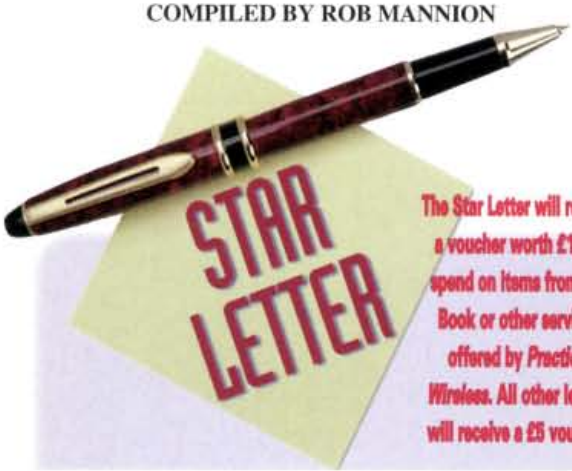
Choice of the World's top DX'ers

Letters

COMPILED BY ROB MANNION



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

Amateur Radio & The Internet

Dear Sir

What a great hobby - and it's all the better for the Internet! I am a long-standing short wave listener (s.w.l.), currently studying the Novice RAE, to at least get on some of the bands. A recent experience, and 'on air' encouragement, from one so far away, really did bring a lump to the throat. A tale well worth repeating for all doubters of this great hobby.

I was set-up, as usual, my trusty FRG-100 by my side, laptop close by, with *qrz.com*, *DX Summit* and *Winlog32*, up & running, and ready for use. The *DX Summit* showed interesting activity on the Isle of Wight, using 14MHz. **Keith G4RZQ** (a good 5 and 6 signal) to be joined by (5 and 9 plus!) **Chris VK2SLO** from Eastern Australia - a fabulous signal and interesting conversation. *Qrz.com* showed VK2 to have an E-mail address, great! A quick s.w.l. E-mail report away, and I continued listening.

A few seconds later, Chris VK2 is reading my E-mail over the air to Keith on the Isle of Wight, and I'm listening to it all in Inverness in the Highlands of Scotland! A definite first for me. In over an hour we exchanged five or six E-mails before Chris went down into the noise. Absolutely brilliant.

I had mentioned during this exchange, that I wanted to get 'on air' one day, and the encouragement was amazing. He on h.f, and me on E-mail! Definitely different. This morning I had more e-mail from Chris, with details and lessons of the Australian exams, and the express offer of help, should I need it, together with loads of other 'stuff', he thought would be of interest.

I'm very keen to get 'on air', and was overwhelmed at the offers of help from so far away. The Internet is a great help to this wonderful hobby of ours, and its use should be encouraged, not thought of as a threat. The two mediums together allow such a vast, and almost instant exchange of knowledge and information, it really does defy belief. I've already got the Internet, but I want Radio as well. What a combination!

Laurence Leech RS178959
Inverness

Editor's comment: That's an excellent result Laurence ... I've never heard of that happening before (although I don't doubt someone else has had something similar occur). What a marvellous use for the Internet, allowing s.w.l.s to participate. More power to your elbow and good luck with the NRAE.

Dear Sir

I read **Donna Vincent G7TZB's** review ('*EURO-WAVE* PMR 446 Transceiver Review' *PW* August, page 28) and I agree with her as to the utility afforded by the PMR 446 system. I say this because my partner Chris and I have been using Motorola equipment in France while on holiday.

From the first floor hotel balcony, a 2.5km path to a coastal position obstructed by slightly taller buildings, was always solid copy. When Chris went slightly further up the coast, the signal from her transceiver was intermittently discernible, but not readable at 3km. It's unlikely that propagation helped as weather conditions varied enormously, no obvious temperature inversions or high pressure were noted.

PMR 446 systems are great for keeping in touch on holiday as Godfrey G4GLM and his partner Chris discovered.

In France, channels 1 and 2 were prohibited as they are permanently allocated to the railways! I believe that Germany has permitted the use of the system, Netherlands will soon and Switzerland (not an EU state) will never allow licence-exempt systems. How's that for a supposedly pan-European agreement?

The UK is the first to implement it - that makes a change! Perhaps the other countries will soon be pressured into doing likewise. While operating the equipment, we never once heard another station, despite being in a busy resort.

Dr. Godfrey Manning G4GLM
Middlesex

Editor's comment: interesting feedback Godfrey! I wonder what the puzzled TGV driver thought of your QSOs. Perhaps they thought you were a UK train service franchisee who'd lost their way in the Channel Tunnel?

Morecambe Bay (Submerged?) Mobile!

Dear Sir

I was interested in the Editor's mention about his QSO with **Bill G0NGE** (*PW* June Page 8) who drives a large fork-lift truck and works h.f. and v.h.f. mobile. I've worked Bill on a couple of occasions on 144MHz but not h.f., I doubt he has the requisite number of hands to work c.w., which is my preferred mode.

A number of years ago, for a couple of years running I had the most uncomfortable series of rides in my life when I and a friend crossed Morecambe Bay/M. Each year, and a number of times a year during the summer... the Queen's (Morecambe Bay) Guide, **Cedric Robinson**, leads parties of walkers, sometimes numbering up to 500 at a time, across the treacherous sands of Morecambe Bay.

On each crossing the walkers are, for safety reasons accompanied by a couple of tractors, one of which tows a trailer which is a cross between a farm trailer and a milk float. It has little by the way of springs!

For two years myself and a colleague loaded my Kenwood TS-50, a Hustler antenna for 3.5MHz, and a truck battery on to the trailer. We then tied it all down and accompanied the trip.

The trailer leaves from Kents Bank on the northern side of the bay and meets the walkers half way in order to pick up stragglers and the lame. You can imagine that once you are a couple of miles out in the bay, surrounded by wet salty sand the set-up works "Quite well" putting it bluntly we had a ball! The journey is however far from flat, particularly at the edges of the bay, and it pays to hold on to everything all at once.

On the second year we were caught in an electrical storm out in the middle of the bay. We formed the only 'pimple' in sight for at least two miles in any direction: a tractor and trailer supporting a 4m high Hustler antenna and a six metre carbon fibre roach pole with a 144MHz antenna on top. As you may have guessed - the antenna coaxial plug came out with extreme alacrity, but needless to say we survived the day!

Roy Walker G0TAK
Lancashire

Editor's Comment: Fascinating story Roy - any others like it readers? If you've operated from The Goodwin Sands, or any other remote spot (normally under water) we'd be interested to hear. Disappointingly through -Roy DID NOT send any Morecambe Bay potted shrimps with his letter!

Access To RAE Test Centres

Dear Sir

I would like to reply to the letter (August 2000 *PW*) from **Colin Topping GM6HGW** regarding access to test centres. When I decided to go for the examination in May 1998 I contacted my local College (Pembrokeshire College) like most people would to ask about availability.

First of all I was told it would be impossible to take the exams there as the papers were not on their list. However a few days later they contacted me to say they would let me sit the papers at a cost of £40 per paper plus the paper cost itself, which I think was £18. This would have given a total of £116.

I almost gave up on the idea of taking the exams, but due to the hard work I'd put in and cost of various courses, books, etc., I searched for a better option. I found another College (Carmarthen College at Llanelli) 72km away **who were very obliging** and it only cost me £24 plus paper costs.

My point is, it's no wonder that there seems to be a decline in new entrants in rural areas when unnecessary obstacles like that I came across are put in their way.

Many Thanks

Mal Broxton
MW0CHI

Editor's comment: Mal has highlighted a real problem, and it's likely to become worse as time goes by. I would fully support any move to put the sitting and control of the RAE into the hands of Radio Amateurs themselves and as I see it - it's the only way forward - and has proved successful elsewhere. Comments from readers who live in countries where this idea is already working would be most welcome.

Dodgy Dits & Dahs?

Dear Sir

Over the last week or so, I have heard a station allegedly using Morse on the 7MHz band, usually around 7.028MHz. After listening intently for quite some time, I finally worked out that the operator was an M0 call. The operator has a tendency to run the whole of the callsign together and it just comes out as a string of seven dahs. When I first heard the transmissions, the operator was just sending de M0??? with no CQ, etc., I have heard the station a couple of times now and have still to work out what the suffix is!

The point of my letter is to ask how such an individual passed a Morse test in the first place? Why wasn't the operator not taught the correct procedures and does he/she expect people to reply when he/she is obviously incompetent? Personally, I will slow down to accommodate anyone, and encourage any newcomers to the c.w. allocations of our bands, but this is just very bad Morse.

There are a number of amateurs in this area who teach Morse and none of them would suggest that a candidate take a test unless they were convinced that he or she was ready. This includes knowing the procedures of a QSO, not to mention the etiquette, such as QRL? before calling CQ.

It's not always easy to find someone in your area to teach Morse, so perhaps this person had to learn using a tutor or tapes. This is no excuse really, because a period of listening would soon teach him (or her) to pick up the necessary. If the person recognises him/herself, please tape record your own Morse and see if you can read it because you are not making yourself understood to me and I suspect many others, I doubt whether you will be able to make sense of your own!

Alan Clay M0AXJ
The Wirral

Editor's comment: Although my own c.w. keying is not very good at all (as many readers know - arthritis is making it increasingly difficult) many of the problems I hear on the bands are from very badly adjusted electronic keyers with almost indecipherable weighting ratios. This leads (for me anyway) to great difficulty in reading the c.w. But, in every day speech we all meet people with strange accents and some who mumble or have speech impediments. So, is it something we should try to overcome (after all we try hard to listen to someone with a stammer in their speech) on the receiving end to help the other station? I enjoy the c.w. mode very much and I know that many people who I work 'bear with me' in my struggle to send the best Morse possible. It's over to you readers ... what do you think?

● Morse - a good keyer helps but it has to be used correctly.

Letters Received Via The 'Internet'

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

New Hobby & New Questions

Dear Sir

Let me explain from the beginning ... I am currently unemployed after being made redundant from my job two weeks ago. While I'm looking for a new job, I thought I would invest in a new hobby.

After seeing your magazine in my local newsagents, I decided to buy it and find out what it's all about. I have always been interested in radios and such like from a young age, I found great satisfaction in going to airports and listening in on air traffic control. I guess I am looking for a similar 'buzz 'now, but don't know where to start. Even after reading your magazine, all I know is that you can buy a Scanner or a Transceiver, which has CTCSS, built in modem and 1750Hz Tone?

What's it all about? Do you think you could do an article for a completely new 'amateur' like myself, or just give me some beginner's advice.

Marcus Davis.
South Wales

Editor's comment: Marcus has raised a interesting point. As feedback from readers regarding 'Radio Basics' projects, etc., has proved there is a real need for *PW* to carry on with simpler projects - perhaps that raised by Marcus adds another need: a separate 'beginner's guide' so to speak. So, in order that we can prepare something to help, I would be very pleased if you could write in with comments, queries and other ideas. All letters will be read, although I hope you understand that I won't be able to reply to everyone individually (I'll acknowledge your responses in 'Keylines'). Thank you in anticipation!

News

COMPILED BY DONNA VINCENT G7TZB

Headline News

Radio Active Joins PW & SWM

We are pleased to announce that PW Publishing Ltd., publishers of *Practical Wireless* and *Short Wave Magazine*, have added *Radio Active Magazine* to their portfolio of titles. With effect from the November issue *Radio Active*, edited by **Elaine Richards G4LFM**, will join our stable and will be available from our Book Store as well as newsagents.

Radio Active's content is broadly based covering many aspects of radio communication from its roots in CB, through commercial usage and general applications to short wave listening and Amateur Radio. In fact, there's something for everyone and it's a good introduction to radio applications as a whole.

If you haven't seen *Radio Active* then look out for it at newsagents and if you're a regular reader we can promise you plenty of interesting reading in the months to come. Priced at £2.25 you'll find it's the perfect compliment to *PW & SWM* offering you another perspective on the fascinating world of radio communication.

Canadian Morse Changes

The *PW* Newdesk has received news that the National Amateur Radio Society for Canada, Radio Amateurs of Canada (RAC) has approached Industry Canada (their equivalent of the Radiocommunications Agency) to discontinue the 12w.p.m. Morse requirement and replace it with a 5w.p.m. test.

The RAC has over the past year consulted the Canadian Amateur Radio community over the issue of Morse and the findings clearly show that there is support towards dropping the 12w.p.m. test, although there are many against the change. However, it is noted that any decision to drop the current requirement for 12w.p.m. would be in keeping with things that are developing in Amateur Radio in other parts of the world, as well as simplifying reciprocal operating.

The President of the RAC, **Kenneth Oelke VE6AFO** had requested that Industry Canada should consider 'beefing up' the existing written tests in a bid to strengthen operator knowledge and skills regarding station set-up and operation, on-air procedures and operating practices. Watch this space for more news as it unfolds.

Have You Been Offered an INAC PSU?

If you've been offered an INAC 25Amp power supply for sale recently the chances are that it's come from a quantity that were stolen from an out-building at Waters & Stanton's premises at Main Road, Hockley, Essex on 8 August 2000. The Spanish made p.s.u.s had only just arrived in the country and hadn't been placed on general sale when the break-in occured.

In total five pieces of model FG-25 and 36 pieces of model FA-25 were stolen. If you have been offered one of these for sale or can offer any information regarding the break-in please contact **CID** at **Rayleigh Police Station, High Street, Rayleigh, Essex Tel: (01268) 775533** or **Waters & Stanton** on **(01702) 206835.**

Last Minute RAE

Stop Press: Here are details of some more RAE courses starting this month, but you'll have to hurry as some courses are already underway:

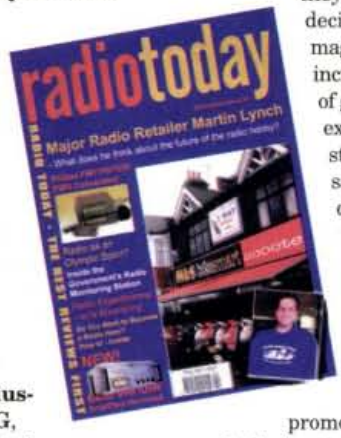
Monday 11 September 2000 saw the start of an an RAE course in preparation for the May 2001 exam at **Newstead Wood School for Girls**, Avebury Road, Orpington, Kent. If you're quick you can still enrol by contacting the Bromley Adult Education College, Widmore Centre, Nightingale Lane, Bromley, Kent BR1 2SQ, Tel: 0208-460 0020. All other enquires to course tutor **Alan G0HIQ**, **Tel: (01689) 831123**.

North Cheshire Radio Club are running NRAE and RAE classes every Sunday from 7pm. Although the courses started on 10 September, enrolements will be accepted until the end of November at the Morley Social Club, Morley Green, Wilmslow, Cheshire. For details contact **Gordon Adams G3LEQ** on Tel: **(01565) 652652** or FAX: **(01565) 634560** or E-mail: **g3leq@cwcom.net**

Warrington College Institute will be running an RAE course on Thursday evenings from 7pm starting on the 14 September. Enrolments are taking place on weekdays at the Winwick Road Campus, Warrington throughout, September, October and November. For more details telephone **Gordon Adams G3LEQ** on **(01565) 652652** or the College on **(01925) 494494**.

Radio Today Closes!

Radio Today, the RSGB's news-stand magazine is to cease publication after it's October 2000 issue. After two years of publishing, under the Editorship of **Steve Telenius-Lowe G4JVG**, the RSGB state in their press release that they have taken the decision to close the magazine due to the increasing difficulties of getting enough exposure on the news-stands. The Society say that they will continue to focus their efforts into further improving and developing their house journal *Radcom* as well as concentrating, supporting and promoting Amateur Radio in schools.



Busman's Holiday For G3XFD/EI5IW!

Rob Mannion G3XFD/EI5IW eventually set off for another Irish holiday after an enforced stay in hospital. Rob writes:

"Choosing to go to Ireland on their early August Bank Holiday weekend - nearly proved to be a big 'peak time' mistake, but thanks to all *PW*'s friends it wasn't! The ferry crossing from Pembroke Dock to Rosslare on Friday 4 August was smooth, but to say the Irish Ferries ship the *Isle of Innisfree* was crowded is an understatement!

● Smiling but (uncharacteristically) speechless for once! Rob pictured with Mark Wall EI7IS, after receiving the inscribed Kilkenny Marble Clock.

The Republic of Ireland may have less than 4 million people - but I can tell you that everyone of them (plus foreign tourists like me) seemed to be on the road that weekend - Dublin must have been empty! Because of this, and the shortage of accommodation, as I was heading for County Mayo my good friend **Oliver Norris**, a keen s.w.l. and member of the very active **Mayo Radio Experimenters Network** kindly invited me to stay at his delightfully situated bungalow near Westport.

Oliver, and his Wife **Briege** made me very welcome and I felt very much at home indeed and were marvellous hosts. Thanks folks!

On Sunday 6 August: Oliver, along with **John Corless EI7IQ** (Vice President of the **Irish Radio Transmitter's Society**) and friends organised an informal 'get together' at the 'Hotel Westport'. The fact that the meeting was successful and thoroughly enjoyed by everyone can be judged by the fact that we were still chatting at 1am. Indeed, we then decided to have another session on the Tuesday, very enjoyable and some of the topics covered will be mentioned in 'Keylines' soon.

Wednesday found me back on the East coast of Ireland. My short 'busman's holiday' was made more enjoyable by the fact that only two weeks before I was due to go to Ireland an invitation came from **Mark Wall EI7IS** to visit the **South Eastern Amateur Radio Group** (SEARG) in Waterford arrived. It was my pleasure to attend the city so famous for 'Waterford Crystal' and the surrounding beautiful countryside. Here the meeting was again thoroughly enjoyable - with many young faces visible. (This recently reformed group is **doing exceptionally well**).

After presenting the '*PW* Origins, Past Present and Future' talk I was presented with a beautiful inscribed Kilkenny Marble clock as a memento of my visit. For once I was left speechless in gratitude, such is the bond of friendship between Radio Amateurs in our group of Islands!

The final event of my Busman's Holiday was on the Thursday evening when I went to see old friends at the Tipperary Amateur Radio Group in Clonmel. Thanks to **Liam EI7FE**, **Hugh EI2HI** and everyone for the evening, which ended up with me getting to bed back at Tagoat (near Rosslare) in Wexford at 3am!

● This time the self-timer on the camera worked! Rob E5IW and some of the South Eastern Amateur Radio Group in Waterford on Wednesday 9th of August.

Finally, I'm pleased to say that, appropriately as I now have a G and EI licence, I'm now a member of both the RSGB and IRTS. And I'm very grateful to say that my first year's membership to the IRTS was a personal gift from **John Corless EI7IQ**, reinforcing the bond I've already mentioned that exists between Amateurs on our Island group. Thank you John, and everyone for a holiday to remember!

Icom Flying High

Icom UK Ltd., Herne Bay, Kent recently aided British adventurer **David Hempleman-Adams** in his succesful bid to cross the Arctic Circle in an open basket balloon. David contacted Icom's **Chris Ridley G8GKC** back in March in an attempt to source some communications equipment as the Iridium 'phone sets he was going to use were proving unreliable.

Chris recommended that David use two h.f. IC-M710 GMDSS marine transceivers, an IC-A3E and a IC-A22E v.h.f. airband transceiver and various antennas, power supplies, battery cases and waterproof radio cases. The IC-M710s were recommended for use as the main operating transceivers between the balloon and the base in Birmingham while the airband transceivers as back-up and for communication with the rescue helicopter. David also took a trip to Icom (UK) Ltd.'s headquarters for a training session using the equipment.

● Chris Ridley G8GKC (left) with David Hempleman-Adams and the IC-M710.

David's trip set a number of records, including:

* First balloonist to fly solo across the Arctic Ocean
* First balloonist to fly solo to the North Pole
* Longest solo flight by a British balloonist at 132 hours
* Altitude record for the Arctic at over 15000ft

All in all a great success for radio and flight!

Please Note

Bob Griffiths G7NHB, RAE instructor has reminded the Newsdesk of the following:

Entires for the City & Guilds Radio Amateur Examination on Monday 11 December 2000 have to be with C&G by **1 November 2000**. Students who are part of an organised course will almost certainly be covered by their instructor. But external candidates need to contact their local examination centre by the middle of October at the latest to give the centre time to process their entry and send it to City & Guilds by 1 November 2000. Late entries can be difficult to process and also carry a substantial surcharge.

So, with that in mind make sure you don't miss out!

Has it really been around that long?

75 YEARS OF TELEVISION

Ray Herbert G2KU looks back at how John Logie Baird made a significant breakthrough for television 75 years ago!

We all take television for granted seeing it as a part of everyday life but until this month 75 years ago television did not exist. The 2 October 2000 sees the 75th anniversary of John Logie Baird making history by becoming the first person anywhere to achieve **true television**. That is, **the instantaneous reproduction of recognisable images from three dimensional objects, showing correct graduations of light and shade.**

The man without whom there would be no television - John Logie Baird.

Several other experimenters were pursuing the same objective, notably C. F. Jenkins (USA), D.von Mihaly (Hungary) and Dr. Fournier d'Albe (UK). Baird and Jenkins put their faith in the Nipkow disc, Mihaly favoured vibrating mirrors and Dr d'Albe used a complex arrangement of selenium cells and acoustic resonators.

The key to the attainment of true television depended upon the ability to use light reflected from different areas of the object. The low output from a light sensitive cell could be overcome by shining a bright light directly at the cell, interposed geometric shapes providing shadowgraphs. By comparison, the amount of light reflected from a coloured surface, the human face for example, was tiny, and that represented the problem in moving on from shadowgraphs to real television pictures with half-tones.

John Baird used reflected light for his demonstration at Selfridges (**Fig. 1**) store in April 1925, but only succeeded in showing a cardboard cut-out of a face. Recently discovered letters between Baird and his financial backer Will Day, indicate that he was using reflected light at Hastings in 1924.

A letter to Day dated 16 June 1924 states "I have just got the cell sufficiently sensitive to work by reflected light, that is actual objects, not transparencies". The suggestion that Baird had improved upon the sensitivity of the cell itself lends credence to the possibility that he was using a home-made device, since the sensitivity of a commercially manufactured photo-electric cell cannot be altered by the user.

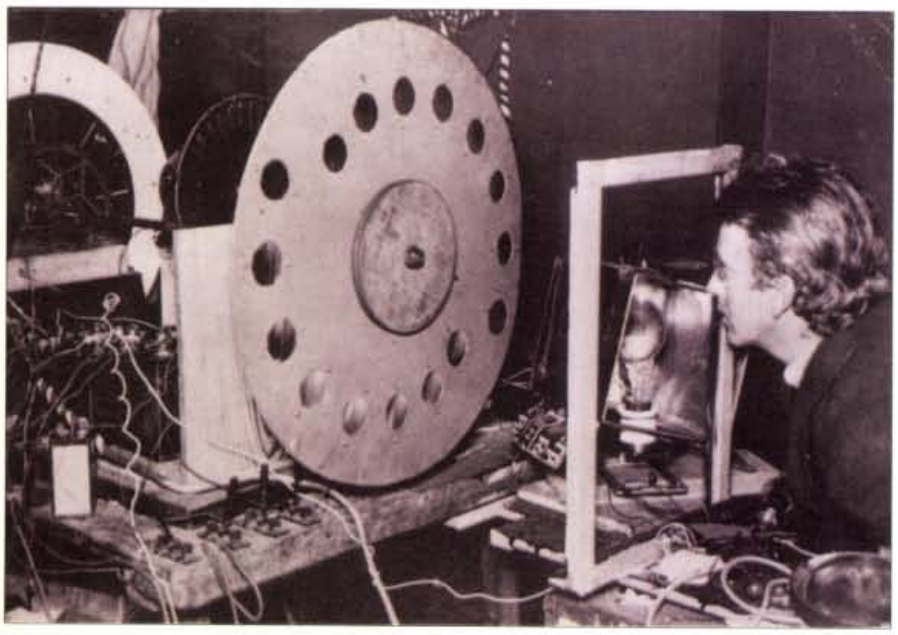


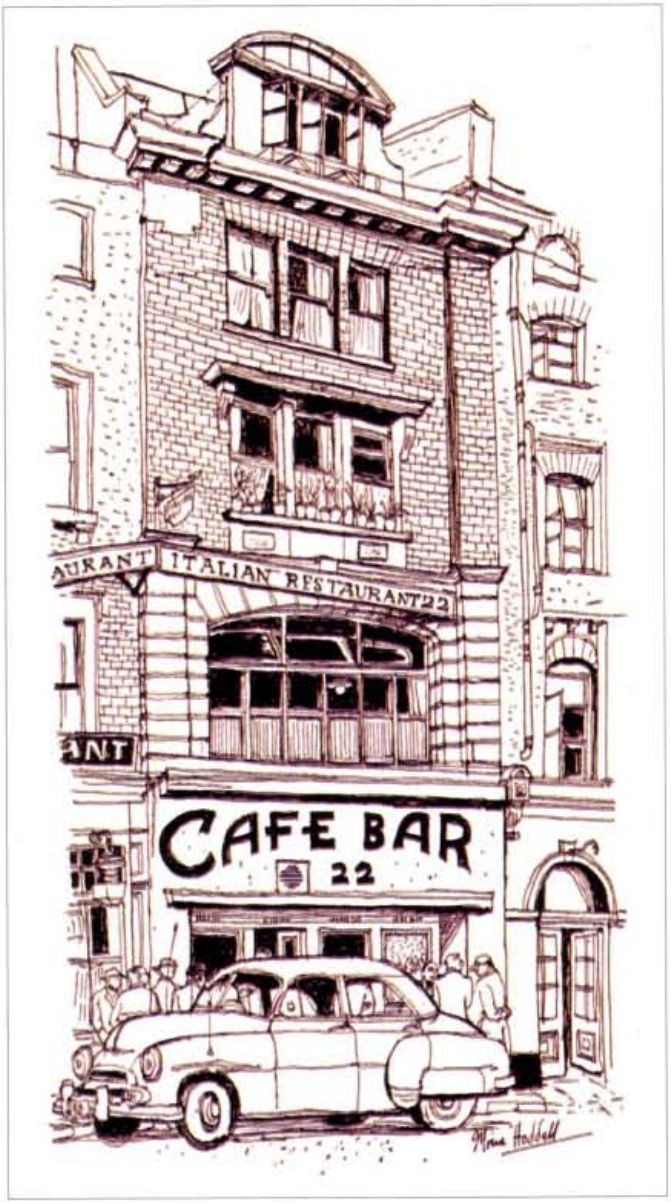
Fig. 1: The equipment used for the 1925 demonstration at Selfridges.

The Breakthrough

Throughout the summer of 1925, Baird continued his experiments at 22 Frith Street, Soho, London (**Fig. 2**) still working alone with less equipment and test gear than would be possessed by the average wireless enthusiast. On 2 October 1925 he finally achieved his goal, real television, and described the important breakthrough in his autobiography, *Sermons, Socks and Television*.

"Funds were going down, the situation was becoming desperate and we were down to our last £30 when at last, one Friday in the first week of October 1925, everything functioned properly. The image of the dummy's head formed itself on the screen with what appeared to me almost unbelievable clarity. I had got it! I could scarcely believe my eyes, and felt myself shaking with excitement.

"I ran down the little flight of stairs to Mr Cross' office, and seized the arm of his office boy William Taynton (**Fig. 4**), hauled himself upstairs and put him in front of the transmitter. I then went to the receiver only to find the screen blank, William did not like the lights, and the whirring discs and had withdrawn out of range. I gave him 2/6 (12p) and pushed his head into position. This time



● Fig. 2: John Logie Baird occupied the 3rd Floor of 22 Frith Street. (Illustration by Moira Hoddell for the Royal Television Society).

he came through and on the screen I saw the flickering, but clearly recognisable image of William's face - the first face seen by television".

Over 50 years ago he made a recording of his recollections of that eventful day. In particular William remembers several powerful lights with tin reflectors, which were nearly touching his face. The terrific heat made his nose bleed. Later, in 1929, at Baird's invitation he joined the company and remained there until 1964.

John Baird did not make any announcement at the time regarding this important milestone in the progress of television. Possibly, he wished to avoid alerting his competitors to the current situation, but a more likely explanation was discussed in the January 2000 issue of *PW* in a short article on 'Baird's Lost Letters'.

The relationship between Day, the hard-headed businessman and Baird, the impecunious inventor, had now deteriorated to the point where Will Day had stopped paying the rent for the Frith Street premises and was actively looking for someone to purchase his shareholding. This situation did not appear to worry Baird and it seems possible that he already had plans for the future which did not include Day, who did, in fact, resign in December. Baird's old friend, Oliver Hutchinson, took over his position and shareholding.

In the meantime, the image quality had improved and demonstrations could be given with confidence to the press. The *Daily Express* carried a report on 8 January 1926 followed by a demonstration to members of the Royal Institution shortly afterwards. "The international race for the perfection of television...has been won by Great Britain" proclaimed the *New York Times* in their edition for 23 January.

A description of the apparatus he used during 1925 is to be found in a paper for the Radio Society of Great Britain (RSGB) which was read by Lt. Col. J.R. Relf at the Institution of Electrical Engineers in December 1926 because John Baird was unwell. *Experimental Wireless* (*EW*) for that month published the paper in full.

The *EW* describes a system using a lens disc containing two identical sets of eight lenses arranged in staggered formation. This provided an image divided into eight strips. To obtain a finer subdivision a rotating spiral slot quadruples the initial scan to provide a 32-line picture.

References by Baird, Taynton and others to the discomfort from the glare and heat of powerful lamps confirms the use of the floodlight system in those earliest days. Also, all the photographs up to mid-1928 show people being televised under an array of floodlights. From then on, W. W. Jacomb, the chief engineer, introduced the spotlight method of transmission. This represented a complete reversal of previous techniques as the subject was now in a blacked-out studio, in front of a hole in the wall through which shone a brilliant pin-point of light that scanned the scene in sequential vertical strips.

Experiments with television were being carried out at the Admiralty Research Laboratories (ARL) between 1923-26 and Prof. Russell Burns has provided details of this work in his IEE paper 'Early Admiralty Interest in the Direction of Aircraft'. The activities at ARL were wide ranging and included scanning systems incorporating lens discs, rotating and oscillating mirrors.

Light sensitive cells formed an important part of ARL's investigations and covered selenium and thalofide cells, also vacuum and gas filled photo-electric devices. Despite the impressive array of technical facilities available to them, they were unable to equal the results being obtained by J. L. Baird. There must have been some subtle ingredient

● Fig. 3: John Logie Baird looking down the viewing tunnel of the television receiver used at the demonstration to members of the Royal Institution.

***"The international race for the perfection of television...has been won by Great Britain"* proclaimed the *New York Times* in their edition for 23 January 1926.**

75 YEARS OF TELEVISION

in the design of his apparatus which enabled him to keep ahead.

The Light Cell Mystery

Significantly, in his description in *Experimental Wireless*, Baird wrote "The trouble did not lie in the mechanical or optical part of the apparatus, but on the electrical side of the problem, and essentially in the light sensitive cell". Considerable mystery surrounds this device, no photographs have ever been seen and it was missing from the equipment donated to the Science Museum late in 1926. It's interesting to note that John Baird always referred to a light sensitive cell and avoided giving a more revealing description.

Probably, the most useful clue is contained in E. G. H. Stewart's report in April 1926 of a private demonstration given to him by Baird. This stated that the light cell was designed by himself, it possessed great sensitivity and differed from other cells on the market. This ties up with comments made by Baird in a 1925 article where he confirmed it was neither a photo-electric cell nor a selenium cell, but a colloidal (fluid) cell of his own invention.

Thalofide cells had been around since 1920 and were suitable for low definition television work since they had a much quicker response time to changes in light values than selenium. Did John Baird use a thalofide light sensitive cell in a colloidal form? Possibly, but the strange thing is, that in later years no one thought to ask him what type of cell he had used.

Fig. 4: William Taynton, the first person ever to be seen on a television screen, holding a large picture tube in 1935.

The President of the Television Society, Sir Robert Renwick, unveiled one of the familiar LCC blue plaques at Frith Street on 24 October 1951. In his address he said, "The Television Society, which is now celebrating its Silver Jubilee, owes its foundation to Baird, and is proud to have had him as its first Honary Fellow. Although this memorial plaque stands in the heart of London, his real memorial is in the forest of television aerials that spread over the whole of the country. When we next look at one of these, we will remember John Logie Baird who first showed us television". *PW*

Further Reading

The Institution of Electrical Engineers is publishing twin books, each dealing with different aspects of Baird's achievements. The first, *Restoring Baird's Image* by Donald McLean is available now. The second, by Professor Russell Burns, *John Logie Baird, Television Pioneer*, is due for publication shortly.

Cost:	£169 for kit, £199 ready assembled
Company:	Hands Electronics
Contact:	Sales
Tel:	(01239) 698427

The AT-11MP Automatic Antenna Tuner

Richard Newton goes on holiday with the AT-11MP auto antenna tuner

Richard Newton G0RSN, our specialist mobile and hand-held reviewer tells us how excited he was to get the chance of trying an automatic antenna tuning unit. He's now also added 'portable operating' to his author's portfolio!

I was very excited when I was asked to review the AT-11MP automatic antenna tuning unit (a.a.t.u.) manufactured by LDG Electronics, supplied by Hands Electronics. I was also especially interested when I was told that it had a special interface for the Icom IC-706 and coaxial socket fittings.

When I collected the a.a.t.u. I could hardly hide my surprise at just how small and how light it was. It was about the same size as the '706. The AT-11MP is available as a 'ready to go' unit or in kit form, and the *PW* team had arranged for me to review the 'ready to go' version.

Pleasing To The Eye

The AT-11MP is pleasing to the eye and has a professional and well constructed feel to it. I was also extremely impressed at the quality of the craftsmanship both in construction and manufacture.

All controls for the AT-11MP are on the front panel, including the master **On/Off** switch and a l.e.d indicator to show the unit is powered. The next switch selects either fully **Automatic** or **Semi-Automatic** tuning.

The next two toggle switches are those for **Fine Tuning** or **Bypassing/Resetting**. There is also push button for evoking a **'Tune Solution'** (while in Semi auto mode) and lastly the s.w.r meter with a very effective back light.

On the rear panel the AT-11MP has two SO239 u.h.f. coaxial cable connectors, a jack plug for the IC-706 interface, a d.c power socket and a 9 pin D plug for the optional Remote Control Unit. The unit is supplied with a long power lead and plug and the IC-706 interface cable and also comes with a hand book.

I have to say that as **a 'user manual' the book does fall a bit short**. This is largely due to that most of it is given over to the construction of the kit. However, in this respect the book seems to be excellent with good explanations and clear colour photos of different stages of construction.

Richard Newton G0RSN has been writing reviews for *Practical Wireless* for eight years. He has been interested in Amateur Radio since he was little as his father was an Amateur. He specialises in h.f. mobile rigs.

Very Portable!

Still enthusing at the very portable size and weight of this impressive little unit I felt I should at least read some of the book before jumping in with both of my size 10s! I read that the AT-11MP was designed to work on frequencies between 1.8 and 30MHz. It will also operate with input powers of between 5 and 150W.

The tuner uses a switched 'L' with 256 capacitors and 256 inductors and High-Low impedance settings, providing over 130 000 tuning combinations. The unit will tune impedances of about 6 to about 850Ω (an s.w.r or about 10:1).

With a tuning range of 0 to 390pF and 0 to 20µH the AT-11MP's 'L' network will tune most coaxial fed antennas, such as dipoles, verticals or beams. Long wires can be tuned **as long as there is a balun installed between the tuner and the antenna**.

The AT-11's book told me that a tuning solution would be found between 0.1 and 6 seconds, on average one would be found after about 2.5 seconds. This estimate turned out to be very realistic.

The cross needle s.w.r and power meter will give an indication of s.w.r and r.f. power when the unit is powered. However, as the power is actually calculated in the processor, the meter will not function when the power is off.

The unit is initialised immediately the power lead is connected, and it draws a small amount of current even when the main switch is off. And although the AT-11 does not remember tuning solutions it will remember the last tuning solution it made as long as it is not disconnected from the power.

In Auto mode the tuner will seek a 1.5:1 (or better) match every time that the s.w.r rises above 3:1. In semi-auto mode the tuner will only seek a match if the **Tune** button is pressed.

The tuner will always require at least 5W of r.f. in order to tune. In either **Auto** or **Semi-Auto** mode you can fine tune the solution found by the AT-11MP by using the **Up/Down** capacitor and inductor controls.

Another feature of the AT-11MP is that it can provide an 'audio feedback' indicator facility. This will then give a number of audible beeps ... a different number corresponding with different s.w.r ranges. (Very useful for operators who suffer from poor eyesight, and also for a mobile or portable set-up where it would be difficult to actually see the meter).

On The Air

I decided to combine my on-air tests with a caravan and camping holiday to

Fig. 1: Richard shows his two sons Thomas (left) and Oliver the joys of portable operating.

my birth-place, Minehead in Somerset. I took my IC-706 and the AT-11MP, all my mobile whips, a 20m long wire with balun and some other bits and pieces. Oh yes, I also managed to squeeze in my wife, **Diane** and our two sons, **Thomas** and **Oliver!**

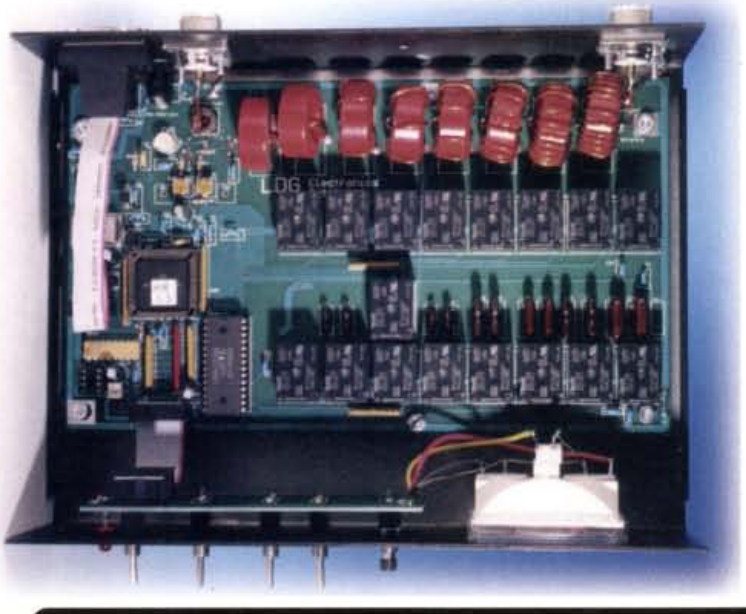
In setting-up I connected the IC-706 and the AT-11MP to the 30A power supply I've got in the caravan. **Note:** It's important remember to turn the AT-11MP on **before the '706**, as the '706 then 'finds' the a.a.t.u. You can then control the tuner using the **Tune** button on the transceiver and the AT-11MP will also tell the '706 when it's tuned to the antenna. The whole operation was wonderfully simple and straightforward!

Unfortunately I was unable to set up the long wire due to lack of space, so I used the mobile whips (on the car) with a coaxial cable feed. The whips are only resonant on parts of the bands they cover so I was looking forward to the freedom of an entire band using the AT-11MP.

On 7MHz

The 7MHz band was tried first using a centre loaded vertical antenna and **Nigel M5AFZ** in Cheshire was the first contact. Nigel was a huge 5 and 9 signal and he gave me a similar report. This excellent first contact was followed by another with **John M0TOR** in Doncaster who was a super signal, we were able to give one another a good 5 and 5.

Fig. 2: Inside the box!



Now, they say the first sign of madness is talking to yourself! well my next contact using the AT-11MP was with **Richard Newton G0EWH** (also /P on a caravan site) in Huntingdon in Cambridgeshire. The contact was a bit up and down with 5 and 5 being the best report.

With the temporary set-up I found it was best to use the AT-11MP in the **Semi-Auto** mode because the wind was blowing the mobile whip, momentarily sending the s.w.r above the 3:1 mark. This meant that the tuner immediately started to retune while I was talking. Setting the tuner to Semi-Auto mode cured this problem straight away.

Although I enjoyed using the IC-706 tuning interface on the AT-11MP I preferred using the **AM** setting on the '706 to force the AT-11MP to tune.

Spurred on by my 7MHz success I decided to use my old multi-band coil and whip set. The best way I can describe them are a set of poor man's G-Whips. Some are quite good but others have been unusable due to the fact I could never get a decent s.w.r.

I listened round the bands and 21MHz seemed to be lively. The AT-11MP **was wonderful**, it tuned the beleaguered 21MHz whip from a 5:1 match to about 1.4:1- Wow!

My first contact was a pile-up breaking call as **Ted TK/P HB9TL** (a Swiss operator operating from Corsica) I got my 5 and 9 report confirmed and that was it! Next, although I did not manage to work him, I also heard **Chai HS1NGR (Thailand)** who was a superb 5 and 9 plus signal. The next confirmed contact was with **Costas SV2CXI** from Greece. I then went to 28MHz and enjoyed a QSO with **Laci HA7UG** in Budapest. I've not had as much fun working mobile/portable in a long while!

The AT-11MP did an excellent job and gave me a lot more scope with my cobbled together portable station. However, I had noticed that on a couple of occasions the s.w.r bridge had struggled to show the higher r.f. output levels.

I was aware that the AT-11MP had been set up using low power, so having taken some advice, I decided to test out some of the instructions in the handbook. Using a simple multimeter, a dummy load and my Kenwood TS-850 set to 50W c.w. **Tune** setting it took me about 10 minutes from start to finish to slightly adjust the s.w.r meter. I had no trouble at all following the instructions.

At home I also tried the AT-11MP out with my R5 vertical and my TS-850. It performed even better in these circumstances, finding most tuning solutions within a second.

Product

The AT-11MP Automatic Antenna Tuner

Pros & Cons

Pros: Portable, lightweight, professional and well constructed 'feel' and provides an audio feedback indicator.

Cons: User manual is more of a construction manual, doesn't keep tuning solutions in the memory and it's a little noisy.

Accessories

Long power lead and plug and interface cable for IC-706

My thanks go to
Sheldon Hands,
Hands Electronics, Tegryn,
Llanfynach, Pembrokshire SA35.
Tel: (01239) 698427
for supplying the AT-11MP.

Summary

I was very impressed with the AT-11MP. Despite the fact it does not keep tuning solutions in memory and it's a little noisy on tuning compared to other auto a.a.t.u.s I've used, I consider that it's small size, coaxial cable connector and lightweight design more than makes up for these.

The AT-11MP naturally lends itself to mobile or portable work. It enhanced my portable working ten fold. It did just as well, if not better, in a home station situation. Altogether it's a very impressive bit of kit.

RRP:
£169 for the kit version, £199 for the built and tested version Plus £6.50 P&P (UK), £10.50 P&P (overseas)

Join Ben Nock G4BXD as he constructs ...

A 3.5 MHz 'PB' QRP TRANSMITTER

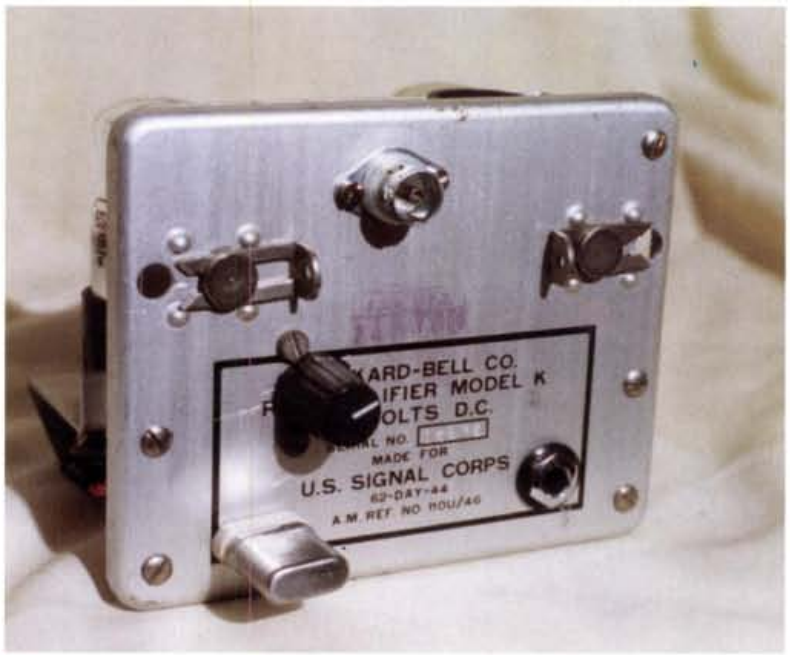
Ben Nock G4BXD, one of *PW*'s regular 'Valve & Vintage' authors, tells you all about a 3.5MHz 'PB' QRP Transmitter which he designed and constructed using valves from a Packard Bell audio amplifier instead of semiconductors.

I had this sudden, unexplained interest in building a QRP transmitter but, due to my interest in valves I wanted to use them rather than one of the many similar semiconductor circuits normally seen described for this type of operation. Also, being a very lazy constructor, I wanted to do as little metal work as possible.

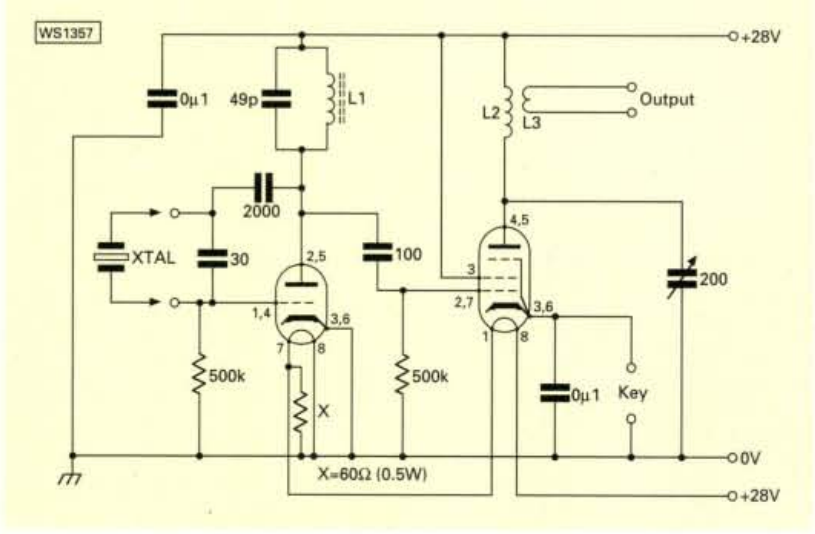
It turned out that I had just the thing in my junk box - I found I had several spare Packard Bell audio pre-amplifiers, model K. These were used in front of various military sets during the late 1940s and early 1950s, etc., in order to increase the modulation on a.m., the unit uses two valves and runs off a single 28V source in as both heater and high tension (h.t.) supply.

As I had several units in use on various military sets already, I felt I could spare one of the extra stock of Packard Bell units I had for a trial, hence the title: 'A 3.5MHz 'PB' QRP Transmitter'. I removed most of the components from inside: a couple of audio transformers; a large capacitor and a few smaller resistors.

The two valves, an 6SL7 and a 28D7, had their heaters wired in series across the supply but, as the 28D7 took more current than the 6SL7, the 6SL7 has a resistor in parallel with its heater. This resistor is left in place, marked 'X' on the circuit diagram, 60Ω 0.5W.



● 'Old for new' - a simple transmitter made up from an audio amplifier (see text).



● Fig. 1: Circuit of G4BXD's 3.5MHz 'PB' QRP transmitter.

Transmitter Design

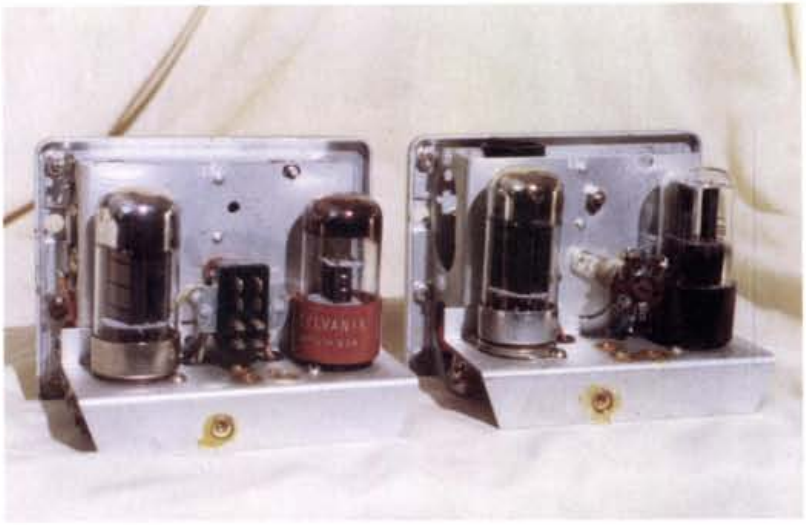
The design for the transmitter came straight out of my head but was no-doubt based on many of the circuits I have seen over the years. Let's face it, there are only so many variations you can devise with a valve, resistor and capacitor so there will inevitably be very close similarities to other circuits. (See **Fig. 1**).

The 6SL7 is a double triode, so both sections were simply strapped together, tuned circuit in the anode feed and the crystal wired between the anode and grid. I was lucky in that I have a very large junk box of tuned circuits and the like.

I chose a coil that appeared to be near what was needed and with the grid dip oscillator (g.d.o.), confirmed its frequency. I chose 3.5MHz as the operating frequency but for those interested in DX working I see no problem in making the transmitter work on either 7 or 14MHz, though I'm not sure how well these valves will work up there.

If you have to wind a coil, you might start with about 70 turns of 34 s.w.g. wire on a 9mm former with dust slug inside. The p.a. coil was again rescued from the junk box, this time it was on a former about 25mm and had about 35 turns of 24 s.w.g. enamelled on it, air spaced.

The antenna coupling winding is about four turns



● Fig. 2: Before conversion (left) and after re-building (right) - the 'PB' transmitter is re-born from the audio amplifier unit (see text).

of 1mm plastic-covered wire around the cold end, that's the end away from the anode connection. There's a large space just behind the front panel, once a large metal cased capacitor is removed, that is ideal for mounting the p.a. coil and tuning capacitor and there's also enough space for the key jack and crystal socket.

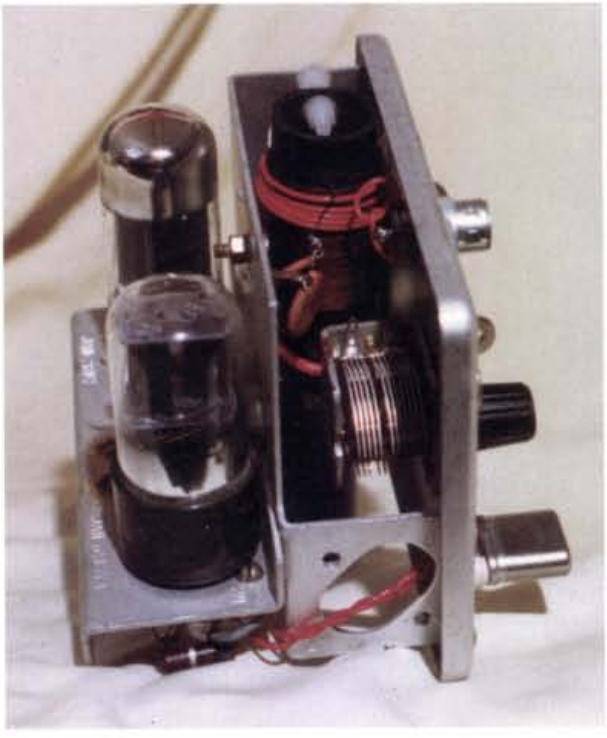
Straightforward Construction

Construction is straight forward, there are no special points to watch out for, the few components that are used fit easily into the space available. After removing the original components (if you've got one of the PB units) you'll find there are five chassis mounted decoupling capacitors, these make ideal mounting points for the h.t. rail and all the components that emanate from it.

Initial trials led to a QSO with **Ray G3IFF** on the south coast at a range of 193km on the normal Sunday morning military users net with a 449 report. Other contacts included a very tough QSO with (fellow *PW* author) Gordon King **G4VFV** in Brixham, Devon at 241km with a 539. Not bad considering Gordon only uses indoor antennas! I also received an amazing report of 579 from **Gerry G3LEO** near Scotch Corner (North Yorkshire)...not bad with an r.f. output level in the region of just over 100mW.

While on the subject of attempting QRP QSOs, I think it's worth mentioning that, as with any QRP operation, it's the antenna and the antenna tuning unit or a.t.u. that has to be up to scratch. There's no point in generating milliwatts of power from the transmitter only to lose most of it in the a.t.u. If you can get all of the available power into the antenna, you stand a much better chance of working other Radio Amateurs, regardless of the power used.

● Fig. 3: The p.a. coil and tuning capacitor with plenty of space to spare in the completed 100mW output low voltage valved transmitter. Perhaps Ben's project will give you ideas to convert similar chassis units to a 'new life'?



Future Options

Future options on this design could be to split the heater and h.t. rails and use two 24V supplies, batteries maybe and feed one to the heaters and the pair, in series, as the h.t. The valve data book states the h.t. for the 28D7 anode and screen is 28V but no doubt it would work with 48V on it for short periods - this should increase the r.f. output of the set.

I used a very simple mains p.s.u, 12-0-12V transformer, full wave rectified across the 24V and a jolly big smoothing capacitor. It's nice - and strange - to work on a valve transmitter where it doesn't matter if you accidentally touch the h.t. line!

With the success of the transmitter, I'm now thinking of making a receiver out of another unit. I was thinking of using the 28D7 as a regenerative detector with the 6SL7 as the audio amplifier. I'll let you know how I get on! *PW*

Your Attention Please!

Filtering Necessary

Even with the extremely low power output of the 'PB' transmitter - adequate 'low-pass' filtering is necessary due to the 'harmonic rich' nature of the crystal oscillator and 'p.a. stage'. Please bear this in mind is you decide to build a higher power version of this very popular basic design. **Editor.**

Coil Winding

If you love building your own projects **but hate the prospect of winding coils**, **'Barrie' Rogers G0SQR** described the perfect project for you in the April 2000 *PW*. The **'Little Imp' Coil Winder** is just what you need to make the winding of those coils much easier and more fun to do.

If you would like to build your very own 'Little Imp' then you can order a back issue of the April 2000 *PW* for just **£2.50** by calling our Book Store on: **(01202) 659930**.

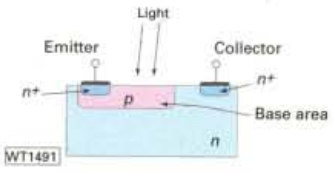
PHOTO-TRANSISTOR?

This month Ian Poole G3YWX investigates transistors that are used as photo-detectors.

Photo-detectors are widely used as they can provide advantages over their single junction counterparts. William Shockley first proposed the idea in 1951, only two years after the first transistor had been demonstrated. Since then photo-transistors have been used in a variety of applications and their development has continued.

Structure

Ordinary transistors are sensitive to light if the device itself is exposed and not encapsulated in a light-proof package. However, devices



● Fig. 1: Typical structure of a standard photo-transistor with homojunction.

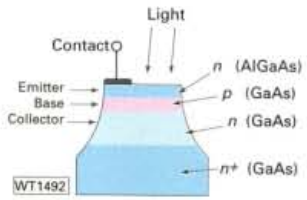
designed to operate specifically as photo-transistors are optimised to give the best performance in this role. The main differences are that the base and collector areas are much larger than in a normal transistor as shown in the typical structure, **Fig. 1**.

The transistors can be made from a variety of semiconductors. Early devices used germanium or silicon, but now type III-V materials like gallium arsenide are used.

Heterostructures that have different materials either side of the junction are also used, as they enable higher levels of efficiency to be attained. These are generally fabricated using epitaxial growth of materials that have matching lattice structures. These devices generally use a mesa structure as shown in **Fig. 2**.

Operational Characteristics

Now we'll look at operational characteristics. Photo-transistors are operated with a normal supply voltage. However, the base connection is



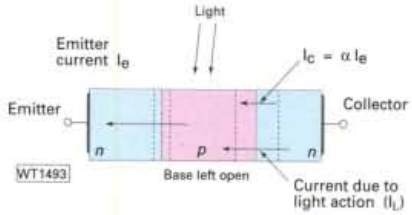
● Fig. 2: A Mesa photo-transistor with heterojunction.

left open circuit. If any bias were applied, then current would flow in the collector circuit and might mask any current arising from the action of any light falling on the device.

The light enters the base region where it causes hole electron pairs to be generated. This mainly occurs in the reverse biased base-collector junction. The hole-electron pairs move under the influence of the electric field and provide the base current, causing electrons to be injected into the emitter.

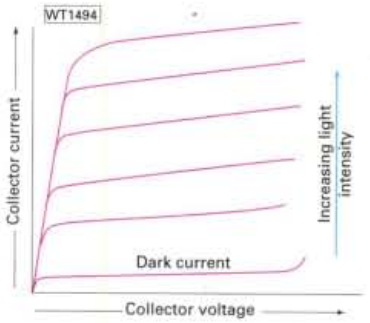
One of the main attractions of a photo-transistor (compared to a photo-diode) is the level of gain achieved. For the standard types of device the level of gain is normally in the same region as the current gain of a typical transistor. This may be in the range of about 50 to a few hundred.

To achieve much higher gain levels, transistors with hetero-structure junctions can be used. These can provide gains rising



● Fig. 3: Operation of a photo-transistor.

to 10 000. Despite the performance, these devices aren't widely used, because they are far more costly than the ordinary homo-structure devices made from a single type



● Fig. 4: The characteristics of a photo-transistor.

of semiconductor. Apart from their gain, the other advantage of photo-transistors is the much lower level of noise developed by the device compared to the avalanche photo-diode.

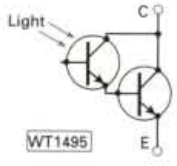
Unfortunately there are disadvantages to using photo-transistors. The main one being their limited bandwidth which arises as a result of the relatively large capacitance associated with the base-collector junction that is enlarged to improve the efficiency of the photo action. This means that the top frequencies for these devices are often as low as 250kHz. Hetero-junction devices have much higher top frequency limits and may operate at frequencies up to around 1GHz.

A plot of the characteristics of a typical photo-transistor is shown in **Fig. 4**. It can be seen that they are very similar to those of a normal transistor.

The difference is that instead of showing curves for different levels of base current, they are shown for different levels of incident light. From the diagram it can be seen that there is a small current flowing even when there is no light present. This is called the dark current, and results from the small number of carriers, i.e. holes or electrons, that are injected into the emitter. Like those generated by the action of the incident light, these are also subject to amplification by the transistor action.

Where very high levels of gain are required a device known as a photo-darlington can be used. This consists of a pair of transistors in a Darlington arrangement where the first transistor acts as the photo-detector.

The emitter of the first transistor is coupled into the base of the second transistor as shown in **Fig. 5.** This gives a very much higher level of gain, and hence is very sensitive. The drawback is that it is very much slower than the ordinary photo-transistor, having a maximum frequency of around 20kHz.



● Fig. 5: For high gain levels a Photo-Darlington device is used.

That's all for now. Next time I'll look at how laser light can be generated using a semiconductor. PW

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September 22/23: The 29th Leicester Amateur Radio Show and Convention takes place this weekend at The Castle Donington International Exhibition Centre, Donington Park, NW Leicestershire. Doors open 0930-1730 each day, admission £3 (one day ticket), £5 (two day ticket), concessions available and under 14s free. Over 150 stands of computers, radio and electronics including flea market, Bring & Buy, clubs and societies and Morse tests on demand. For more information contact **Geoff Dover G4AFJ** on **(01455) 823344** or **E-mail g4afj@argonet.co.uk**

October 1: The Great Lumley Amateur Radio & Electronics Society are holding their rally at the Great Lumley Community Centre, Front Street, Great Lumley, near Chester le Street, County Durham, just off the A1(M). There will be free parking, plus easy access, good, inexpensive food and drink, radio, hobbies, electronics, computer, satellite and component stalls, Bring & Buy in two sections - junk and good buys. Doors open 1100 (1030 for disabled visitors). Admission is £1, free of charge to under 14s accompanied by an adult. Talk-in. Further details on **0191-384 2803** or **0208-937 2772** or from Rally Organiser **Nancy Bone G7UUR, 49 South Street, Durham City DH1 4QP**.

October 15: The Blackwood Radio, Computer & Electronics Rally is to be held again at the Newport Centre, Newport, South Wales, which is about 2km from J25A on the M4. Opens 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. Further information can be obtained from **Stuart Instone GW0NPL** on **(01495) 240260/(07970) 777756** (combined telephone/FAX number) or E-mail: **fireham@aol.com**

October 15: The Hornsea Amateur Radio Club Rally will be taking place on this day. For more details on where it is and what will be there, contact **Duncan G3TLI** on **(01964) 532588**.

October 29: The Galashiels & District Amateur Radio Society 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, etc. More details from **Jim GM7LUN** on **(01896) 850245** or E-mail: **jimk@gm7lun.freeserve.co.uk**

November 4/5: The 14th North Wales Radio & Electronics Show will be held at the North Wales Conference Centre, Llandudno. The show opens at 1000 both days and the entrance fee is £2 for adults and under 14s free when accompanied by an adult. There will be a club room and an extensive Bring & Buy. **M. Mee GW7NFY** on **(01745) 591704** (combined telephone and FAX number).

November 12: The Midland Amateur Radio Society are holding their 12th Radio & Computer Rally at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Doors open at 1000. There will be a large, free car park, special interest exhibits, local clubs, etc. Trader information from **Norman G8BHE** on **0121-422 9787** or general information from **Peter G6DRN** on **0121-443 1189**.

November 12: The Tenth Great Northern Hamfest takes place at the Metrodome Leisure Complex, Queens Road, Barnsley, South Yorkshire. Doors open at 1000. For further information please contact the Hamfest Manager, **Ernie Bailey G4LUE, 8 Hild Ave, Cudworth, Barnsley, Yorkshire S72 8RN** or telephone on **(01226) 716339** or **(07787) 546515** (mobile).

November 25: The Rochdale & District Amateur Radio Society are holding their traditional radio rally at St Vincent de Paul Catholic Church Hall, Caldershaw Road, off the A680 Edenfield Road, approx two miles west of Rochdale. Follow the orange arrows from M62 J20. Doors open 1030, 1015 for disabled visitors. Entrance fee is just £1 and there will be refreshments/rest area. **John G7OAI**, evenings, on **(01706) 376204**.

November 25/26: The London Amateur Radio & Computer Show is to be held at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. There will be trade stands, talk-in on 2m and 70cm, Bring & Buy, special interest groups, free parking, disabled facilities, camp site, family attractions, licensed bar, catering and Morse tests. Doors open on Saturday at 1015 till 1700 and on the Sunday from 1000 till 1600. Further information on **(01923) 893929**.

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

November 26: The Bishop Auckland Radio Amateurs Club (BARAC) Rally will take place at Spennymoor Leisure Centre. This venue is ideally suited for both trader and disabled visitors as it boasts good parking and access to large ground floor hall. There will be the usual radio, computer, electronics and Bring & Buy stalls, as well as catering and bar facilities. Morse tests are available on demand. There will be lots to do for all the family within the Leisure Centre for members of the family not interested in radio. Doors open 1100 (1030 for disabled visitors). Admission is £1, under 14s free of charge. Talk-in on S22. **Mark G0GFG** on **(01388) 745353** or **G7OCK** on **(01388) 762678**.

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February 4: The 16th South Essex ARS Radio Rally will be held at the Paddocks (situated at the end of the A130), Long Rd, Canvey Island, Essex. Doors open at 1030 and featured will be Amateur Radio, Computer and Electronic Component exhibitors. Home-made refreshments, free car parking with space outside main doors for disabled visitors. Details from **Brian F Bellamy G7IIO** on **(01268) 756331**, E-mail: **briang7iio@yahoo.com**

February 11: The Cambridge & Dsitrict ARC Annual Radio, Computer Rally & Car Boot Sale takes place today at a **new venue** - Lordsbridge Arena, Wimpole Road, Barton, Nr Cambridge, opposite Mullards Radio Observatory on the A603 off J12 on the M11. Doors open 1000 for disabled visitors, 1030 general public, admission is £1.50, £1 OAP/disabled and Under 14s free. Talk-in on S22. **Bob G0GVZ** on **(01223) 413401** or E-mail: **Bob.Grimes@btinternet.com**

March 18: The Norbreck Amateur Radio, Electronics and Computing Exhibition, organised by the Northern Amateur Radio Societies Association (NARSA), will be held at the Norbreck Castle Exhibition Centre, Blackpool. Don't miss the largest single day exhibition in the country. Morse tests will be available on demand. **Peter Denton G6CGF** on **0151-630 5790**.

April 21/22: The London Amateur Radio & Computer Show will take place at Alexandra Palace, Wood Green, London N22 - **please note the change of venue!** Further details on **(01923) 893929**.

April 22: The 17th Yeovil QRP Convention takes place today at the Digby Hall, Sherborne, Dorset. Doors open at 1000. Traders, construction challenge contest, talks, QRP forum, Morse tests, catering, free parking and invalid facilities. Talk-in on S22. Further details from **D. Bowden M1WOB** on **(01934) 414452**.

April 22: The Harrogate Radio Computer and Electronics Rally will be held at the Harrogate Ladies College today. For more information contact **Gerald Brady G0UFI** on **(01765) 640229** or E-mail g0ufi@qsl.net

May 20: The Drayton Manor Radio & Computer Rally will take place at Drayton manor Park, Fazeley, Tamworth, Staffs, on the A4091. Main traders will be in four marquees, there will also be a large outside traders flea market, Bring & Buy stall, local clubs and special interest stands. Doors open from 1000 onwards. Trader information from **Norman** on **0121-422 9787**, other information from **Peter G6DRN** on **0121-443 1189** - evenings please.

On Air With...
LES ÎLES GLÉNAN

Phil Whitchurch G3SWH takes you on an Amateur Radio journey to the Island of St. Nicolas where he and his friend, Jim, set up an Amateur Radio station.

Following our successful 1996 expedition to Les Minquiers (the Minkies - EU-099)) as GJ3RTE/P and GJ3SWH/P, Jim and I started to look for an island group to activate in 1997. We considered St Kilda (EU-059) and St Tudwals (EU-106), but were unable to obtain permission to land, so our thoughts turned towards some of the more unusual French islands.

I had activated Les Iles Chausey (EU-039) in March 1996 and Les Iles St. Marcouf (EU-081) were found to be inaccessible following un-repaired storm damage to the jetty. However, a little research showed that Les Iles Glénan, in the Bay of Biscay, off Concarneau, were both inhabited and accessible, so I started to make more concrete plans. The archipelago consists of a total of nine islands, each of which counts separately for the French islands award (DIFM) but only as a single group for IOTA purposes.

Using my limited spoken French, I made contact with the tourist office in Fouesnant and was lucky enough to find a very helpful lady there called Lydia who spoke good English. I learned from her that there's an internationally famous sailing school and a diving centre on the islands, as well as some very limited accommodation for rent.

Neither the sailing school nor the diving centre were interested in providing rooms for Radio Amateurs, so Lydia gave me the telephone number of **Monsieur Herpe**, who also speaks good English and whose girlfriend runs Les Viviers, one of the two restaurants on the island of St. Nicolas. M. Herpe was most helpful and accepted our booking over the telephone, refusing my offer of a deposit and saying we could pay by credit card on the island.

We originally wanted to go at the end of March, when we believed propagation to be more favourable and, although there's a choice of several ferries, their schedules did not commence until after Easter. We had alternative dates available in May, but the rooms were all booked by the diving school.

Finally, we decided upon the weekend of 28/29th June. Channel ferry timings from Plymouth to Roscoff were most convenient and integrated well with the Beg Meil ferries to the island at 1000 on Saturday 28th, returning at 1700 on Monday 30th.

We had been fortunate enough to borrow two of the IOTA Committee's **Yaesu FT-900AT** transceivers an our plan was to be on the air from the island with two stations for over 48 hours.

Everything went according to plan until we arrived at the ferry company's offices in Beg Meil, when we found that the ferry had been cancelled due to bad weather. A

Continued on page 26...

Fig. 1: (Background) The landing jetty and the two restaurants on St. Nicolas Island.

Phil Whitchurch G3SWH and Jim sat at their Amateur Radio set-up on the Island of St. Nicolas.

... continued from page 24

very helpful lady found an alternative ferry at 1000 from Bénodet and I drove the 10km or so at breakneck speed, stopping only to fill our jerry cans with petrol for the two generators.

We made the ferry in plenty of time and Jim went off to get some essential provisions whilst I exercised my French to get the tickets, only to be told there was no return ferry on Monday evening, only Sunday or Tuesday. I left the question of the return open and we started to load our equipment onto the *Aigrette*.

We came up against yet another problem when we were told that the jerry cans of petrol just purchased would not be allowed on the boat. After some desperate negotiations, the captain relented and they were carried on the foredeck - the rest of our gear was stowed on the stern.

● Fig. 3: Phil G3SWH with Jean-Paul F3TT - an unexpected visitor to their station on St. Nicolas Island.

Arrival At The Island

The ferry journey was uneventful and there was no sign of the bad weather which had upset our plans in the beginning. On arrival at the island of St. Nicolas (see **Fig. 1**), we unloaded our gear and I set off to find M. Herpe, only to find that nobody knew him! I eventually found his girlfriend and we were shown to our room which had two single beds, a sink, a gas cooker and (generator powered) electricity.

● Fig. 2: Phil G3SWH and Jim outside their room on St. Nicolas Island.

The weather was fine and we had a courtyard outside our room, so we decided to set up our two stations on the pub-style table outside, running one radio from the local power and one from the quieter of our two generators. (See **Fig. 2**).

Jim set up his 20m ground plane and I set up my multi-band inverted V dipoles on a 9m (30 foot) telescopic mast, maintaining about 100m between the two antennas. We found that we could operate the two stations simultaneously on 14.26MHz s.s.b. and 14.025MHz c.w. without any untoward mutual interference.

First QSO

Jim's first QSO was on s.s.b. with **DL2DXA** at 1309UTC. Mine, on the other hand was on c.w. with **DK9QD** at 1307UTC and Jim worked on 14MHz steadily for an hour or so. I made forays on to the 18.1 and 21MHz bands but could not generate a pile up. Jim was obviously in much greater demand than me and I came to the conclusion that my signal was not getting out as well as his. We changed antennas, and my rate increased, whereas Jim's decreased, which proved where the problem lay.

To maintain the maximum distance between the antennas, I had erected mine at the end of about a 120m run of URM70 coaxial cable. This exact arrangement had worked well in the Minkies, so I was a bit sceptical when the problem appeared to be power loss along the feeder. I'd tried to obtain attenuation figures for URM70 at 14MHz, but could only get figures for 100MHz (1.5dB per 10m) and 1000MHz. My interpolation seems to be in question!

I quickly lowered the telescopic mast and moved it to a closer location within the courtyard, within a 20m cable run of the rig. In the process of doing so, the antennas got hopelessly tangled and I spent about two and a half hours untangling and re-erecting them, even with Jim's help. The QSO rate then increased to a more satisfactory level.

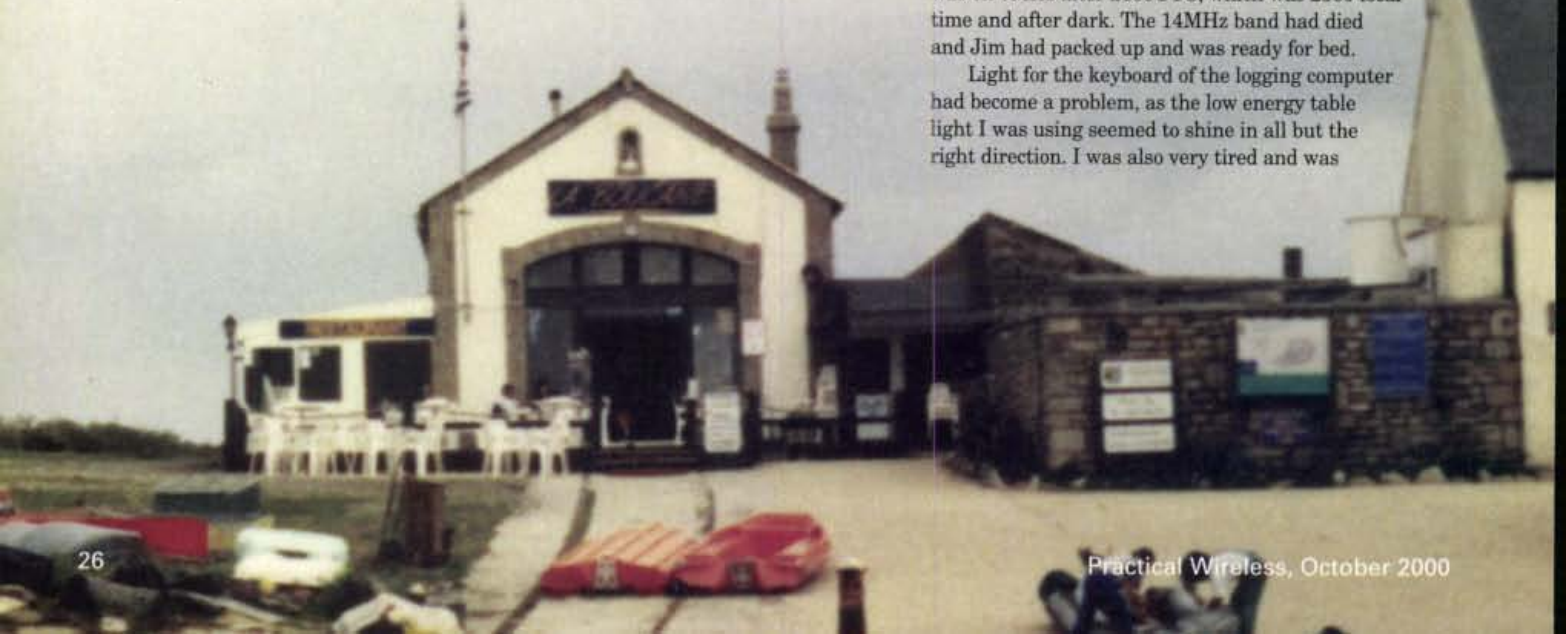
Poor Conditions

Conditions were very poor and the bands seemed only to be open to Europe. I did work a handful of US and Canadian stations, but Jim worked none at all. It was the weekend of the US field day contest and we suspected that the field day stations were too busy working each other to look for QSOs with non US stations.

Skip on 14MHz was not good to the UK, we were able to work GMs without difficulty, as well as Gs in the north but almost nothing in the south. Even my favourite band of 10.1MHz failed to live up to expectations.

The only time that I got a good pile up running was on 7MHz after 2100UTC, which was 2300 local time and after dark. The 14MHz band had died and Jim had packed up and was ready for bed.

Light for the keyboard of the logging computer had become a problem, as the low energy table light I was using seemed to shine in all but the right direction. I was also very tired and was



having trouble reading the calls of the stations calling as a result. I ran the pile up for half an hour or so after that but decided to call it a night. Jim had 521 QSOs in his log and I had only 338.

I was up early the following morning and the flow of QSOs was steady, with activity on 7, 14 and 18.1MHz. Jim took down his ground plane and put up a sloping dipole for 7MHz but found activity to be poor, so reverted to 14MHz after a couple of hours.

We decided that, providing we could change our Channel ferry booking from Monday evening to Sunday evening we should take the Sunday afternoon ferry from the island, as we had no desire to be stranded there. Jim had a mobile phone with GSM facilities, so we tried to call the 'freephone' number for Brittany Ferries in Plymouth, only to find that you can't call a UK 'freephone' number or Directory Enquiries from abroad!

Because of this, we had to get Jim's wife to call Directory Enquiries for the Plymouth number and then call us back with it before we could change the booking. There was no ferry on the Sunday night, but there was an early morning sailing on Monday 30th, which we booked.

Local Interest

We caused quite a lot of interest amongst the Sunday visitors to the island who wanted to know what we were doing. It's bad enough trying to explain Amateur Radio to people who speak English, but it was totally impossible due to my atrocious French! An unexpected pleasure was a visit from **Jean-Paul F3TT** (see **Fig. 3**) who was visiting the island as a tourist and who spent some time with us.

We decided that we would need to close down and pack up at about 1300UTC (1500 local time) as the ferry was scheduled for 1700. The QSO rate had dropped right down by this time and Jim's last QSO was with 9H3JR at 1240UTC - his 739th! And mine, with S58MU at 1312UTC - my 701st!

We packed up all the gear and paid the bill for the room. When the ferry arrived, we were still in the process of transporting it to the jetty. I loaded what we had onto the foredeck, explained to the ticket collector that we needed tickets and that we had more baggage ashore.

When I went back to collect it, I found Jim busy tidying up the room. I picked up the last of the baggage, told him to hurry and headed back to the jetty, to find the ferry had cast off and was leaving without us. After much shouting and to the embarrassment of the ticket collector, the ferry put pack to shore and we loaded the last of the gear.

Jim was carrying the jerry cans, which still contained some petrol. Again the Captain refused to allow them on board "for safety reasons", no matter how much we protested. We were thus obliged to abandon about 30 litres of petrol in two jerry cans on the island's jetty. I have since wondered quite how "safe" that was, but could see no alternative. I'm sure the islanders put the petrol to good use!

On arrival at Bénodet, we loaded all the gear into the car and set off towards Roscoff, planning to find a small hotel for the night en route. The ferry left at 0830 and I wanted to be as close as possible to the port the previous evening. We finally found a room in St Pol de Léon, had a good meal and slept very well.

● Fig. 4: Phil and Jim's QSL card. (See text).

Disappointing Number

It was very disappointing to have to cut the planned time on the island by 50%, as was the low number of QSOs in general, particularly with our transatlantic friends. However, it was good experience and we learned a lot about what **not** to do next time!

Our particular thanks must go to our XYLs, **Cheryl** and **Jan** for allowing us to go, to M Herpe for his help in arranging the accommodation on the island and to **Neville Cheadle G3NUG** for the loan of the two Yaesu FT-900AT transceivers, without whom this operation would not have been possible.

Special QSLs

Special QSLs (see **Fig. 4**) have been printed and are available for both stations via G3SWH direct with reply paid postage (QTHR in any callbook since 1970) or via the RSGB Bureau. *PW*

"We caused quite a lot of interest amongst the Sunday visitors to the island who wanted to know what we were doing."

Electronics-In-Action

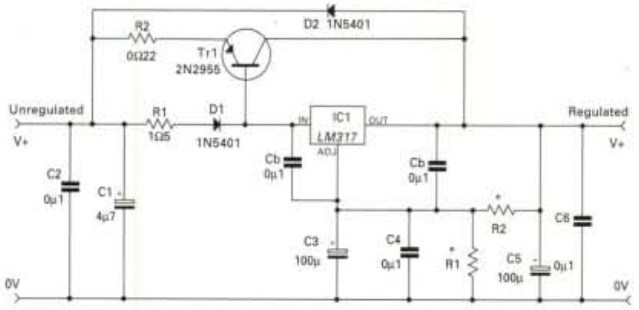
Hello and welcome to the October 2000 Electronics-in-Action column! This time I'll be explaining more about the LM317 power supply unit that I described in the August column, and I'll 'lightly' cover switch-mode p.s.u.s. But first some news of a 'vanishing component'.

A subject that concerns us, as a practical magazine, is that of vanishing components, especially after we publish a project and the components become difficult to source. On that topic, I've had an E-mail from **Mr A. Lewis** in Camberley who's having trouble finding a BB212 varicap diode. This diode was the main tuning control for the 'Multi-band Miniature Receiver' described by **David Rowlands G6VEB** on pages 24 - 26 of the July issue of *PW*. Mr Lewis found that on telephoning around the only firm that could obtain large numbers of BB212s was **Basic Components** in Farnborough, Hants **Tel: (01252) 548018** who say they can import from Germany. For more details and price of the BB212 varicap, you should contact **Ray** at Basic Components.

The BB212 problem isn't the first time that the 'disappearing component' has foiled us. Several years ago, we had to 'pull' a superb 28MHz transceiver (especially designed for us) when the Plessey SL600 series of communications i.c.s disappeared almost overnight. The only advice that I can give is to **keep buying up components as you see them being sold cheaply** - you never know when they will come in handy to repair some piece of equipment that you have become 'fond' of.

Extending The LM317 Design

After I described a simple step-variable LM317 based p.s.u. in the August column, I've had an E-mail from **Ted Martin** who asked if it were possible to extend the design. In his E-mail Ted says that he needs to build a multiple output voltage p.s.u. and asked two questions: 1) Can V_{out} be larger than V_{in}? 2) If I parallel several LM317s will one of them 'hog' all the current and if so how do I prevent this?



● Fig. 3: I favour using a single *pnp* transistor as a current multiplier, if greater output current is needed. (See text for details).

The answer to question 1 is, in the instance of the simple design I showed in the August column, is sadly - no! And this simple answer may be applied to almost every 'linear' power supply where the current input regulator is always of the same order as the current supplied to the load by the regulator. The input voltage (to the regulator) has always to be higher than the output level. Although there are some special circuits that can run with a very small voltage differential between input and output. But the circuit I designed isn't one of them. It is possible to 'parallel' several LM317 i.c.s to give a greater output current capability, but the two methods I'll describe both have their problems. Look first at the circuit of **Fig. 1**. This is, in essence, the same as the circuit shown on page 41 of the August issue of *PW*, although it looks more complicated.

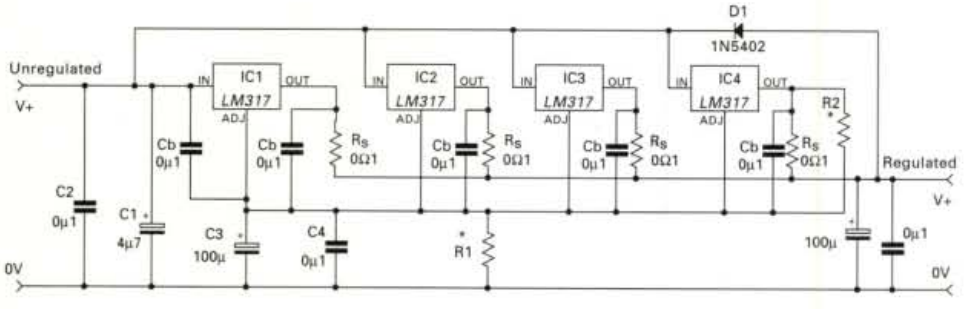
Each of the four LM317 i.c.s has its input ('**IN**') connected to the supply rail and the '**ADJ**' pin to the common voltage setting point through R1 to 0V. To help to isolate each '317 from it neighbour, but to allow them to share the load, each output is now taken through individual low value resistors (shown as 0Ω1) before being coupled to the full load. Another possibility to increase current capability, is to use the similar circuit shown in **Fig. 2**, where the diodes labelled 'Ds' isolate each '317 from its neighbour much more effectively than the resistors in Fig. 1.

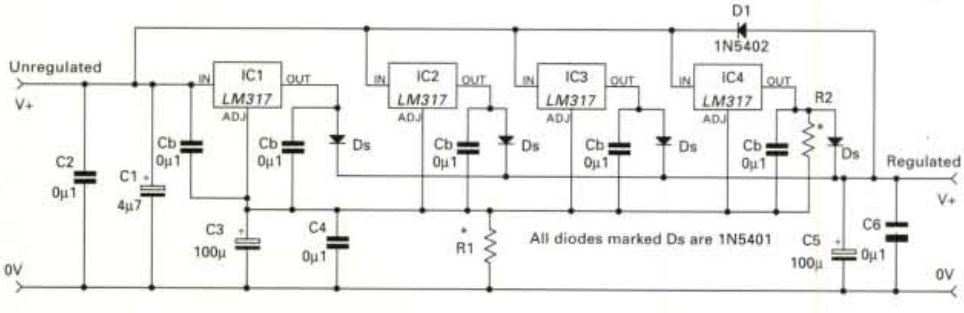
In both of these circuits there are several drawbacks that have to be kept in mind when designing and building the circuit. One of the LM317 i.c.s has to be thought of as the 'master' i.c. In the case of my two circuits, this master i.c. is used to set the output voltage, all others merely follow 'as best they can'. The components that help in loadsharing, be they resistors or diodes, cause a reduced voltage regulation capability to be kept in mind. The basic output voltage setting is still as described in August, but the output will 'droop' under load by around 100mV for the resistors or 0.7V for the diode circuit.

Basic Problem

Both of the above circuits have 'in my mind' a basic problem, and that is of complexity. So now I come to the circuit that is my preference for higher current capability. Each LM317, added to the circuit of Fig. 1 or 2, must have its own decoupling capacitors fitted near to the actual i.c. The circuit I prefer is shown in **Fig. 3**, where the *pnp* transistor (2N2955 or similar) acts as a current 'amplifier' for the output pin giving about a four to five times increase in the output

● Fig. 1: Using separate 0Ω1 resistors with multiple LM317 i.c.s to increase the output current available isn't without its problems. (See text for details).





● Fig. 2: Diodes are also a possibility to allow current sharing between multiple LM317 devices. (See text for details).

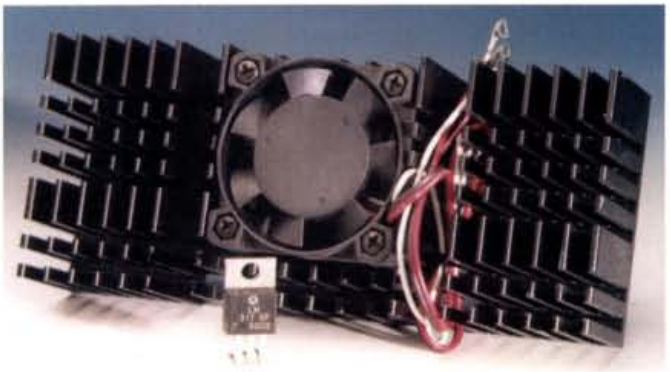


Fig. 4: Capable of good heat dissipation by virtue of a 12V fan, this computer item could be 'retro-fitted' to a p.s.u. that is running hot. (See text for details).

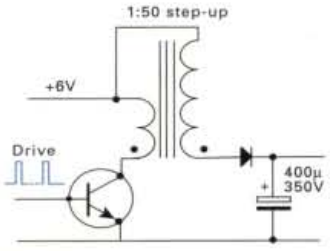


Fig. 5: Stepping a 6V supply up to 300V for a Zenon flash tube is a simple use of a switch-mode power supply.

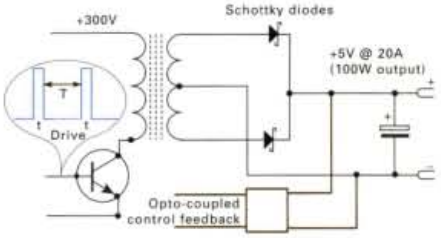


Fig. 6: By switching energy at at high voltage (but low current) gives a greater efficiency for computer power supplies, where high currents are needed at a low voltage.

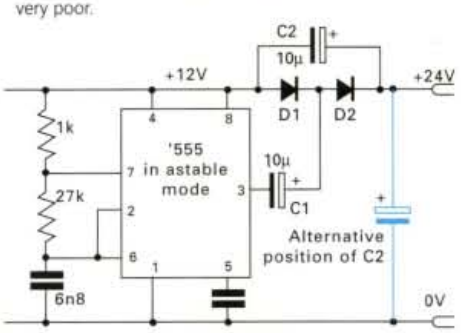


Fig. 7: A simple voltage step-up circuit giving a maximum of twice the power supply rail voltage at the output. But the voltage regulation is very poor.

current capability of the circuit. And as you can see it's rather more simple than either of the first two circuits discussed above. But don't forget when the current supplied goes up you will need a much bigger heatsink for the various devices. Each must have its own area of the heatsink - or even a separate heatsink.

And on the subject of heatsinks, have a look at the photograph of **Fig. 4** which shows a heatsink with 12V fan that is designed for the Pentium II series of computer processors. The heatsink shown in the photograph will quite happily dissipate up to about 25W in normal use and can cope reasonably well with up to 40W of intermittent dissipation. With a little ingenuity this could be added to the outside of an existing case to give 'through wall' heatsinking helping to reduce the internal heat of an existing set.

Fits Neatly

A request from a reader, was passed to me by the Editor **Rob G3XFD** after one of his *PW* club visits, and it fits in neatly with the first question asked by Ted Martin. Ted's first question was about creating an output voltage higher than the input voltage, which might seem impossible. So, I'll delve a little into the world of switch-mode power supplies.

Many of you will have come across switch-mode power supplies possibly without realising it. The oldest example I can think about is the e.h.t. circuit using the 'flyback' of the line output transformer in a television to create the very high voltages needed to drive the screen. A similar circuit is used in most all battery electronic flashguns for photography. It's common to have a 6V battery pack creating around 300V for the flash tube.

The circuit is arranged so that a switch of some sort, puts energy into, either an inductor or a capacitor, which may be passed over at either a higher voltage or current level to the output. In switch-mode p.s.u. it's the energy which is passed from input to output, rather than voltage or current directly. A skeleton voltage step-up convertor is shown in **Fig. 5**, where a low input voltage (but at a much higher current) creates a higher output voltage at a lower current. But output power cannot be greater than input power.

On a similar, but opposite tack, have a look at the part circuit of **Fig. 6**, which shows a 300V input switched, transformed and rectified down to supply the 5V rail for a computer. To regulate the output, an analogue of the output is passed back through the voltage isolation of the opto-coupler to control the switching drive to the input side. In a computer power supply the 300V is created by rectifying the incoming mains without transformer at all. the switching frequency applied to the transistor will often be around 50kHz, and either the frequency of switching will be varied (with fixed pulse width) or the 'mark-space' ratio of the switching frequency itself is used to control the output voltage. But capacitors can also be used as a switch-mode p.s.u., usually to change voltages which I've shown a simple version in **Fig. 7**.

The simple step-up switching circuit of Fig. 7 will give an output voltage of almost twice the input level. The 555 i.c. is used as to create a square wave with a mark-space ratio of around 50% at its output pin 3. if the 555 is not oscillating then the output voltage would be around 10.2V But when the 555 is oscillating the capacitor C1 couples this 12V change of level to the junction of the two diodes. Diode D1 isolates this pulse from the power line leaving the pulse to flow into capacitor C2 charging it up. As it is charged up the output voltage must also rise, taking it above the power rail.

By a cunning rearrangement of capacitors and diodes it's possible to create a negative supply of -12V as shown in the circuit of **Fig. 8**.

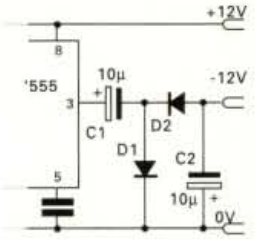


Fig. 8: Moving the capacitors and diodes around allows us to create a negative output rail. Again the voltage regulation is very poor.

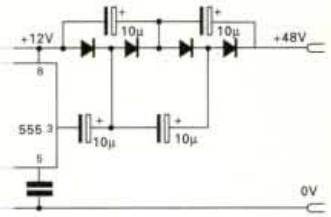


Fig. 9 Using the 'Cockcroft-Walton' multiplier circuit to 'quadruple' the output level. This has the same voltage regulation problems as before.

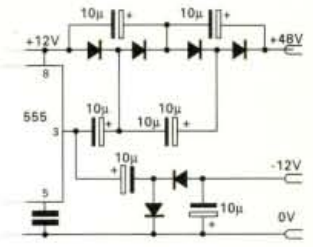


Fig. 10: Combining circuits of Fig.s 8 and 9 to create a simple p.s.u. for a single valved radio perhaps.

Another alternative is a second set of capacitors and diodes added to the circuit of Fig. 7 to create the voltage quadrupler of **Fig. 9** where the maximum output voltage could be as high as 48V (almost). How about the circuit of **Fig. 10** for valve enthusiasts looking to create a safe h.t. and suitable 'grid-bias' supplies for a simple one-valve radio?

All switch-mode power supplies have one thing in common - they are efficient in terms of output power to input power, approaching up to 90%. Where a simple 'linear' regulator may not even be 50% efficient.

Ah well it's happened again - I've run out of space. See you all in the next E-i-A.

Tex

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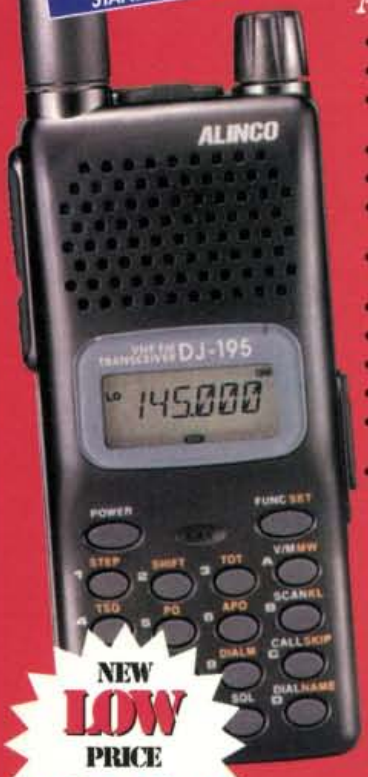

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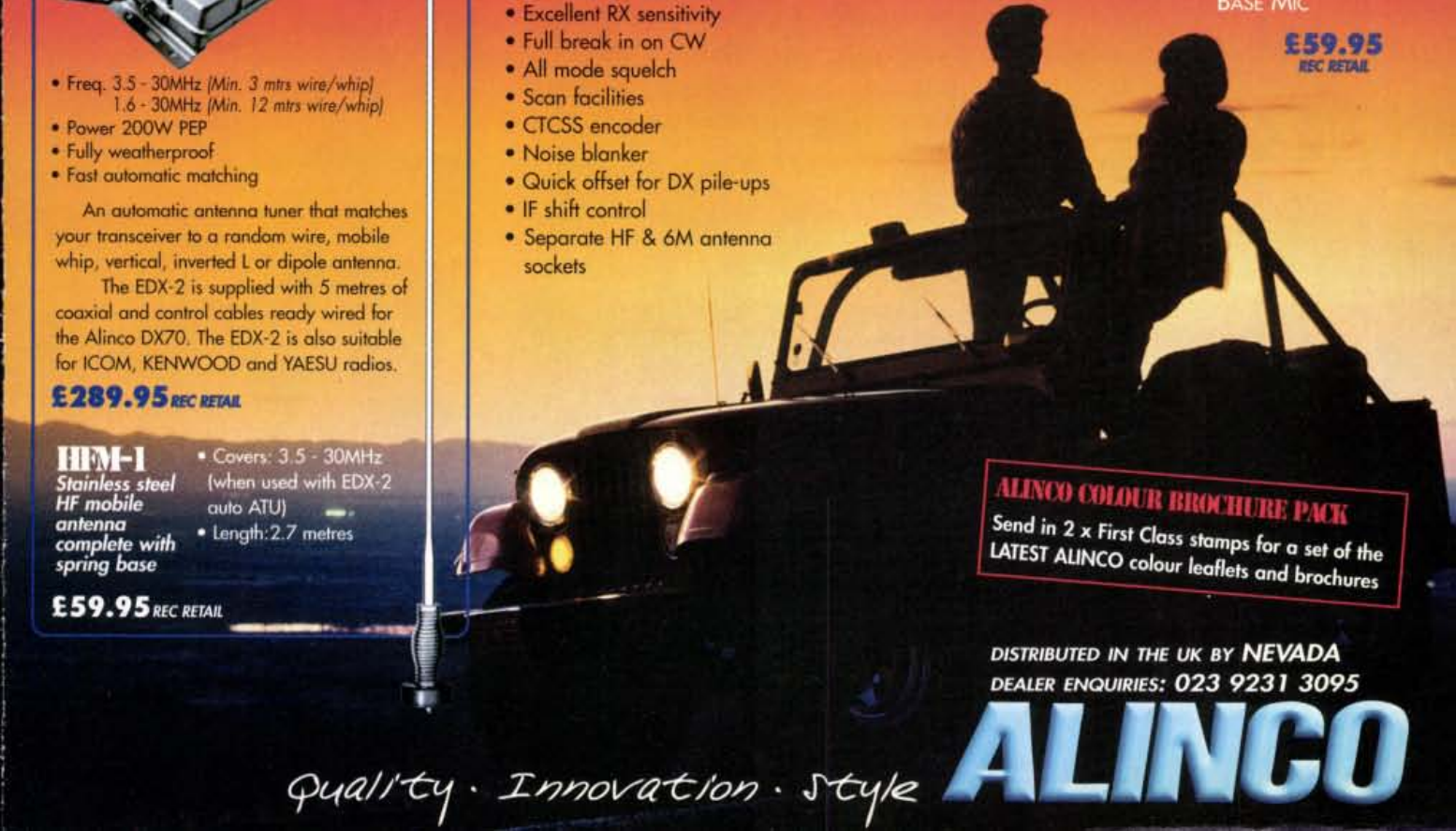

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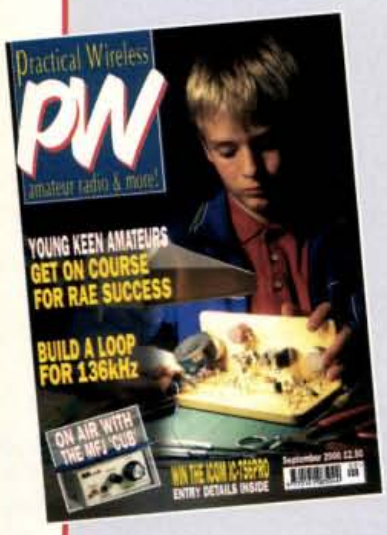

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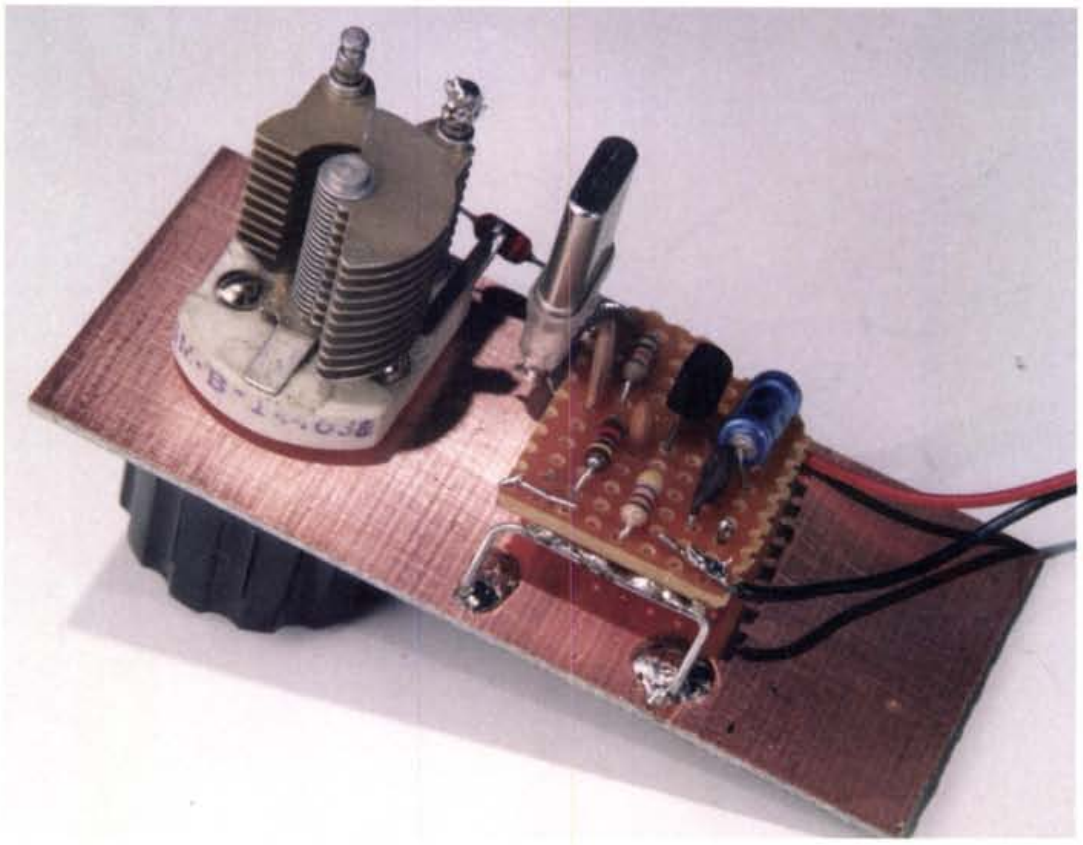
Carrying On The Practical Way

This month the Rev. George Dobbs G3RJV takes a close look at 'shifting' crystal oscillators .... after the appropriate quotation he's managed to find!

"whether on crystal rocks ye rove"
William Blake.
"To the Muses"



● This month G3RJV delves a little deeper into Variable Crystal Oscillator (VXO) techniques.

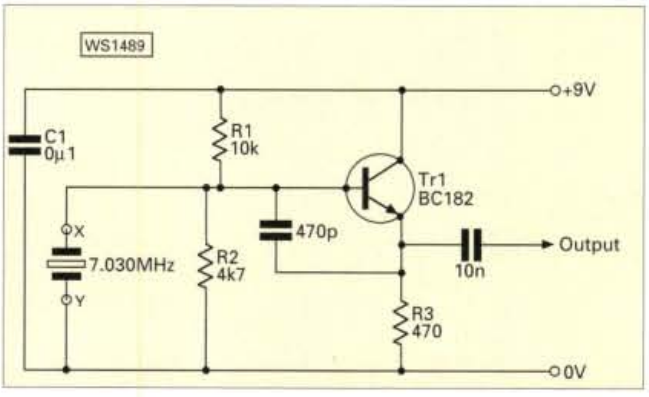
Sometimes I'm asked about the philosophy of radio home construction and QRP operation. And although it's difficult to explain in a few words ...here's a little story I related at a recent Dayton HamVention Forum. I had with me an apple. I always buy myself fruit in the United States - a country known for offering me large quantities of meat and very little in the way of vegetables. The apple is a beautiful thing and a very natural food substance but very different from how we once knew apples.

I bought it at a supermarket and I was not sure which country it came from although it may have been labelled by country on the shelf display. I had no idea which town it came from and certainly could not know in which orchard it was picked! That apple, although a natural thing, was just an object, a product sold to me. In fact it came from a section of the shop called 'produce'.

Not so many years ago if I had an apple it would have probably been a 'subject'. It might have been local and I may have known which orchard it came from. I also might have known who had picked it or I may even have picked it myself. In those times I could have known the fruit I was eating. Sadly these days, we eat objects.

This is also a model of most aspects of Amateur Radio as a modern hobby. It's largely a user hobby. When I first began Amateur Radio almost everyone I knew had built their own equipment or it was surplus equipment that they had modified themselves. I knew Radio Amateurs who took great pride in how little their stations had cost whereas these days more pride seems to emanate from how much a station costs.

I would not wish to be a 'Luddite' and certainly Amateur Radio stations are technically better than they have ever been in the past but we are distanced from the



● Fig. 1: A basic bipolar transistorised crystal oscillator circuit (see text).

equipment which we use. Once upon a time most Radio Amateurs built their own equipment, then they began to buy equipment but knew what happened inside the box. Later we began to buy equipment the internals of which were a mystery and now amateurs buy equipment unsure about what all the front panel controls do.

The building of your own equipment, however modest, does redress some of the balance and perhaps, to use the jargon, helps us to reclaim radio for ourselves. But enough of the philosophical sermonising- back to the soldering!

Variable Frequency Oscillator

In my last column I described a simple little transmitter, which used a variable frequency crystal oscillator (VXO). In that issue in his little footnote, **Rob Mannion G3XFD** the *PW* Editor expressed some surprise at the degree of shift possible in that particular VXO design. So this month, to help further I'm offering a few extra notes on variable frequency crystal oscillators.

To pick up the William Blake text, the source of my quotation this month, the main advantage of using 'crystal rocks' in oscillators is that they do not 'rove'.

Certainly I do hear horror stories from people attempting to build inductance/capacitor controlled variable frequency oscillators (v.f.o.s.) I receive letters about problems in getting such oscillators on frequency and then stopping them wandering around the desired frequency!

Although such problems can lie with the design of the circuit more often they are associated with the method of construction. Most common v.f.o. designs will give a reproducible stable oscillator if the construction is mechanically sound.

The VXO does often offer a viable alternative. Based upon the stability of the crystal oscillator, it allows some frequency shift for tuning. The main problem lies in the amount of available frequency shift which is usually only in the order of kilohertz.

The amount of shift does depend upon the frequency of the oscillator: the higher the frequency the more the expected shift, and individual crystal. The type of off-set circuit will also determine the amount of available shift from the nominal crystal frequency.

A Basic Circuit

The diagram, **Fig. 1**, shows a basic crystal oscillator circuit. The crystal controls the frequency of oscillation. In this example I used a 7.030MHz crystal - the QRP calling frequency for the 40m (7MHz) band.

The internal theoretical circuit of the crystal is a somewhat complex combination of inductance and capacitance. Applying external inductors and capacitors can vary this frequency.

The diagram, **Fig. 2**, shows the common ways in which this may be done. I tried some of the combinations of Fig. 2 and the results are shown in **Table 1**. (Bear in mind that such results will depend upon individual samples of crystal and the way in which the circuit is built and laid out).

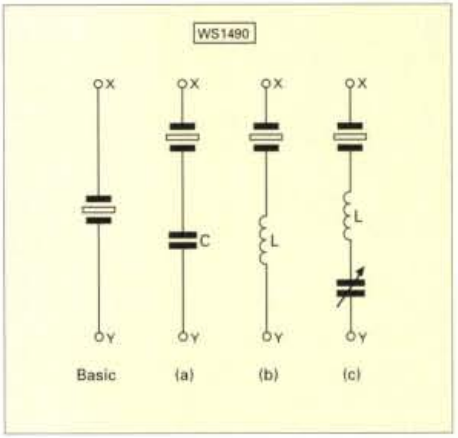


Fig. 2: Techniques for providing variable frequency shift on a crystal oscillator - turning it into a VXO (see text). Details for the separate circuit references a, b and c are provided in Table 1.

The first interesting result is that the basic oscillator circuit, without any form of offset circuit, **oscillates below** the nominal frequency of 7.030MHz. This is due to loading of the crystal by the circuit.

If a constructor wishes to obtain the nominal crystal frequency from an oscillator, some degree of external adjustment is usually required. A small series capacitor will usually do the job.

The offset circuits in Fig. 2. apply series capacitance or inductance or a combination of the two. The rough rule of thumb is that capacitance raises the oscillator frequency and inductance lowers the oscillator frequency. The combination in Fig. 2 (c) can shift the frequency either side of the nominal frequency.

The results shown on the table for additional capacitance alone show that there is a limit to the effectiveness of simply adding extra capacitance. A variable capacitor or trimmer added to the oscillator is a common way to apply a small degree of offset. My results with a 60pF variable capacitor show that this can be a useful and simple way to obtain a variable crystal oscillator.

Fig No.	L / C	Freq (kHz)
Fig. 1	None	7028
Fig. 2a	4p7	7035
	10p	7033
	22p	7030
	56p	7029
	60pF	7029 - 7036
Fig. 2b	10µH	7027
	22µH	7024
	47µH	6940
Fig. 2c	22µH+60pF	7026 - 7034
	47µH+60pF	6975 - 7032

Table 1.

Adding a range of small moulded fixed inductors did give a downward movement in frequency as shown in the table. The 47μH inductor gave a dramatic movement in frequency.

However, **a word or two of real caution now needs to be said** about the addition of inductance to a crystal oscillator circuit. Over a certain value the inductance takes over from the crystal as the main frequency controlling component. At this point the stability of the oscillator is compromised because the mode of operation has changed.

The last results on the table are for a combination of inductance and capacitance, a method I have often used in *PW* circuits. The results for the 22μH inductor with the 60pf variable capacitor give a useful swing of frequency around the nominal frequency of the oscillator.

The 47μH inductor with the 60pF variable capacitor gives an amazing swing of frequency. But constructors beware! There's a real danger that the low end of this range is compromising the stability of the oscillator. This will depend upon the individual crystal. I leave readers to experiment ...and you have got those soldering irons switched on haven't you? *PW*

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It's A Classic!

The Kenwood TS-830S HF transceiver

In our occasional series where specialist authors look at older 'classic' equipment Rob Mannion G3XFD reports on his findings using the Kenwood (Trio) TS-830S. Rob suggests that someone taking up an M5 licence could find this transceiver very useful indeed.

When I found out that the **Shortwave Shop**, Christchurch had a Kenwood TS-830S available for testing I jumped at the idea as I thought it would be ideal for our 'It's A Classic' series. Especially in mind is the (very much appreciated) added activity on 7MHz - particularly - with the recently arrived M5 operators, many of whom will probably be very interested indeed in this popular transceiver.

Kenwood have produced some excellent transceivers over the years - the more recent TS-850 - along with the Yaesu FT-1000 - seem (from my log where I always record details of the equipment used by the other operator) to be the most preferred rigs for c.w. enthusiasts. However, the TS-850 really does seem to have found a niche with some people and you don't often see them for sale and this also applies to the earlier TS-830S!

So, after reading this article I hope you'll take a second look at any TS-830S you might see for sale. It could prove a good investment and also provide you with an excellent introduction to the h.f. bands.

What's On Offer?

So, what's on offer with the Kenwood TS-830S - what does it do and how does it perform? To answer your questions I'll run through some of the main design points.

Firstly, it's an h.f. band only 100W transceiver, covering all (note it covers all the WARC bands too) the present h.f. allocations, and was originally introduced in the early 1980s. It provides c.w., and s.s.b. modes and for the c.w. operator provides semi-break in facilities.

Based around a double conversion superhet design the receiver is all solid state. The first intermediate frequency is 8.83MHz and the second is the standard 455kHz.

Only three valves are used in the TS-830S. The power amplifier (p.a.) valves are the easily obtainable, extremely reliable 6146B types. The driver stage uses a 12BY7A.

In use the built-in rear mounted cooling fan runs so silently that I had to check to see that it was working!

Other facilities included in the design are: VOX, built-in 25kHz calibrator, RIT, switch-selected r.f. attenuator (**and there's also a proper r.f. gain control**) and noise blanker. Switch selected automatic gain control (a.g.c.) is provided along with the just as important automatic level control (a.l.c.).

Speech compression is controlled from a front panel switch, and for the c.w. operator variable delay semi-automatic break-in is provided via the VOX circuitry used for s.s.b. operation.

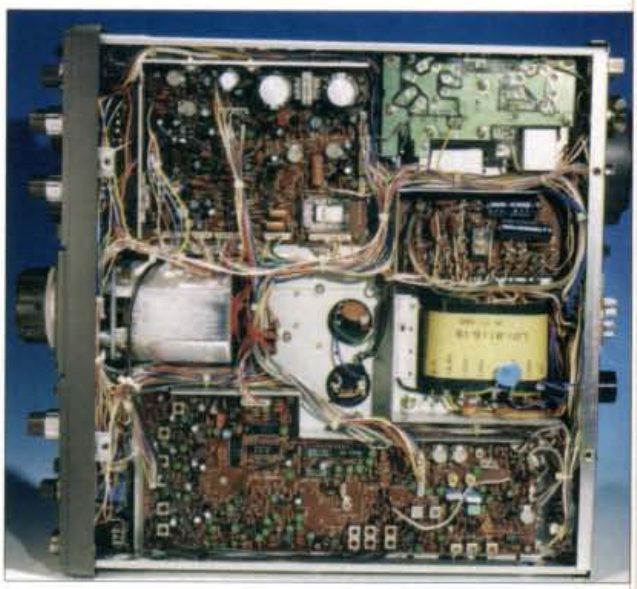
Power output control is achieved by using the Carrier control (concentrically mounted with the microphone gain control). And, as a keen QRP operator I was pleased to see from my power meter that it could be smoothly adjusted from well below 5W up to the full output power of around 100W.

Front panel lay-out is excellent and the all-important antenna (50Ω) tuning is exceedingly easy to set up and use. In conjunction with a good antenna tuning unit (a.t.u.) even an inexperienced operator should have no problems whatsoever.

On The Air

The acid test for any transceiver must surely be 'on the air'. I suggest this because many of the reviews published nowadays are accompanied by reams of measurements which unless they're prepared from tests taken under the necessary (certificated) laboratory conditions - often don't mean very much.

Rear view of the upper side of the main chassis. Note the 6146B p.a. valves and the cooling fan which G3XFD says is extremely quiet when running (see text)



Underside view of the TS-830S showing main transformer (centre right) and main printed circuit boards. Note that although i.c.s are used, there are many discrete (and recognisable!) components, making user-servicing a possiblity...provided replacements are available.

Product

The Kenwood TS-830S h.f. transceiver

Pros & Cons

Pros: Easy-to-use transceiver with built-in power supply, very reliable, and quiet in operation. Selective receiver with good characteristics despite relatively low first i.f. Good quality audio on transmit and receive. Stable oscillators and excellent brightly lit fluorescent digital frequency read-out.

Cons: Heavy power consumption for portable use because of valved p.a. stage. Noisy semi-automatic break in operation (somewhat alleviated by wearing headphones) on c.w. Easily knocked switch: When moving rig take care not to knock the neutralising slide switch.

- It's a Classic! With rugged valves in the p.a. stage and a clear fluorescent frequency read-out the Kenwood TS-830S holds its own on the bands and G3XFD enjoyed using it on the air.

- Rear panel of the TS-830S. The slide switch immediately under the cooling fan is for adjustment of the neutralising on the p.a. stage. Inadvertently knocked to 'off' it can lead to the operator thinking that the p.a. stage has failed (see text).

The 'test results' are often only included 'as a guide' because to comply with European Union law they have to be accompanied by a statement that they have not been done by a certificated laboratory (A very expensive process indeed). Added to this problem is the fact that many manufacturers 'dress up' their specifications and present them in ways that many of us - even fully qualified electronic engineers can have difficulty interpreting!

Bearing in mind that the TS-830S has a relatively low first i.f. of less than 9MHz, I was expecting it not to perform as well as my Alinco DX-70 which has a first i.f. in the region **of 70MHz** (such is progress!). However, this was soon disproved and I found the TS-830S to be an excellent performer, especially with the help of the built in i.f. shift and 'notch' facilities. (Although the transceiver I had on loan was recorded as having a narrow c.w. filter fitted in 1986 this had subsequently been removed). A pity because I would have liked to have evaluated it on air

On 7MHz (my yardstick band as conditions can often be chaotic) the selectivity and general performance on the receiver was excellent. Adjacent channel performance was very good, and it was only when I was on c.w. - with other stations operating within a kilohertz or so - that problems appeared.

Although the receiver coped well with strong adjacent channel signal there was some 'pumping' of the a.g.c. In other words the adjacent channel transmissions - although not affecting my QSO - appeared on the S-meter. However, such 'pumping' is often seen on other rigs, and I've got no doubt that if a narrow crystal filter was fitted (for the keen c.w. operator) the problem could lessen.

On 7MHz (and other bands of course) the variable r.f. gain control also proved very useful - especially when very strong adjacent channel station 'splatter' appeared. Only once did I have to switch in the 'step' attenuator - and that was when I was working a station right up near to the band edge just below 7.1MHz.

Lack of sensitivity on older transceivers can often show up on the bands above 14MHz. Not so with the TS-830! Up on 28MHz I found some activity ('Ten' wasn't so good during the review period) and the receiver proved more than adequate. A pity though that the TS-830 is not equipped with narrow band f. m, as I could hear (on my Alinco DX-70) that there was some worthwhile activity on the band.

On My Operating Desk?

You may ask - would I, bearing in mind my experience with this transceiver and the many others which have come my way be happy to have this transceiver on my operating desk? The short answer is yes!

In fact, having never owned one of these lovely old rigs I wish I had! I say this even though some of the Amateur Radio dealers I spoke to on the telephone (to get an idea of the price you'd have to pay 'through the trade') say that they don't handle valved transceivers any more. Some of the traders also suggested that spares could be a real problem.

There are one or two annoying things with this transceiver. But to be fair the design is over 20 years old! The transmit-receive switching, for example, is especially annoying on c.w. However, wearing my Eugen Beyer studio headphones took the 'click-clack' of the relays (coming on and dropping out when the shortest delay for the semi-automatic 'break-in' is selected) reduced the level of the sound out of my hearing range.

Another point for potential TS-830 owners to remember is the famous neutralising switch. I'd heard that it was possible to inadvertently operate it with a finger when the unit was being carried. However, once caught out you'll not be caught again. You soon realise that the p.a. hasn't given up the ghost ... it's just 'finger trouble'!

PW

Summary

With everything considered, and if I were on a limited budget and had the chance of buying a TS-830S from another Amateur - I wouldn't hesitate. It's a good rig and remarkably (considering it's valved) not large at all - my old KW2000B dwarfs it!

So, take another look - don't leave the TS-830S on the shelf. It's a good 'first transceiver' and if you like a really good bright frequency read-out display and good old analogue metering - this is the 'classic' rig for you!

My thanks go to the **Shortwave Shop, 18 Fairmile Road, Christchurch, Dorset BH23 2LJ, Tel/FAX: (01202) 490099 for the loan of the TS-830S. (Actual loan transceiver already sold!).**

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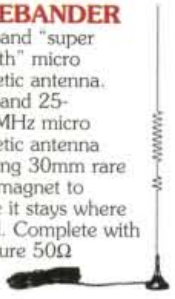

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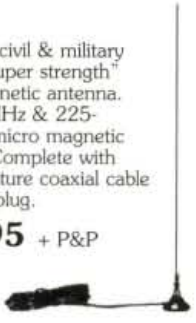

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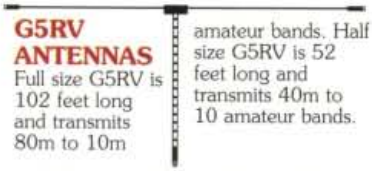

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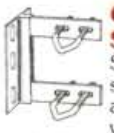

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Rob Mannion G3XFD takes pleasure in talking to...

RADIO PERSONALITY - ROBERT SNARY G4OBE

Radio Amateurs don't come much more 'big hearted' then Robert Snary G4OBE. Rob Mannion G3XFD took pleasure in talking to someone who has done so much to encourage young people into the hobby.

Robert Snary G4OBE and I have known each other for some years now and I've always been impressed by his attitude to people, his devotion to the hobby and the wonderfully kind nature. Added to that he's as big as I am - and we really feel like brothers when we're together!

If you've witnessed him in action at the Picketts Lock Show in London, you cannot fail to be impressed. Anyone helped into our hobby by G4OBE has a flying start!

So, after managing to pin him down for a while (with the help of his ever supportive parents) we managed to find time to record Robert's interesting background. Armed with tape recorder and pen I got to work and wasn't disappointed!

● Robert Snary G4OBE, in action at the Picketts Locks show in March 2000, proving how successful the Novice training scheme can be.

A question that is sometimes asked of hobbyists is "Is an interest in radio inherited?" It may well be true, as both the grandfathers of Robert G4OBE were interested in radio, his maternal grandfather made one of the first receivers in Tottenham while his paternal grandfather had one of the first receivers in Edmonton and was also a reader of both *Practical Wireless* and *Wireless World*.

Robert told me that "One of the first expressions of interest in radio was when as a five year old I was found with a screwdriver trying to take the back off the family radiogram to find out how it worked. To encourage my interest in finding out about radio safely I was bought the Ladybird Book of *How to Build Your Own Transistor Radio**.

* Note: Many readers will remember this book (now out of print) - which was written of course by the very well known *PW* author the **Rev. George Dobbs G3RJV**.

First Of Many

Continuing, Robert told me: "I was also introduced to the first of the many people who helped me, **Frank Mozer**. The name Mozer will bring back memories to many people in the North London area as being one of the main local component shops.

As I became more confident I was also bought a Philips Electronics Set so that I could learn more, little did my parents know what they had started.

When I was 13½ I joined the Air Training Corps (ATC) and this was where I had the second of my lucky breaks in that one on the instructors (**Don Blampied G4JGO**) was going to be taking the RAE at Friday Hill House in Chingford and was willing to take some cadets along as well. I also received a lot of help and encouragement from the other radio instructor at the squadron **Ted Ball** (now **G4NLR**).

Distinction & Credit

Now in full - and fascinating - flow Robert continued his story: "I took the RAE in May 1977 and passed (Distinction and Credit) and received my first licence in September 1977 as **G80BE** (at the time I was the youngest amateur in the country).

It was when I first came on air that I met a great number of local amateurs who all helped encourage me. These included **Paddy G3LZE**, **John G8PPZ**, **Robert G8CTF** and many more too numerous to mention but who also offered much appreciated help and guidance.

I used my interest in radio to help me with my choice of career and joined the Post Office International Telephones (later British Telecom International) as an apprentice.

Whilst the apprenticeship came first I also learnt c.w. and took my Morse test in January 1982 and waited until May 1982 for my current callsign. In December 1982 I became too old to remain in Air Cadets and became a civilian instructor with the ATC.

In the years that followed I served as the PRO for the Southgate Amateur Radio Club and this was at a time when **John Jackson G3TZZ** was mayor for Enfield and the Southgate Club ran several special event stations in the GBxEMC series culminating with a sponsored station which raised over £1000 for the Mayor's Charity.

Novice Instructor

Delving deeper into his radio 'past' Robert continued: "When the first call for Novice Instructors was made in 1990 I registered as a Novice Instructor and ran my first class in October 1991 for the March 1992 examination. The reason for the delay was to ensure that everything would work first time as I am a great believer in the 5Ps rule (Proper Preparation Prevents Poor Performance). The first course was more nerve

racking as the first student to sign up for the course was **Margaret** now **2E1AQS**, better known to me as Mum!

The night of the examination was the first time I suffered from 'exam nerves' which I still suffer from every time I have a course take the NRAE, even though I now have over 100 successful candidates having gone through what is locally known as the 'Enfield Novice Training Academy'.

I've always promised the students that I will see then before going into the examination and be there as they come out. However, this was put to the test when on one occasion I was suffering from Chicken Pox and had to do the well wishing from the quarantine of my car!

I should pinpoint that in all fairness it is **not just my work in the Novice courses** but is in fact a team effort as without the support given by my Mother 2E1AQS and my Dad **Frank**, the s.w.l. member of the family, I would be unable to do everything that I get involved with. Their help is particularly important in the preparation of the training facilities in what used to be the front room as well as answering enquiries when I'm at work.

Aside from the work I do as both a Novice Instructor and also since July the RSGB Novice Training Co-ordinator I still try to get on air and am active with both Worked All Britain (WAB) and also 10-10 international as well as being a GB2RS newsreader. I also do try and visit clubs giving talks on the Novice Scheme, WAB and also such topics as Electronic Intelligence, etc. As a result of some of the visits and talks other clubs have successfully started Novice courses.

● Robert spent many years associated with the Air Training Corps and it's appropriate that he's shown encouraging ATC Cadets at the London Show.

Other Activities

As the tape rolled I learned of other interesting aspects of G4OBE's busy life as he told me: "I also get involved with other activities away from radio, one of which is being a First Aider and I have taken part in First Aid Competitions.

With the competition work I also help by **being a casualty!** This casualty work has also seen me at some emergency service exercises providing an 'economy sized body' for people to work with! Yet another interest is Aviation and Photography as can be seen by the front of one of my QSL cards (photograph taken at Biggin Hill, QSL card by FDS).

I also still enjoy home-brew especially experimenting with antennas and getting on air as often as I can. The wall of my shack displays some of the awards that I have achieved over the years although I won't let you publish a photo as my call describes the shack: G4 **O**dd **B**its **E**verywhere)!

● The sense of achievement shown by "first timers' (both young and old) provides G4OBE with much satisfaction. "It's the way forward for our hobby" he told *Practical Wireless*.

Hobby Influenced Work?

Continuing, Robert reflected on a question often asked of electronics professionals who are active in Amateur Radio: "Many people have commented that their hobby has influenced work and this is true in my case as I have moved on from an engineering role working on Transmission Systems in BT's International Operations to being given the role of undertaking the design and delivery of specialised training courses this change of career came about as a result of my running Novice courses.

One of the things that I strongly feel about in the hobby is that we need to encourage the next generation of Amateurs to keep the hobby alive. There have been many comments about the Internet, however having been at the Picketts Lock Rally and also at the Hatfield Rally last year with a stand to encourage youngsters to have a go at construction it was gratifying to see the number of potential Amateurs say that they enjoyed building things.

When one visitor was asked what they thought of building an electronic dice project as opposed to using the Web the rely was " I made this! Working with the computer is just looking at a screen"!

Robert continued: "It's remarks like this and the pleasure of seeing people getting back on the air and enjoying Amateur Radio that I feel that by being an Instructor I'm putting something back into the hobby. While all the new friends that I have made makes the work on the courses worthwhile".

Thanks Robert! What a giant he is in every sense of the word: large helpings of enthusiasm, dedication and all accompanied by a big smile. **We should all be proud of G4OBE** and let's hope one day he will be Robert Snary OBE, G4OBE, in recognition of his services to Amateur Radio!

PW

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This amazing 10 metre all mode handheld delivers 6 watts ssb and 4 watts on AM, FM
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AE485S. Mobile 10m unit
Power output is 6 W AM, 25 W FM, 25 W SSB
Features include Mike Gain, RF gain, Programable repeater offset and Low power.
Priced at £199.95

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MFJ-969 300W ATU 160-6m wire, coax or balanced. Includes VSWR / Power Meter, Antenna Selector, PEP feature, Roller Coaster Tuning. **Only £169.95**

MFJ-949E 300W ATU 160-10m wire, coax or balanced. Includes VSWR / Power Meter, Antenna Selector, PEP feature, Roller Coaster Tuning. **Only £139.95**

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MFJ-901B 300W ATU
160-10m wire, coax or balanced.
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Remember! All equipment sold by ML&S is BRAND NEW, not dog-eared, shop soiled, opened, ex-demo, unwanted gift or returns. So there! Full UK manufacturers warranty with all items sold.

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ather let our customers tell you how good we are!

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Proper DSP HF Transceiver.
£1399. Only £100 deposit &
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TM-D700E
The only Dual bander with Built in Modem and APRS facility. £469.
Only £69 deposit & 24 payments of £20.36.

TH-D7E
Compact handie dual bander with Modem & APRS.
New mk11 model with KISS mode. £249.

Mr Martin Lynch
Martin Lynch & Sons
Ealing, London

Dear Sirs
I would like to congratulate you on how well I was dealt with in your shop on Sunday 1st July 2000.

I popped into your shop and spoke to Chris with an interest in buying a second hand HF radio (mobile).

He was very efficient and extremely helpful, in fact I ended up buying a new Yaesu rig.

I would just like to convey how happy I am with the service which I received, so keep up the good work.

Many Thanks
JW Smith M1JWS

POWER SUPPLIES

Diamond GSV-4000
Switch Mode PSU 40 Amps!
Nice and compact, 13.8V DC at 40 AMPS, fully metered and it only weighs 3.5kg.

Only £159.95

Samlex SEC-1223 PSU
Without doubt the best selling PSU in the last twelve months. Very small & compact, ideal for FT-100 & IC-706.

- Voltage out: 13.8 DC
- Current: 23-25amps
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Linear Amp UK Amplifiers
The Linear Amp UK range of amplifiers are proudly built in the heart of Yorkshire. If you want a well made amplifier with support only a phonecall away -then look no further.

Ranger 811
Using the 811 valves giving up to 800 watts output the Ranger 811H is great value at **only £895.00**

Explorer 1200
Another good value Amplifier offering 1.2kw **at only £1595.00**

Call for details of 2 metre, 6 metre 70cm and other amplifiers in the range.

To celebrate Peter and Gwens 50th Birthday's we are offering the full range of amplifiers on **interest free credit** for this month only.

Garmin Street Pilot
The Street pilot is an excellent in car GPS unit with map detail down to street level.
The amber backlit display is easy to read and makes the unit Ideal for navigation in unknown territory. The Street Pilot is also at home with APRS when used in conjunction with a THD7E or TMD700E. Supplied with *The UK Metro Guide* on CD Rom, an 8mb Ram module cigar Lead, PC lead and a magnetic roof mount antenna the system is all **ready to go at £595.00** including delivery to your Door.

Garmin E Map
The Garmin Emap is a hand held version of the Street Pilot and comes with Data lead,8 mb Ram Card & *UK Metro Guide* on CD Rom at **only £329.00.**

The Garmin GPS3plus
The ever popular GPS3 now has more map detail and allows upload to street level. **Available at £339.00**

Road and Recreation CD Rom available at **£99.00**

HEIL SOUND

ML&S are the sole authorised retailers of this excellent range of TX/RX Audio products from the USA. As used by the 9M0C DXpedition last year, treat yourself to either the HC4 for DX or HC5 'full articulation' inserts.
The Pro Series Headsets are designed to meet the demands of top contesters and DX chasers. The light and comfortable headset combines with a flexible boom which houses either a HC4 DX or HC5 full "BBC quality" microphone insert.

Heil Proset *Professional Headset & Boom Microphone.* **£119.95.**
HC-4 & HC-5 *Inserts.* **ML&S £29.95. Foot Switch. £??.?? Heil Leads. £14.95.**
Heil Pro Micro *Lightweight Headset & Boom Microphone.* **£??.??**

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ML&S

Leicester Amateur

22nd & 23rd September 2000, Castle D

The Editors' Corner
A Welcome Awaits You From Elaine & Rob!

I'm delighted to say that for the 2000 'Leicester' Show at Donington on Friday 22nd and Saturday 23rd of September that **Elaine Richards G4LFM** will be joining us on the *PW* Publishing stand. This has come about since our Publishers added *Radio Active* to their portfolio of magazines.

As many of you will remember - last year we had a totally new stand design at the show and some readers had difficulty in finding me to come and have a chat. Well, this time it's all going to be arranged so that you'll be able to see both Elaine and I, and meet the rest of the magazine team very easily indeed.

Elaine and I worked together on *PW* when I first joined the magazine, before she went off to join our sister publication *Short Wave Magazine*. Eventually Elaine went 'freelance' and took over the Editorship of *Radio Active* magazine, which covers CB and general radio communications interest. And in fact Elaine will be joining us on the stand at the Leicester Show in her capacity as Editor of *RA*, now that PW Publishing owns *RA*, just over seven years since she originally left us.

Elaine rejoins us with even more experienced to add to her unfailing enthusiasm for her work. The heading photograph shows Elaine and I together at the 1999 Show where we managed to find time to chat in my 'little corner'.

However, this year we're planning to **have two** 'Editor's Corners' at the Show. We're planning to arrange an 'Editor's Corner' at either end of our stand so that readers can come and chat to their respective Editors. So, don't jump to conclusions when you see Elaine and I at opposite ends of our stand - it's not that we've 'fallen out' - it's arranged that way so you can come and chat to us and relax for a short while.

Some readers have commented to me that the latest design of our stand at the major shows cuts me off, making it look like I've become estranged from the rest of the team! Well, I'm pleased to say that's just not the case - it's been arranged in the new way so you can come and chat, sit down and not feel as though you're in anyone's way!

Once A Year

When it comes to the larger shows - as I've mentioned on previous occasions - I have to remember that for many of you they provide the only time you'll get the chance to talk to either **Donna Vincent G7TZB**, **Tex Swann G1TEX** or myself. So, with this in mind we have to enable the meeting to be as comfortable and easy as possible. Hence the chair (or stool) for you to sit on and the 'screened off' enclave so we can chat in reasonable comfort. (perhaps one day I'll be able to arrange a '*PW* Reader's Lounge' where we can al sit in easy-chairs!

In return I know how important you regard the 'meeting of minds' to be. This was demonstrated at the London Show in March of this year. Here, for the first time, I was invited by the organisers to give a *PW* 'State of The Nation' (state of the magazine more like!) type of talk for those who wanted to attend. And bearing in mind that the talk **Tex Swann G1TEX** and I presented was the very last one of the day on the Sunday ... it was extremely well attended. So, as you may gather I fully realise just how valuable face-to-face meetings like this are for everyone involved.

So, in closing on this topic I look forward to meeting you on the stand this year. Look out for my 'battery buggy' whizzing around the main floor - and don't hesitate to 'flag me down;' to have a chat. It's what I'm there for - just to meet and talk to you all.

Special Interest Groups

Another, equally important, aspect of the Leicester Show is the opportunity provided for the 'Special Interest' groups to meet their members each year. Like ourselves, they take advantage to present trophies, enrol new members, promote their particular interest and share ideas. And in this respect I also fully support what each group gets up to. Some, particularly the British Railways Amateur Radio Society (I was Founder Member back in 1966), the *Four Metre News* magazine, Royal Navy ARS and Radio Old Timer's Association, and the RAIBC have particualy close ties with G3XFD.

In all cases nowadays I have to support everyone from a distance because (you may remember the 'Keylines' Editorial on the subject) - the sum of the individual subscriptions became such that I thought it best to support one and all although not 'officially' belongingg to any organisation other than the IRTS and the RSGB. Despite this, I feel very strongly that supporting the many different aspects of our hobby is so very important. You name it - and there's an organisation sheltering under the common 'umbrella' of Amateur Radio. Why not choose one (or two) yourself for yourself? They really could do with your support!

Looking forward to seeing you at the show. Safe journey to Donington and please do come and have a chat with me!

G3XFD

Radio Show News

onington International Exhibition Centre

Show News

To whet your appetite and get you in the mood for the 29th Leicester Amateur Radio Show and Convention here is a sneak preview of just a few of the people and products you can expect to find at Castle Donington this year. If you can't make it to the show then our guide will give you an idea of what you can find in your favourite radio dealer's stores after the show.

AOR (UK) Ltd. - Stand 5C

The production unit of the AR8600 will be proudly displayed by the AOR team at this year's show. The company state that: "This is the latest mobile receiver with an 'all new' front-end and r.f. stages, providing superior sensitivity and higher dynamic range.

Operation is similar to the trend setting AR8200 Series-2 but the circuit design is very different thanks to increased availability of space within the cabinet. Over 90% of the microprocessor operation is in common with that of the AR8200-2, however you can fit all five slot cards simultaneously and select two to operate.

Other features include: 8.33kHz airband channel spacing along with all-mode receive and wide frequency coverage; an internally fitted RS232 port; wide 10.7MHz i.f. output is provided for compatibility with the SDU5500 spectrum display unit with antenna input via a BNC socket with operation of the receiver from 12V d.c.

The receiver performance is similar to that of the AR3000A, the front-end and mixers are different to that of the AR8200 series, better strong signal handling and a more even sensitivity across the spectrum results".
Stocks are expected in the UK during October with a price tag of around £799.

Icom UK Ltd - Stand 19

The Icom team will be displaying their full range of Amateur transceivers and communications receivers on their stand. Highlights to look out for will be the forthcoming IC-718 h.f. transceiver and the new PMR446 licence free set, the IC-446S. So for the complete picture drop by the stand, meet the team and see what's on offer.

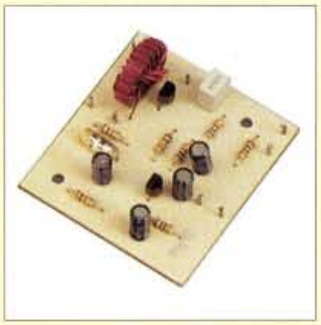
Kenwood Electronics UK Ltd Stand 17

Rush along to see **David Wilkins G5HY** and the Kenwood crew as they'll be exhibiting the first UK sight of the prototypes of the two new Kenwood all-band radios (both the normal front-panel version and also the 'black box' version). These radios are so new that as yet there are no model numbers, prices or further details available.

The Kenwood stand will also play host to **Roger Barker G4IDED** who will be demonstrating Ui-View/APRS and WinPack as they relate to Kenwood hand-helds and mobiles, especially the TM-D700E and TH-D7E.

Lake Electronics Stand W6A

Alan Lake would love you to call at his stand where he'll have the full range of Lake kits including



the DTR series of QRP transceivers and the TU4 a.t.u. and the **new** MkII TUA1 s.w.r. meter. Also on show will be a selection of antenna tuners, couplers and filters.

The Novice will be tempted by the two Novice receiver kits together with details of special terms for NRAE instructors. If you're taking the XYL don't panic about her finding something of interest as on Alan's stand she'll be delighted by the 'Conscience Pressie' range!

Martin Lynch & Sons Stand 12b

Martin and his 'gang' will be showing off all the latest 'toys' from the three big Amateur Radio manufacturers. Martin will be there all day on the Friday, as he was missed from last years show. Martin hopes to have a healthy stock of the new Yaesu FT-1000MP MkV and details of the new FT-817 portable h.f. to 430MHz all-mode transceiver, which is even smaller than the old FT-290 144MHz rig!

A monster range of new and used equipment will be also be available and Martin is particularly interested in any recent clean Amateur Equipment for outright purchase, being bought from you outright on the spot. You're guaranteed a friendly welcome by the 'Lynch Mob' so make sure you pay them a visit.

Nevada Communications Stand 11

The brand new President Lincoln 28MHz multi-mode transceiver will have its first outing on

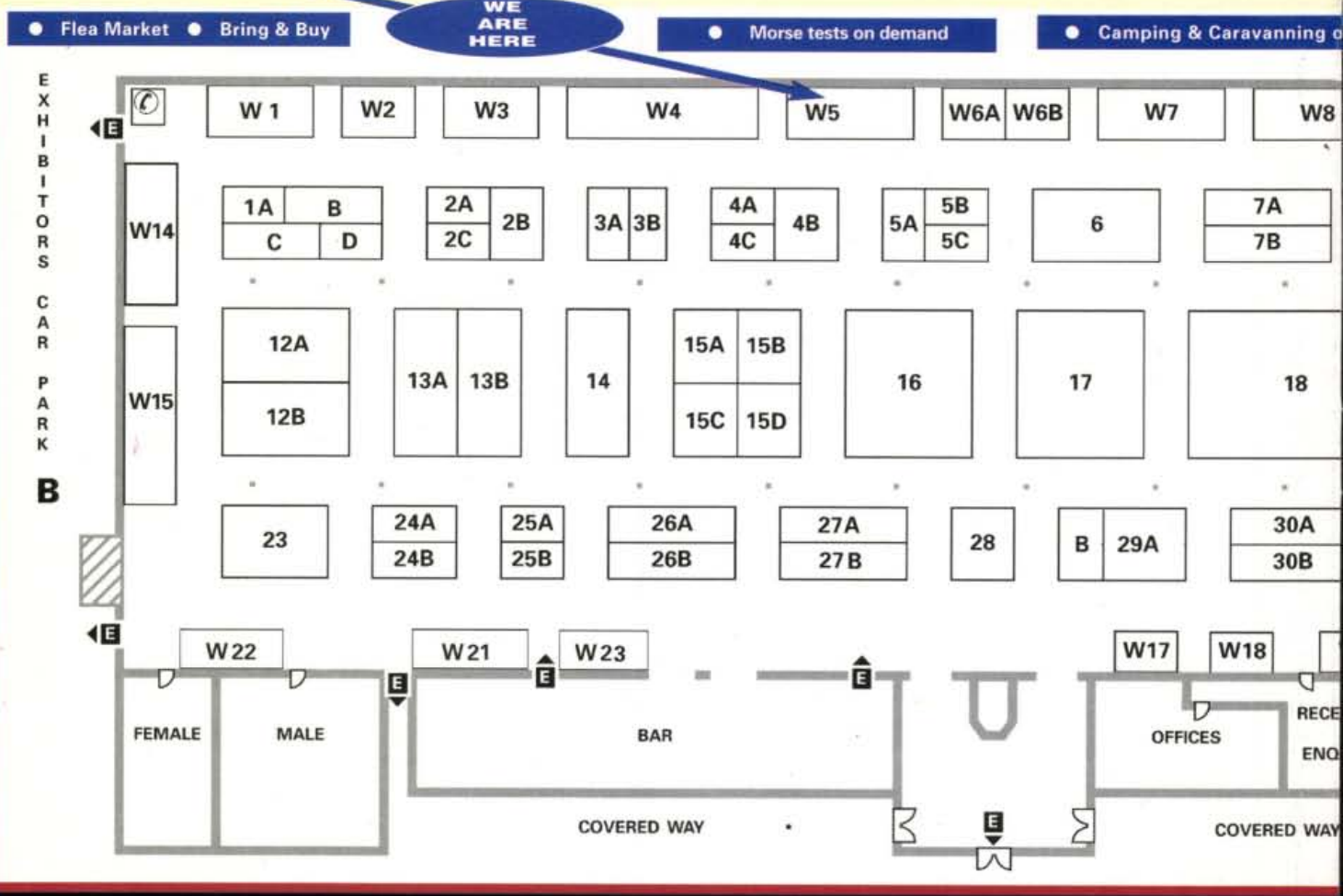
Continued on page 48...

Leicester Amateur Radio

22nd & 23rd September 2000, Castle Do

Exhibitor's List

Company	Stand No:
Essex Amateur Radio	W1
Harwood Trading	W2
Haydon Communications	W4
PW Publishing Ltd	**W5**
Lake Electronics	W6a
T & M Milman	W6b
Waters & Stanton	W9
Communications PMR	W10
Strikalite	W11
Radioworld	W14
Milkay Distributors	W15
Lowe Electronics	W16
Poole Logic	W17
LMW Electronics	W18
Timestep Electronics	W19
Bring & Buy	W20
R & D Instrument	W21
CHP	W22
Linear Amp UK	W23
Moonraker (UK)	W24
Maplin	1a
The Phone Shop	1c
H. Morgan Smith	2a
KM Publications	2c
Microwave	4c
Nonuts	5a
AOR (UK) Ltd	5c
Westlake Electronics	7b
Remote Imaging Group	9c
Alsco Tradiing	10a
InkTec Midlands	10b
Nevada Communications	11
Talk about Antenna Co	11a/t
Strumech Versa Tower	12a
Martin Lynch & Sons	12b
	Fri. Only
Sandpiper Comms.	14
IT Creations	15a



Show & Convention 2000

nington International Exhibition Centre

Company	Stand No:
Kenwood Electronics UK Ltd	17
YAESU UK LTD	18
Icom UK Ltd	19
RSGB	20
JAB Electronic Components	23
TLX Electronics	24a
Transworld Satellite	25
J & M Computers	26a
Nomis	27a
Dial Electronics	27b
Featival Computing	28

Company	Stand No:
Barenco	29a
Radio Communications Agency	29b
Ronal Computers Ltd	30a
Microgenis	30b
SGS Electronics	31a
QRP Component Company	31b
U.B.M. (London)	32
Computer Junk Shop	33
Radio Today	34a
Rich Electronics	35

* Details correct at time of going to press

Prices

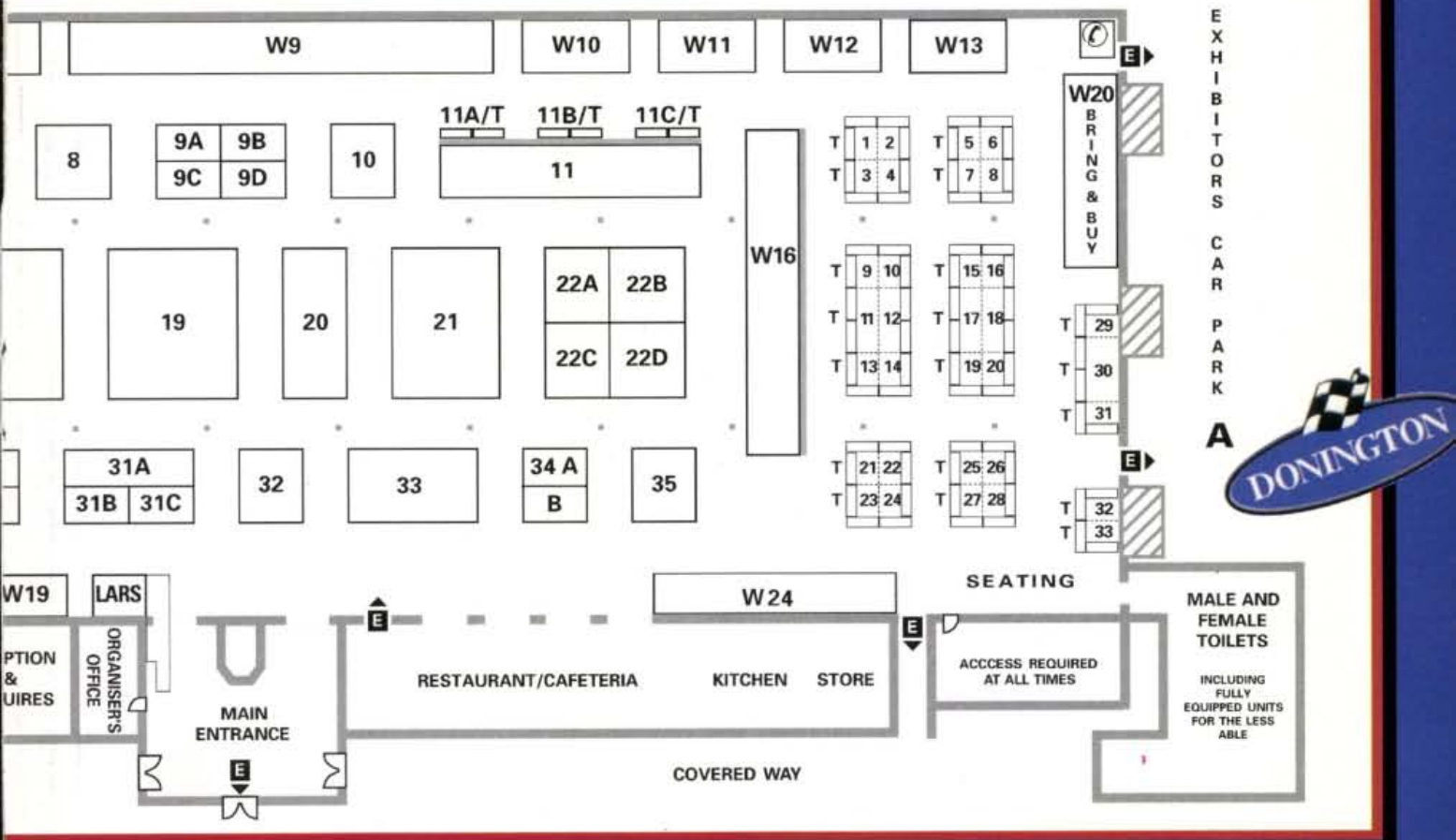
Admission:

£3	(1 day ticket)
£2.50	(OAP & under 16s)
£5	(2 day ticket)
£4	(OAP & under 16s)

Under 14s free when accompanied by an adult

Opening Times: 9.30am - 5.30pm

n site • National Clubs & Societies • Flea Market • Bring & Buy • Morse tests on demand



Leicester Amateur

22nd & 23rd September 2000, Castle Donin

News

...continued from page 45

Nevada's stand this year.

The Lincoln covers 28 to 30MHz, with a.m./f.m./s.s.b./c.w. with a power output of 25W on s.s.b. and 10W on a.m./f.m. The radio has a host of features including: Channel selector, manual or electronic up and down keys, frequency tuning, volume with power on/off control, squelch, l.c.d. display (RX/TX, mode, s.w.r, S/RF, frequency, channel, band). Jack for external S/RF meter and external speaker, frequency lock and scan function to name just a few.

With a price tag of just £225 this radio should prove very popular and provide the capability of world-wide communications on the 28MHz band at this time of the sunspot cycle. So why not stop by and see for yourself?

QRP Component Company Stand 31b

Chris Rees G3TUX is offering all visitors to his stand a slice of 'real radio'. Kits, Keys and QRP, will be the order of the day together with the full range of AKD receivers, transceivers and filters will be on display, including the new active receiver antenna.

You'll also find kits from Howes, Ten Tec and Kanga as well as the new MFJ Cub transceiver on offer. If you're looking for a Morse key, Chris will have a variety for you to choose from including Bencher, Kent and Samson keys and the fabulous TiCK keyer kits.

Waters & Stanton PLC Stand W9

Waters & Stanton will be 'manning' their usual large stand opposite the main entrance at this year's Donington show where they will have on show the complete range of products from major manufacturers such as Icom., Kenwood, and Yaesu. There will also be the chance to see new products from INAC, Heil, Radio Works, Watson and Yupiteru.

Of particular interest will be the Yupiteru MVT 7300 scanner and the complete range of INAC full control power supplies. No matter what you are looking for you can be sure of a warm welcome from the W&S Donington team.

W. H. Westlake - Stand 7b

If you're looking for high quality coaxial cable and connectors then make sure you visit the **Westlake** stand. They'll have several special offers on cut lengths of many cable types, as well as selling an extensive range of connectors including some which are only available from them.

So go along and you may just find that connector you've been searching for.

Talk about Antenna Company Stand 11a/1

Paul Beevers of Talk about Antennas will be displaying his full range of antennas which will include the Highlander, Full Monty and a Travelling Wave Wire. He will also be promoting his 'Suffolk Screwdriver' antenna, which as the name suggests is made in rural Suffolk by Paul.

Also on display will be two antennas made in California by a good friend of Paul's whose special 'stealth' antennas he will be stocking in his range. Paul is also in the process of getting his website up together so for a preview of his products point your browser at **www.talkaboutantennas.s5.com** or why not drop him an E-mail for details of his antenna range,. his address is **Antennaman@excite.com**

Please note the information given in these pages was correct at the time of going to press and we have only be able to publish information that we have be sent.

Radio Show Extras

gton International Exhibition Centre

DONINGTON

blishing Presents...
l Show Offers

More out of Thin Air - Half Price!

PW Publishing's very own collection of antenna theory, design and construction articles.

Show Price £3

ARRL Operating Manual 6th Edition - Save over £5!

See how the The American's do it (Ideal for the hobbyists around the world)- everything for the active 'ham' is inside this 400 page book.

Show Price £13

Guide to World Wide Weather Services 19th Edition - Save £13!

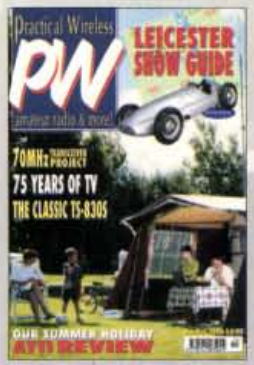
Internet, Navtex, Radiofax, Radio telex and more are covered in this acclaimed Joerg Klingenfuss comprehensive reference manual.

Show Price £10

Your three favourite radio magazines, *Practical Wireless*, *Short Wave Magazine* and *Radio Active* will have some very special offers just for you during the Leicester Show!

Come along to **Stand No W5** for a warm, friendly radio welcome and you'll have a chance to:

* **Browse and buy from our great selection of radio related books**
* **Take advantage of special show prices**
* **Subscribe at a special price**
* **Meet the team behind the magazines**



So come along and see us on stand W5 at the Leicester Amateur Radio Show & Convention on Friday 22 & Saturday 23 September - Don't Miss Out!

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CHEQUE SPREAD

LIMITED OFFER

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- 4W RF out (12V) 2W RF out (9V)
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6M/2M/70cm + wideband receiver
500kHz-16MHz

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YAESU VX1R

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Mini 2M/70cm transceiver and wideband RX
500kHz-999MHz.

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CHEQUE SPREAD

THE DXERS CHOICE

AD-K....Kenwood Adaptor Cable
AD-I....Icom Adaptor Cable
AD-Y....Yaesu Adaptor Cable
£14.95 each

PROSET 4
PROSET 5
£119.95 £8 p&p

ICOM T81E

CHEQUE SPREAD

6M - 23cm HANDIE

- Ultra Wide RX
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ICOM IC735	HF 100W TRANSCEIVER	399.00
ICOM IC746	HF + 2M + 6M + FILTERS	1075.00
ICOM IC756	100W HF + 6M	1199.00
KENWOOD TS450S	100W HF TRANSCEIVER	499.00

VHF/UHF TRANSCEIVERS

ALINCO 203E	HANDIE 2M	99.00
ALINCO DJC1	MICRO 2M HANDIE	79.00
ALINCO DJ S41	70CM MINI HANDIE	75.00
ALINCO DR 510E	2M/70CM MOBILE TRANSCEIVER	179.00
ALINCO DRM 06TH	20W 6M FM	179.00
ICOM IC3230H	2M/70CM MOBILE TRANSCEIVER	225.00
ICOM IC575H	10M/6M MULTIMODE BASE	499.00
ICOM T8E	2/5/70CM HANDIE	225.00
ICOM ICW2E	2M/70CM HANDIE	129.90
KENPRO KT22	2M FM THUMBWHEEL	59.00
KENWOOD TM733E	TWINBANDER	295.00
STANDARD C8900	2M FM MOBILE	125.00
TRIO TR2200GX	2M FM PORTABLE	59.00
TRIO TR751E	2M MULTIMODE TRANSCEIVER	325.00
TRIO TS700G	2M MULTIMODE BASE STATION	225.00
TRIO TS711E	2M MULTIMODE BASE	299.00
YAESU FT23R	2M HANDIE	125.00
YAESU FT11R	2M HANDIE	129.00
YAESU FT290R	2M ALL MODE choice from	199.00
YAESU FT411	2M FM HANDIE - BOXED	125.00
YAESU FT726R	2M/70CMS BASE	499.00
YAESU FT5100	2M/70CM MOBILE + CTCSS	295.00
YAESU FT5200	2M/70CM MOBILE TRANSCEIVER	299.00
YAESU FT709R	70CM HANDIE	69.00
YAESU FT90R	2M/70CM MOBILE TRANSCEIVER	275.00
YAESU FTL2014	VHF PMR TRANSCEIVER	75.00

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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
M MODULES	432/50 70CMS AMP	99.00
M MODULES	432/50 LARGE 70CMS AMP	125.00

SCANNERS & RECEIVERS

AKD TARGET HF35	HF RECEIVER	120.00
COM ICPCR100	COMPUTER BASED SCANNER AM/FM	149.00
ICOM ICR1	HANDHELD SCANNER	159.00
ICOM R75	HF RECEIVER + UT102	625.00
ICOM ICR75	HF RECEIVER + DSP	649.00
ICOM ICR7100	WIDE COVERAGE BASE RECEIVER	599.00
ICOM ICR72	HF RECEIVER	399.00
KENWOOD R5000 + VHF BASE RECEIVER		599.00
JRC NRD535	HF RECEIVER	799.00
JRC NRD535/LOWE	HF RECEIVER + LOWE MODS	829.00
REALISTIC PRO 2026	BASE SCANNER	125.00
YUPITERU MVT9000	HANDHELD SCANNER	249.00
YUPITERU VT125 II	AIRBAND SCANNER	99.00
YUPITERU VT225	AIRBAND SCANNER	159.00
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AMTRON UK552	FREQUENCY COUNTER	69.00
DATONG PC1	HF CONVERTER	59.00
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• 0 - 600MHz• 1kW CW • SO239
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- 1.8-150MHz
- Measures average or peak power

A heavy duty, wide frequency range HF & VHF power meter.

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- 150W
- 1.8 - 30MHz
- 4:1 Balun

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GP-3	144/430MHz 4.5/7.2 1.78mtrs 200W	£57.95
GP-6	144/430MHz 6.5/9.0 3.07mtrs 200W	£89.95
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HR-50	50MHz centre loaded , length 2.13 mtrs	£39.95
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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
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RS-730	Hatch/Trunk Mount fully adjustable	£18.50
TBR	Hatch/Trunk Mount standard model	£14.95

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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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Comet CFX-514N	50/144/430MHz	£47.95

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A2710S	2/70cm 5 + 5 el. Yagi	£79.95
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*p&p £10 on each item * £12 p&p on each item*

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THD7E	2m/Dual Band Transceiver with TNC	£259.00
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GOODMAN GPMR114	Tracker PMR 446 (Pair)	£99.99
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PALSTAR G5RVH/E	G5RV Half Size (40-10m) Economy Model	£24.95
PALSTAR WIN4010	40-10 Mtr Windom Antenna	£49.95
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PRO AM PHF15	15m Mobile Whip 3/8	£19.95
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Power: ..... 1kW PEP

PL259 ..... £39.95

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

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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

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PALSTAR PS06	4-6Amp 13.8V PSU	£29.95
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PALSTAR PS50	40-50A 13.8V PSU	£169.95
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MVT7300	H/Held Scanner 531Khz-1320Mhz 1000mem	£269.95
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YAESU VR500	Handheld Scanning Receiver	£199.99
MAYCOM	AR108 VHF Airband Scanning Rcvr	£69.95
ICOM R2	H/held Scanning RX 500Khz - 1310MHz	£139.00

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A tale of a 'true wireless pioneer'

THE LISTENING YEARS

Rose Hails looks back to the early and middle part of the last century to remember the 'Listening Years' when her Father, like many of his generation, was a true 'wireless pioneer'.

My late father, **Frank Stokes** (1901-1990), lived most of his life in Ashington - a large mining town in Northumberland. He'd been brought there when my Grandfather had come seeking work in about 1904 from Leeds in Yorkshire, where family and descendants settled until scattering in the 1930s. Dad left school at the young age of 13 to follow his father into the mines, the only work available at the time. He was a clever boy, but there was no money for further education and no time for night school because of the ghastly shifts and work which was very hard. So, he became self-taught with the use of the local library.

● Like many men of his generation - the late coal miner Frank Stokes was a 'wireless pioneer' in his own small way. With nothing more than enthusiasm and a will to succeed he 'made and mended' his own receiver.

Time On Their Hands

During the miner's strikes in the early 1920s Dad, and friends, now with time on their hands, set about making a crystal wireless set. It consisted of a wooden box, two cardboard cylinders, cotton covered wire, a hat pin and a cat's whisker crystal and wire contact.

There was an outside antenna, they had one set of earphones and everyone had to wait for a turn to listen into London station 2LO. All thought it was a truly wonderful experience. Such were the simple pleasures of a bygone age!

Making & Mending

Looking back from these days of 'everything in plastic bubble packs' where all that you need is available, it's hard to imagine that in my father's early youth he had to learn to do most household repairs. Repairing bicycle tyre punctures, repairs around the house - were all part of the everyday skills needed for most working people.

Another thing that's often forgotten is the length of the working day and the very short weekends. Try and tell young people they have to work on a Saturday without double or treble pay nowadays!

● 'Making & Mending' was something the 'man of the house' had to do in the days of the depression and after the Second World War. After a job like this Frank Stokes could be repairing a wireless receiver or helping his daughters with their homework.

So, it's not surprising that together with his friends Dad had to scrimp, save and make the basics for a 'wireless' set. And to help them they would have read the early wireless magazines - all weekly in those days.

Smoking cigarettes, a habit so socially unacceptable today, provided 'learn as you smoke' information on the 'Cigarette Cards' included in the packet. It's strange to think just how collectable these cards are nowadays - as they sell at auction for what my father would have considered a King's Ransom!

Dad and his pals also went camping on the Northumberland coast during the strikes - to a place called Lymeburn. They swam, fished, played football and even took photographs. We went there as children to that beautiful bay which has sadly since been desecrated by open-cast mining and industry.

As the years passed by, Dad was able to help us with our school homework, especially my sister who attended Grammar School. He certainly was ahead of his time, as the care and attention he gave us children was not common among miners.

The family wireless set played an important part in our growing up. Dad was there to repair it and, like other Dads of the time - to repair things around the house as required. No calling the repairman then - they often weren't available and working people couldn't afford them. That's why 'practical' and 'doing' magazines and 'd.i.y.' publications abounded in those days.

We have these times and many more memories which Dad recalled and taped for us in the last six years of his life after our Mother died. It helped him cope with his grief.

Now we, together with our Grandchildren can listen to those tapes from long ago days. And indeed, they really do provide a link to those 'Listening Years' and to a Dad whose memory I'll always be proud of. Like the thousands of others who had to make their own wireless sets from the most basic parts - he too was a pioneer. Let's not forget them! *PW*

● Those who could not afford wireless magazines were often helped by 'Cigarette Cards' which - in serial form - provided the basic information (and a persistent cough) to help build a wireless set. (From 'Packet Wireless - History On A Card' *PW* March 2000.)

New to v.h.f. construction? Don't worry there's a kit available to help! See page 39 for further details.

The PW Four

John Beech G8SEQ describes a simple transmitter - receiver pair for the under used band of 70MHz. So, get building and join in the fun on 'four'!

This project, although looking and behaving like a transceiver when completed, isn't strictly a transceiver at all! The only common components between the transmitter and the receiver are the transmit-receive change-over circuit, which is all electronic.

The approach was used for a number of reasons, the main one being to make it more versatile. Thus the project should appeal to short wave listener and licensed Amateur alike. Since our licensing regulations stipulate that we must be capable of receiving on any band we choose to transmit on then I will deal with the receiver first.

The Receiver:

My design brief was for 'a simple f.m. rig with up to four crystal controlled transmit channels and a fully tuneable receiver'. There was also mention made of 'ancient mode' (a.m.) too.

Let's look at the receiver first. As you will read later, it is relatively easy to make the transmitter multi-mode, but not so the receiver. However, a second i.f. circuit for the receiver is under construction which will demodulate a.m. and s.s.b. I'm planning that this would be assembled on an additional small p.c.b.

The TBA820M (IC4 **Fig. 1**) audio amplifier was chosen as this is cheap, readily available and is easily 'squelched'. It has an output power of 2W, which is adequate for all but the noisiest environments.

Drive for the audio chip is from the output of the Motorola MC3357 n.b.f.m. chip (IC2). This older device was chosen because I have had plenty of experience with it , and it's available with pins, rather than surface mount and so is capable of being assembled by mere mortals.

The MC3357 is also double conversion, allowing standard filter components for 455kHz and 10.7MHz i.f.s to be used. Ahead of this i.c. is a dual gate m.o.s.f.e.t. mixer to down convert the incoming signal to 10.7MHz (Tr8 **Fig. 2**).

While the m.o.s.f.e.t. type of mixer has some gain and some drawbacks, it was chosen for its simplicity of construction and drive arrangements. One of its two input ports is driven by the receive pre-amplifier (Tr7), which is also a dual gate f.e.t.

The local oscillator (l.o.) port is driven by the output of the v.f.o. (Tr6). As the design brief, excluded a synthesiser, I chose a variable crystal oscillator (v.x.o.) circuit as shown, although I had toyed with an up-mixing oscillator-mixer circuit.

The v.f.o. itself is a tried and trusted circuit which would also lend itself to varactor tuning. Using a varactor can give better mechanical stability, is cost effective, allows remote tuning (if required) and can easily be made to scan the band by application of any oscillating waveform. The latter is an important, but not essential, consideration for a band which has relatively low occupancy.

Now it's onto the construction stage of the receiver. Wind the input filter and v.f.o. coils, there are no other receiver coils to wind, the i.f. and discriminator coils being pre-wound. If the receiver is to be used in conjunction with the transmitter, then the antenna input should be connected via a change-over system of your choice (see later).

All the low profile components such as resistors, transistors and i.c.s should be mounted first. Solder the i.c.s directly to the board; **do not use sockets**.

Solder in the capacitors next

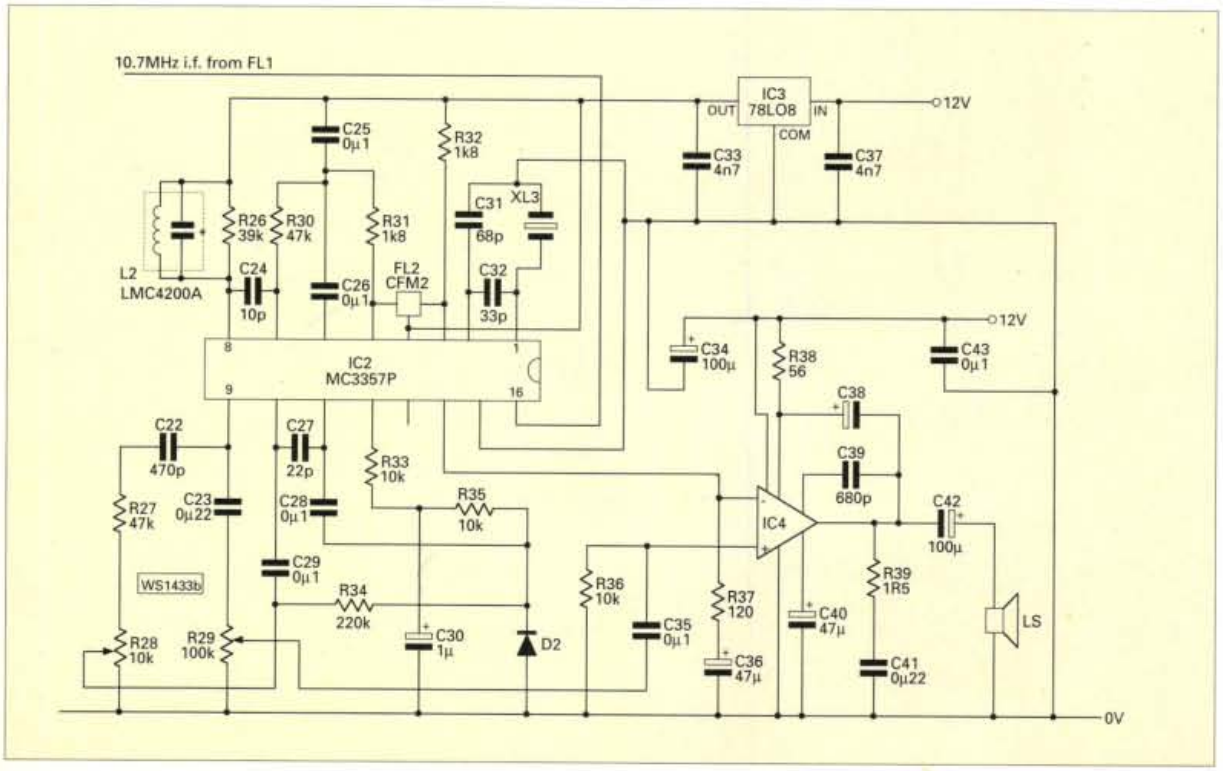


Fig. 1: The main circuit of the receiver is fed from a simple first mixer shown in Fig. 2.

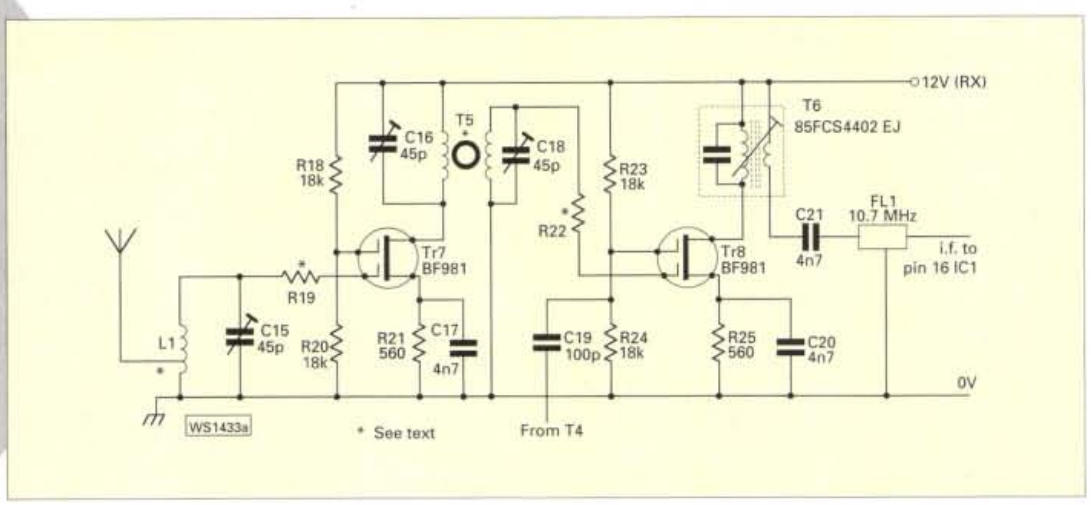


Fig. 2: The first mixer takes the 70MHz incoming signals, and converts it to 10.7MHz.

(smallest first), followed by the filters, inductors, etc. Wire up the volume control and squelch potentiometers. Lastly wire in the speaker, power connections and antenna. (A short wire may be attached directly to the p.c.b. for setting-up purposes.)

Receiver Set-up

Now to the receiver set-up. Firstly power up the circuit, using a current limited p.s.u. if available, (or a 100Ω resistor in series with your 13.8V supply). Monitor the total current drawn. if this continues to rise after the first second or so (or exceeds 100mA), switch off and investigate immediately.

If all is well advance the volume control clockwise and the squelch controls anti-clockwise. A loud hiss should be heard which is cut off when the squelch control is about half way. Check that the volume control acts in the correct sense. if it doesn't, rewire the outer connections only.

The same goes for the squelch control. If no signal generator is available, then tune the input and local oscillator stages (v.f.o output) for maximum noise in the speaker. Then tune the discriminator coil L2 for **minimum** noise.

If a signal generator is available, then tune for best quieting with an unmodulated signal, then adjust for best recovered audio with f.m. modulation switched on. Note for best results, it's advisable to re-tune the input and the discriminator with a weak off-air signal with an external antenna connected.

The squelch circuit can now be checked. With no signal the squelch control should be turned clockwise until the hiss from the speaker is cut off.

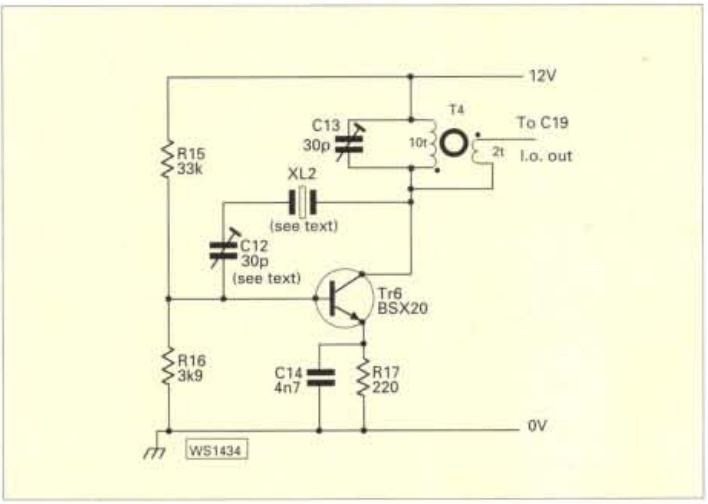


Fig. 3: By replacing C12 with an isolated 50pF variable unit, this oscillator can be made to cover several channels.

Next switch the generator on with minimum signal and gradually increase its output until the squelch opens. Repeat with a slightly higher squelch setting; a stronger signal should be required to open the squelch

The l.o. can be operated either for a single channel using the circuit as a shown in **Fig. 3**. Alternatively, by using an isolated 50pF variable, several channels can be covered.

Once satisfactory operation of the v.f.o. is achieved it should be

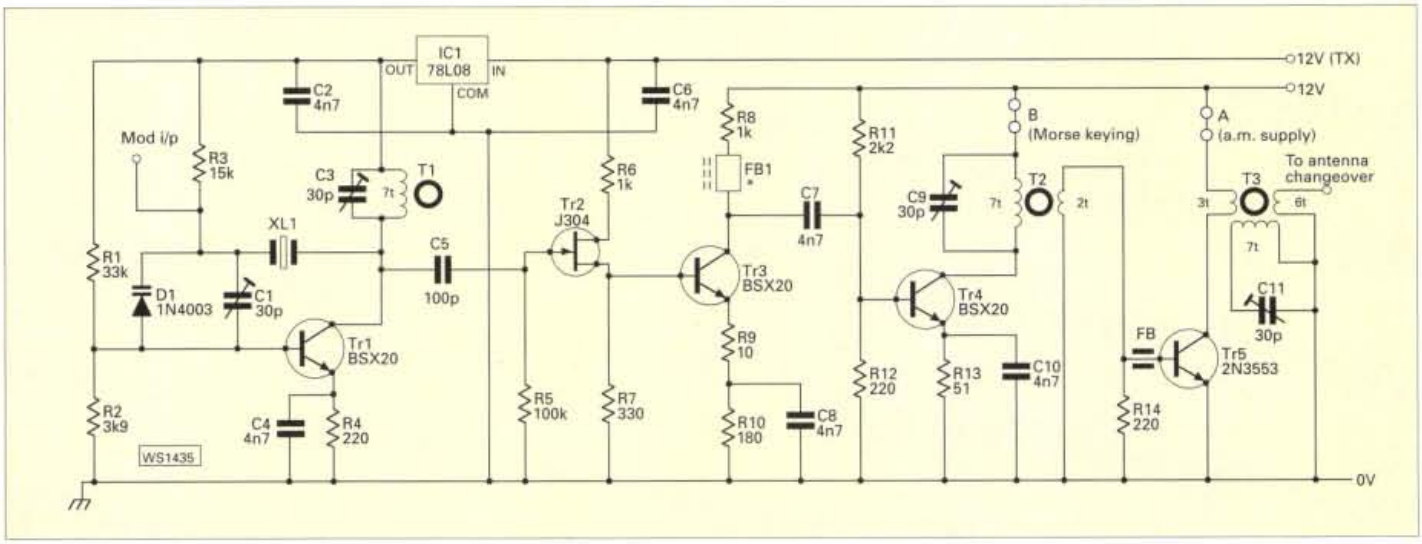


Fig. 4: Producing between one and two watts of r.f. the transmitter can be made into a multi-mode version fairly simply. Contacts labelled 'A' and 'B' may be used to introduce an amplitude modulated supply or to allow the unit to be used with a Morse key.

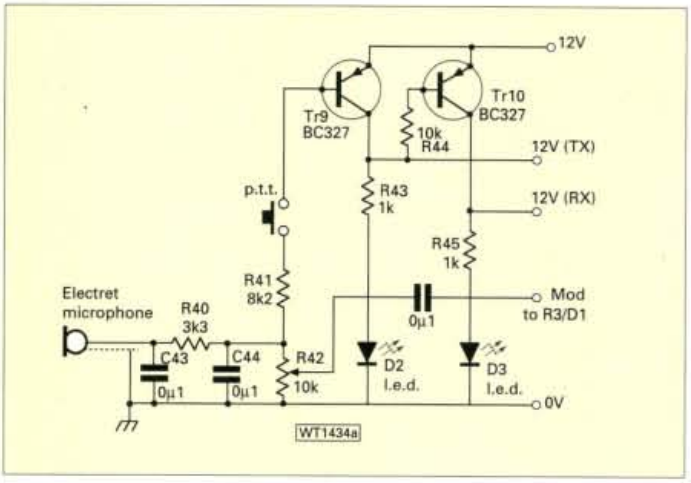


Fig. 5: The electronic change-over circuit can also be used to provide the polarising supply for the electret microphone unit.

enclosed in a tin-plate box, soldered to the p.c.b. and re-calibrated. It's unlikely that the second local oscillator (10.245MHz) will not work, but occasionally 'lazy' crystals will fail to oscillate, if so replace it.

The Transmitter:

Next on the list is the transmitter. People who are not Radio Amateurs think that transmitters are something wonderful and indeed they are. However, they are not so wonderful that they are difficult to design and make.

As a novice instructor, one of the first things I teach is that anything that oscillates will transmit! The trick is to make it transmit what you want it to. Again to keep it simple so it's a crystal controlled design offering up to four channels, a oscillator followed by an r.f. amplifier chain as shown in **Fig. 4**.

The oscillator section has a varactor to generate n.b.f.m. by applying an audio signal voltage to it from an electret microphone. Applying d.c. pulses instead of audio produces frequency shift keying (FSK), should the unit be required to transmit data or act as a beacon.

By keying the driver stage via a *pnp* device and click filter A1A (c.w.) transmissions can be sent as well. Also a modulation circuit could be introduced into the p.a. supply (point A) in order to generate a.m.

Generating s.s.b. is a little more difficult but not impossible. It can be done quite cheaply, using a 455kHz ceramic resonator and filter.

The transmit crystal is operating as a third overtone oscillator at the output frequency, allowing a simple amplifier design and filtering requirements. In all five transistors are used and three tuned circuits.

The first transistor oscillator has a tuned circuit in its collector to ensure that the crystal only oscillates in its third overtone mode. This is buffered by a j.f.e.t. and a simple amplifier.

Note that the driver stage (Tr4) has a tuned output and impedance matching circuit to drive the p.a. stage. The p.a. stage consists of a single transistor operating in Class AB. This mode of operation was chosen because the stage operates with higher gain, allowing a higher output power than could otherwise be achieved from a modest amplifier chain.

(There will also be less harmonics generated, making filtering simpler. And only simple modifications would be required should the TX be converted to s.s.b. use).

In use the output power should be 1-2W depending on the supply voltage (12-15V recommended), but well within the 2N3553's 7W power dissipation. However, heatsinking is a problem with this device at higher power levels as it resides in a TO5 can which is connected to the collector and hence it is difficult to use a metal case for a heatsink.

The commonly available 'star' heatsinks used in this design will only dissipate 2W satisfactorily. But if it's found to be running hot then either the supply voltage, or reduce its r.f. drive by increasing the value of the emitter resistor in Tr4, the driver stage.

Change-Over Circuit

The basic change-over circuit (**Fig. 5**) consists of two transistors. One (Tr10) supplies current to the whole of the receiver when the p.t.t. switch is open circuit.

A second transistor (Tr9) supplies the transmitter low power stages with 12V, when the p.t.t. is grounded, the p.a. stage receiving 12V all the while the set is powered up. This avoids having to switch large amounts of d.c.

You could use one of the supplies to switch an antenna switchover relay or you could use my preferred method, not shown here, of p.i.n. switching diodes as the change-over mechanism. Two l.e.d.s are included to indicate the set is powered up and in receive or transmit mode.

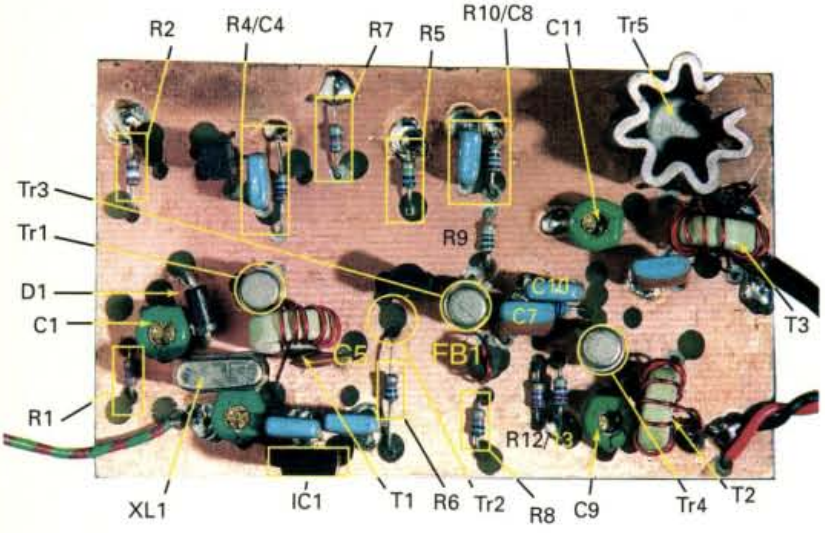
Construction Of Transmitter:

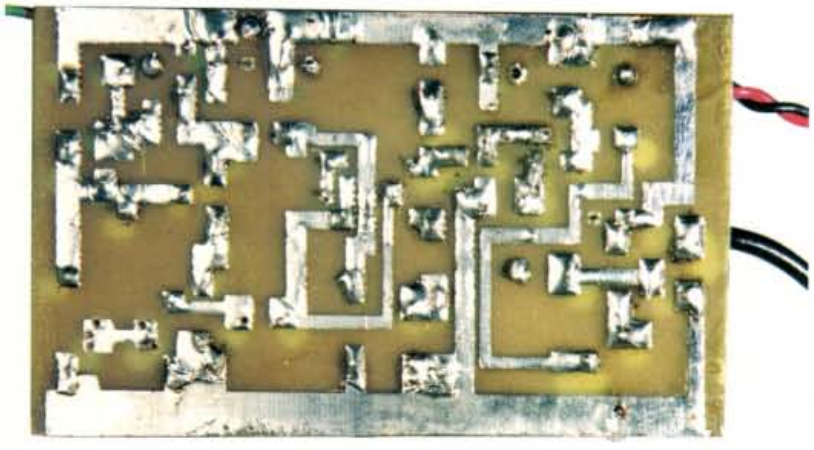
Finally we turn to the construction of the transmitter. First wind the coils on the toroids. This can be done quite quickly as the number of turns is low.

Enamelled copper wire should be used through out, although I have used PTFE coated silver plated wire (as used for wire-wrapping in the past) 26s.w.g. wire should be used for the coils with more turns and 22s.w.g. for those with fewer windings. However, the wire gauge is not too critical, although you should avoid very thin wire.

Assemble the components onto the p.c.b. starting with the low profile components and finishing with the transistors. It's advisable to fit the TO18 and TO5 heatsinks to the driver and p.a. transistors before soldering them in. Keep the leads

Fig. 6: The prototype transmitter board, showing the major component positioning.





fairly short (about 5 mm) but not so short that the cans (connected to collectors) short out onto the ground-plane.

Make sure that any components which have a grounded lead are properly soldered on the top surface (ground plane) of the p.c.b. The connection to the underside (where present) in this case only really serves to anchor the component.

To connect the RG174 coaxial cable to the p.c.b. twist the outer braid into two short pigtails (about 6-8 mm long), push the centre conductor through the p.c.b. and solder. Then solder the pigtails to the top surface of the board either side of the centre conductor, so that the latter leaves the board at right angles.

Connect to a chassis mounted antenna socket of your choice. (I prefer BNC connectors for these frequencies).

Finally connect a twisted pair of multistranded red and black wires to the p.c.b. for d.c. power. It is wise to use a current limited supply and/or 500mA fuse for initial testing. A reverse polarity protection diode can also be included on the board as well - just in case.

Transmitter Set-up

Transmitter set-up is quite straight forward. You should start with all variable capacitors half meshed.

Connect a 50Ω dummy load to the antenna socket. If possible, monitor the current during set-up and switch and investigate off if current rises above 500mA.

In normal operation when tuned up the transmitter will draw 300mA maximum. Check that the 12V line with a voltmeter.

Check also that the regulator is delivering 8V to the oscillator circuit. If you have a frequency counter then a probe held near or on the can of the oscillator transistor will indicate that this is oscillating and the trimmer capacitor can be adjusted to give the exact frequency required.

If a counter is not available then you should be able to detect the second harmonic at 140MHz on an airband receiver. (It may be necessary to key the transmitter on and off to help to identify it). If an in-line power meter is available, connect this between the antenna socket and the dummy load.

Next check that the collector voltage on the driver transistor rises to 12V when the p.t.t. is grounded. The total current drawn should also increase. When tuned the total current should not exceed 300mA when the p.t.t. is depressed, but it may be a lot less at this stage.

Here's the tuning technique that I use to make sure that all output is at the design frequency. After satisfying yourself that the transmitter is producing some power and starting at the last tuned circuit, adjust the trimmer until it is fully meshed and then tune to find the **first** peak (you may only find one).

By tuning from a point maximum capacitance, you will ensure that you are tuning **the fundamental** and **not a harmonic**. Repeat the method of tuning with the driver stage and then the oscillator stage.

Next connect the electret microphone. You will need a receiver for the band to check the modulation, so if you haven't constructed the receiver - do it now! (If you are building this as a stand alone or beacon TX then presumably you already have receive capability).

At a pinch you could listen for the second harmonic on an airband receiver, but this will sound over- deviated. The deviation is set by the multi-turn potentiometer (R42). on the input to the varactor.

Very little audio 'tailoring' has been built into this circuit, only some treble cut and some experimenting with this may be needed to suit your own voice characteristics. For FSK data modes, this filtering should be by-passed.

If the transmitter is to be used for c.w. or a.m. then the varactor should either be removed or left connected to its bias network, with the input grounded via a 100nF capacitor.

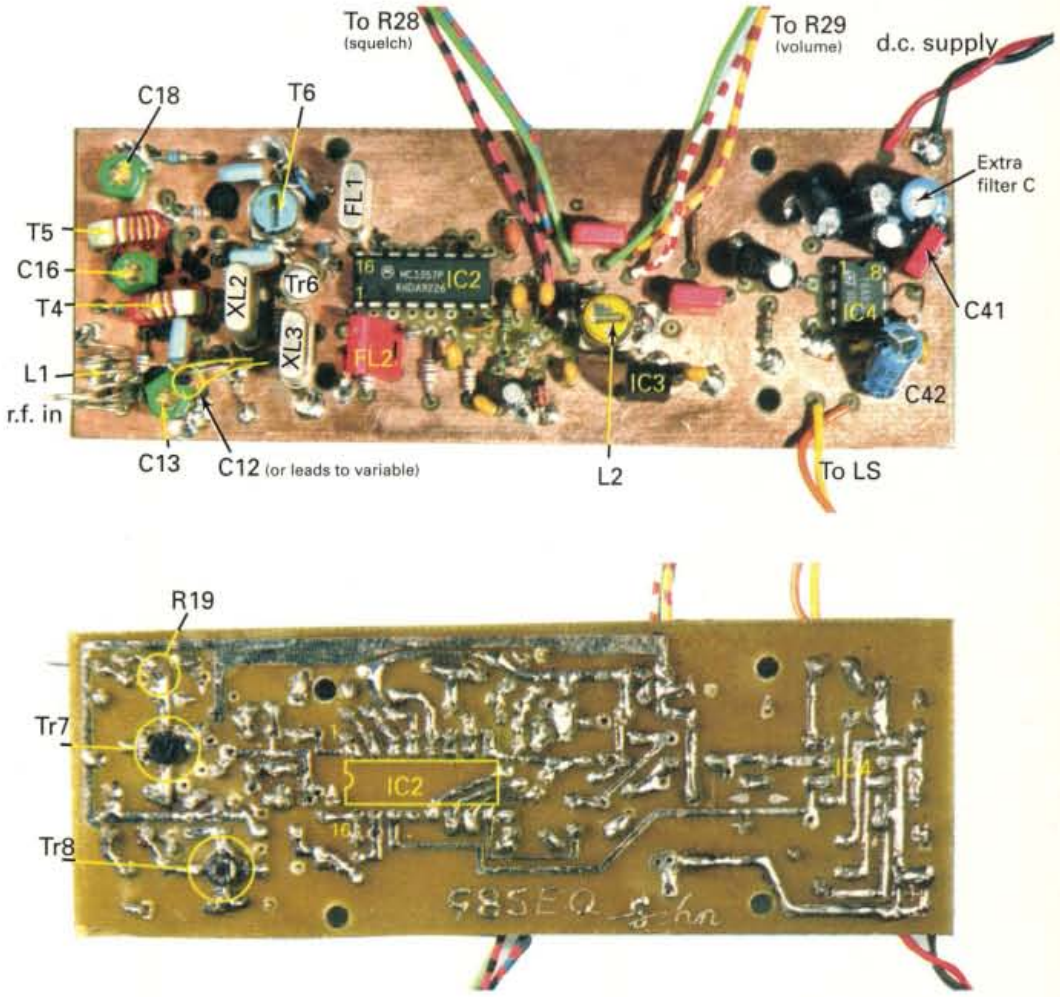


Fig 7: The prototype receiver board, showing the major component positioning.

Well that's it, rather spartan in terms of description, but a working transmitter receiver nonetheless! Enjoy yourselves on 'four'!

PW

Editorial note: A Kit of parts for the PW 'Four' project will be available from Sequence Electronics by the time you read this. For more details contact John Beech G8SEQ at 124 Belgrave Road, Wyken, Coventry CV2 5BH

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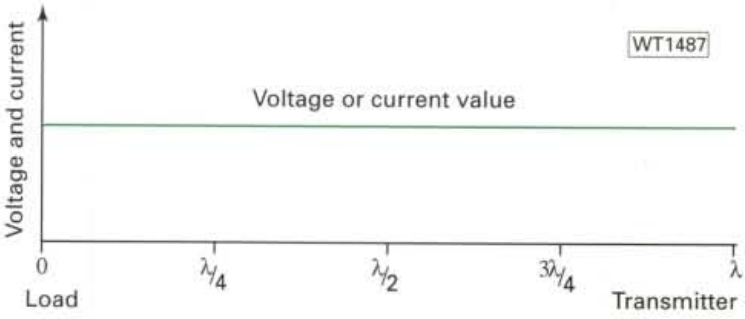
Antenna Workshop

STANDING WAVE RATIO – What About It?

Joe Carr K4IPV, now one of *PW*'s 'antenna specialist' authors demystifies s.w.r. - he describes how it's measured and looks at its effect on the antenna and transmitter

Standing wave ratio (s.w.r.) is a topic that is of intense interest to radio enthusiasts. Amateur Radio operators use antennas, most of which work best when the s.w.r. is 1:1, indicating that the antenna impedance is matched to the feedline impedance. There is a lot of heat and smoke about s.w.r. in radio circles. It's one of things that qualifies as an 'urban myth' in our hobby. Some of the heat and smoke on this matter is well justified. In other cases, the perceived problems are not real, and in still others the problems are little more than hogwash.



● Fig. 2: A perfectly matched load has flat voltage and current values, representing, at any point on the line, the characteristic impedance of the line.

Dispelling Myths

In order to dispel some of the myths, let's first take a look at s.w.r. theory, considering s.w.r. in an antenna system. Suppose a single cycle of a signal is launched down a transmission line (it is called the 'incident' or 'forward' wave). When the load (in this case an antenna) is matched to the transmission line, that's also matched to the transmitter, all of the incident wave is radiated into space. None is reflected back down the transmission line towards the source.

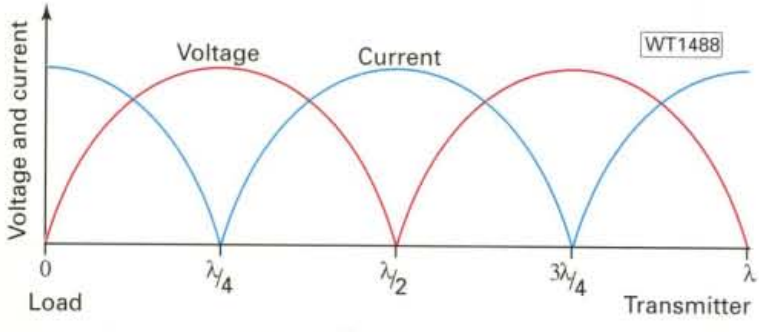
Now, let's consider what happens when the load is say, 200Ω (in a nominal 50Ω system). The incident wave isn't totally absorbed by the load (resistor or antenna). So, part of the wave will be reflected back towards the source. This is the reflected wave. Both incident and reflected waves are both examples of travelling waves. The reflected wave represents power that is lost, and can cause other problems too.

The situation I've just described represents a single-cycle pulse launched down a transmission line. In a real radio system, the oscillations of the incident wave are constant. Then the reflected waves will interfere with following incident waves. At any given point, the amplitude of the wave is the algebraic sum of the interfering incident and reflected signals. The resultant pattern caused by the interference of the incident and reflected waves is called a standing wave.

If you measure the voltage or current at all points along the transmission line from the load back to the source, then you will find a situation like one of those in **Fig. 1**. If the load, line and source are all matched, then you will find the voltage level on the line is 'flat' as in **Fig. 2**. This situation occurs when all of the incident signal is radiated.

If the load and feedline are not matched, then some variant between Fig. 1 and Fig. 2 will be found. Current and voltage levels rise to maxima, then fall to minima every half-wavelength along the line. Both waveforms are constantly displaced from each other by 90° along the line.

● Fig. 1: The illustration represents a short circuit load (minimum voltage, maximum current). Note that at odd λ/4 points (from the load) represent open circuit conditions.



Several Ways

The figure for s.w.r. can be calculated in several ways. For instance, it's possible to measure the voltage or current maxima and minima to find the s.w.r. When the current levels are used, then the value is referred to as the i.s.w.r., and when voltage levels are used, it's called v.s.w.r. The more common measure quoted is v.s.w.r. and is often used interchangeably with s.w.r.

The value of the v.s.w.r. is the ratio of the maximum voltage over the minimum voltage, or V_{max}/V_{min}, but, we can also calculate the v.s.w.r. from knowledge of the two impedances involved. If Z_L is the load impedance and Z_O is the transmission line characteristic impedance, then v.s.w.r. is the greater value divided by the smaller. So, if $Z_L > Z_O$ then v.s.w.r. = Z_L / Z_O or, if $Z_L < Z_O$ then v.s.w.r. = Z_O / Z_L

For example, if Z_L is 200Ω and Z_O is 50Ω, then the v.s.w.r. is Z_L/Z_O = 200/50 = 4:1.

An implication of the repetitive nature of the voltage and current waveform in Fig. 1b is that a value equal to the actual load impedance 'appears' every half wavelength along the line. So, if the load is 100Ω, measuring the impedance at half wavelength intervals will show the same value of 100Ω. Another implication of this fact is that transmission lines form the basis for impedance transformation, frequently found in λ/4 transmission line transformers.

Various Frequencies

If you measure the v.s.w.r. at various frequencies you will find a situation like that shown in **Fig. 3**. The v.s.w.r. drops to a low value at the resonant frequency of the antenna, rising at frequencies above, and below,

resonance. If the antenna and transmission line impedances are matched, (at resonance) then the v.s.w.r. will dip to 1:1, but all other cases mean that v.s.w.r. will be above 1:1. Note that finding the v.s.w.r. minima finds the resonant point only, not that the antenna is matched.

Mismatch of the antenna means more than just a high v.s.w.r. (often a symptom of some other problems) causing signal loss or problems to the transmitter. For example, many modern radio transmitters include an automatic level control (a.l.c.) circuit. It measures the reflected r.f. power, hence by implication the s.w.r., and starts reducing transmitter power as the mismatch increases.

Many a.l.c. circuits come in to action with an s.w.r. of 1.5:1 or above, and power shut-down begins, the effect increasing until the transmitter may be completely shut down when the working into an s.w.r. of greater than 2.5 or 3:1. I've seen a '100 watt' transmitter actually put out less than 1W because of a.l.c. action.

The v.s.w.r.-versus-frequency curve of Fig. 2 is relatively common for antennas such as dipoles and verticals that don't include any tuning elements. On higher *Q* antennas (narrower band) the v.s.w.r. rises more rapidly than shown in Fig. 2. On lower *Q* antennas the v.s.w.r. rises more slowly either side of resonance. These antennas are broadband, so are more useful in some situations.

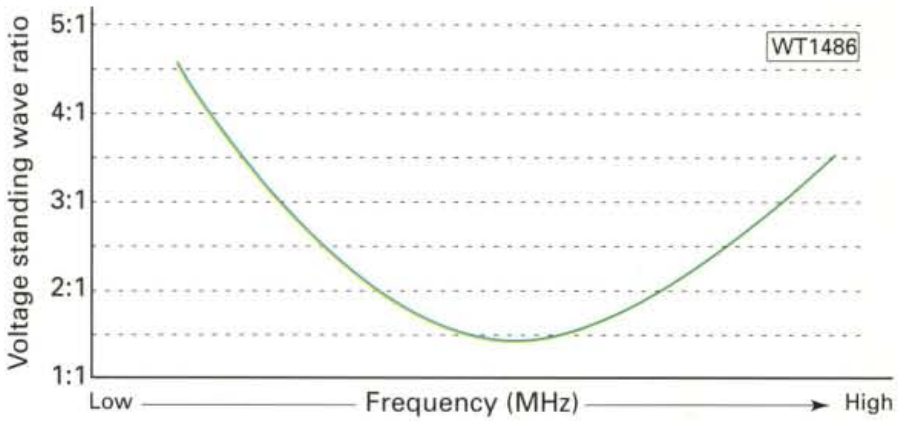
Be careful of spurious claims of broadbanding, however. There is one way to lower the *Q* (making the antenna more broadband) and that is to increase the resistive losses. This broadens the bandwidth but costs more in losses into the bargain than keeping the v.s.w.r. situation as in Fig. 2.

Over And Over

We keep hearing one old v.s.w.r. myth over and over again: you can 'cut your coaxial cable to reduce the v.s.w.r. to 1:1'. How many people have cut the coaxial cable and watched the v.s.w.r. reduce to 1:1, so they cannot be convinced this is an error? I've heard of one dealer who kept very short length coaxial patch leads to insert into the line at the transmitter in order to find the correct length that reduced the v.s.w.r. to 1:1! Ahhh...well! But the measurement isn't real, it's a measurement artifact only making it appear to be true.

The only really proper way to reduce the v.s.w.r. to 1:1 is to tune the antenna to resonance then - match the antenna feedpoint impedance to the transmission line impedance. For a centre-fed half-wavelength dipole, or a bottom-fed quarter-wavelength vertical, the proper way to resonate the antenna is to adjust the length of the radiator elements to place the correct minimum v.s.w.r. point at the desired resonant frequency.

The textbook formula used to calculate antenna dimensions gives only approximate lengths, the real value is found from experimentation on the particular antenna after it is installed. Even commercial antennas are adjusted this way. On certain mobile antennas, for example, this trick is done by raising (or lowering) the radiator while watching the s.w.r. meter.



● Fig. 3: A plot of frequency against v.s.w.r. for a typical antenna. The lowest point is the resonant frequency of the antenna, and the v.s.w.r. gives the amount of mismatch.

Not A Good Match

Even after finding the resonant point, the feedpoint impedance may not be a good match to the transmission line. A mismatch will result in this case. Ideally, impedance matching should be carried out at the feedpoint of the antenna. Antenna tuners intended for coaxial cable are little more than 'line flatteners', that cannot really 'tune the antenna'. Rather they reduce the v.s.w.r. that the transmitter 'sees' looking into the transmission line allowing it to work properly. And of course many an.t.u.s also provide some harmonic attenuation.

Used by many amateurs (myself included) an antenna matching unit (tuner) is connected at the output of the transmitter. I use either a Heath SA-2060A or an MFJ Differential Tuner between my Kenwood TS-430 and the 25m or so of coaxial cable to my Hustler 4BTV. However, **I don't pretend to be tuning the antenna**, the TS-430 is a solid-state rig, and the p.a. stage isn't terribly tolerant, shutting down with a high v.s.w.r. The purpose of the a.t.u. is to reduce the v.s.w.r. seen by the transmitter.and to heck with the actual mismatch at the antenna.

The best form of a.t.u. is one that both 'helps' the transmitter and also resonates to the signal frequency, preventing harmonics from getting out. A dirty little secret is that some a.t.u.s are actually variable high-pass filters, and these must be used with a low-pass filter ahead of them if spurious signals are to be kept 'at home'.

A better approach is to use an antenna tuning unit or impedance matching transformer mounted right at the feedpoint of the antenna. This method matches the antenna feedpoint impedance to the transmission line impedance, causing the v.s.w.r. to drop to 1:1. And I'll deal with these in a future article.

Conclusion

The role of v.s.w.r. or s.w.r. is **very important** in radio and communications. It can make or break some installations, and is always a factor in the types of antennas typically used by Radio Amateurs. *PW*

Valve & Vintage

The relaxed atmosphere, and the faint smell of polished wooden cabinets from the pre Second World War receivers on the shelf announce that Charles Miller is in the 'shop 'this month to continue his 'Getting Started In Radio'- memories.

After the easy ride I'd had in my first job, where a dozen or so repairs a week were carried out mostly by Arthur with minimal assistance by me, I was staggered by the sheer volume of work being handled in my new employer's workshops. My elder colleague, whom we'll call Delbert, and I were expected to repair on average a set an hour, five and a half days a week, 50 weeks of the year.

Can you imagine it? We were doing well over 2000 sets a year, which at the rate Smith charged compared with what he paid suggests to me now that he must have been making a fortune. Not that we gave this aspect of the job a thought at the time, though; we enjoyed the work so much that we even used to do unpaid overtime delivering repaired sets in the evenings!

The workshop (save the mark!) in which Delbert and I functioned consisted of a rudely constructed timber and hardboard circle about ten feet long by six feet wide partitioned off from Smith's main radio showroom. It had an old blanket hanging across the open doorway to screen us from the customer's view.

I assume that Smith's motive in providing the curtaining was concerned not with affording us privacy but with preventing customers from being disillusioned by seeing just what the 'fully qualified engineers in the well-equipped workshops' mentioned in his advertisement really looked like!

The bench took up half the space in our cubicle and the equipment consisted of an AVO model Seven, which was allocated to me and a whacking great GEC 'Selectest' used by Delbert. We also had a test loudspeaker each and a couple of 65W Solon soldering irons which lived in conical buckets like inverted witches' hats screwed to the underside of the bench front. For reasons best known to the makers, these buckets had a hole at the bottom about half and inch in diameter.

If you dropped the iron into the bucket immediately after making a joint, you stood a good chance of having surplus hot solder falling off the bit straight onto your foot, where it bit into your sock. This was painful; the solder hardened sufficiently in the wool to prevent it being flicked off whilst still being hot enough to give you a nasty burn.

Don, our gifted part-timer, had his own workshop adjacent to ours and constructed on even odder lines. The blanket in our doorway did at least admit some daylight and permit us the occasional glimpse of what was going on in the showroom, but Don's cubicle was a place of stygian darkness approached via an intermediate hardboard dungeon and not one but two blankets. Maybe Don had at all costs to be protected from being observed by his other employers. He certainly couldn't have suffered from claustrophobia.

Don's role was to attend to the real stinkers that Delbert or I just couldn't manage within the stipulated time-scale. He also had the sole signal generator, because as far as we were concerned 'alignment' of sets was confined to inspired twiddling of various trimmers to achieve acceptable results over the various wavebands.

Only if a set had been totally mis-tuned by a nutty customer did we resort to enlisting Don's assistance in a full-scale realignment job. Actually, this is not altogether a bad principle for an engineer to follow nowadays (especially if you wish to repair a set an hour).

Another piece of equipment that lived in our workshop was a twin-panel AVO valve tester. This was never used by us for servicing work as it was much quicker and more effective to check valves by substitution.

However, the tester was a good little earner because Smith charged customers a tanner a time for testing their own valves. It didn't end there, because those old AVOs were susceptible to what you might call create accounting.

When you had set up the base connections and

I assume that Smith's motive in providing the curtaining was concerned not so much with affording us privacy as with preventing customers from being disillusioned by seeing just what the 'fully qualified engineers in the well-equipped workshops' mentioned in his advertisement really looked like!

the anode (and screen grid if applicable) voltage for a particular valve, you had a choice of two test procedures. For one you set a pointer knob to a position marked 'mA/V' and with another knob you backed off to zero the needle on the large built-in meter.

You then operated a key switch which altered the grid voltage by one volt, whereupon the meter registered the mutual conductance of the valve directly in milliamperes per volt. This being too technical for the average customer, for the alternative test another scale on the meter was provided, consisting of three sections coloured green

yellow and red to indicate **good, indifferent** and **replace**.

The pointer knob was set to the rated mutual conductance for a new example of the valve under test and when the key switch was operated, the needle indicated the state of health of the valve. Now, if the valve to be tested was rated to have a mutual conductance of, say, 2mA/V and you set the pointer knob to 8mA/V, even if the valve were in first-class order, it could only move the pointer into the 'replace' section on the dial. It took me some time to tell why Smith sometimes gave Delbert a significant glance when ushering in a customer with a handful of valves to be tested...!

Odd Practice

Another odd practice that I discovered was that when Delbert filled in the job sheets for his repairs, detailing the time spent and the components used, among the latter he'd usually mark some with an asterisk. Eventually, I found that this meant that they hadn't actually been fitted, but were included on the sheets simply to bump up the bills handed to the customers.

Thankfully I was never asked to take part in this chicanery, which quite frankly disgusted me, but looking back I suppose Smith himself doctored my job sheets. I used to think that surely there was enough profit to be made legitimately without the firm resorting to what was blatant cheating?

It was for such small sums, as well, possibly about half a crown (12½ p) on each bill, but then again with hindsight, when you consider the 4000+ turnover of sets through the workshop per annum, it must have yielded at least £599 extra profit each year and thus more than paid the wages for Delbert and myself.

You may have gained the impression that the workshops were a little inconvenient. This is not true - they were **immensely inconvenient**, mainly because the radio showroom was actually a redundant ballroom on the floor above a well known chain-store tailor's shop, and had to be approached via flight of stairs with a right angle bend near the top. It was bad enough humping ordinary table receivers up and down these stairs, and when it came to large radiograms, it was murder.

About a year after I started working for Smith, he told Delbert and me that he had acquired another shop at the North end of the town, to which our workshop was to be relocated. This could only be good news as far as we were concerned because we believed that any change must be for the better.

Alas for forlorn hopes! A present-day health and safety officer would have had several fits if he had inspected that new workshop. It turned out to be a loft above out-buildings to the side of the new shop with the sole access being via a ladder and a trap door.

In all conscience, not even Smith could expect us to carry radio sets up a ladder so he promised us that stairs would be installed. They were, but for cheapness, Smith obtained the metal spiral staircase from a defunct omnibus of what must have been Edwardian vintage and climbing up into the workshop was comparable to plodding up the inside of a lighthouse.

Once you had contrived, at great personal risk, to carry a radio set on your shoulder up the spiral staircase without tripping over, there was the ever-present danger of your absentmindedly stepping through the permanently open trap door and falling headlong to the stone floor below.

... a gloom-wrapped back yard to find a genuine brick-built toilet, vintage circa 1900. Inside, screwed to the top of the door frame, was a switch for dim electric light, which had to be found by the groping method.

In the winter, an icy blast of wind came up through the trap and caused us to huddle for warmth near a superannuated two bar electric fire that properly ought to have been thrown on the scrap heap about 20 years previous. Its elements were so worn out that the wire frequently burned through and we repaired it by twisting the ends together.

The twisted joint tended to go high resistance and to flow white hot, until it disintegrated to the accompaniment of a miniature firework display with hot bits of metal and ceramic flying around the workshop. Since every time we made a joint it meant a loss of an inch or more in the length of the element, there was a corresponding increase in the current passing through it, so the next firework display was even more spectacular. How we managed never to set the place on fire is a mystery to me.

To answer a call of nature, you had to dash down the stairs and blunder out into what in winter was a gloom-wrapped back yard to find a genuine brick-built toilet, vintage circa 1900. Inside, screwed to the top of the door frame, was a switch for dim electric light, which had to be found by the groping method.

One pouring wet day I sped across the yard and felt for the switch as usual, but instead by hand encountered an electrical joint box alongside it. For reasons best known to himself, the idiot who had installed the box had omitted to fit its lid so my forefinger impinged on a 230V live terminal, which, when you are standing on wet ground, is not very pleasant. However, I got away with not even a slight burn and thought not more about it.

On another occasion, when we were re-wiring the benches, I accepted Delbert's word that a certain mains cable was dead and cut through it with my slide cutters. That is was **not** dead was demonstrated by a vivid flash and a large chunk of metal being burned out of the cutters.

I felt nothing, the mains fuse blew too quickly for that - there must have been a junior angel somewhere up there specially appointed to look after young radio engineers! *PW*

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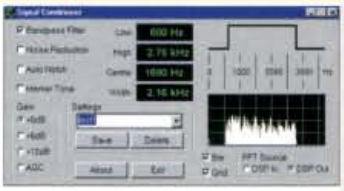

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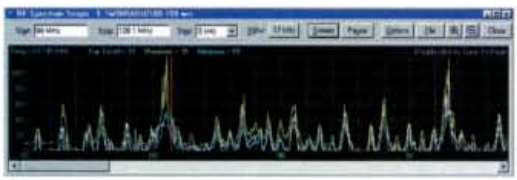

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Tuning step size	100 Hz (5 Hz BFO)	100 Hz (1 Hz for SSB and CW)	100 Hz (1 Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 9 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

Hello and welcome to the new style column and as the title suggests I'll be concentrating on **all** aspects of DXing on the v.h.f. bands and above. **Ian White G3SEK** mentioned in the introduction to the *VHF/UHF DX Book* that contacting stations in far-away places is one of Amateur Radio's greatest challenges, especially if you choose to do it on the v.h.f. and u.h.f. bands. When these bands open up for DX they can produce some truly exotic signals.

You could hear the throaty sound of signals reflected back from an aurora, the stunning strength of Sporadic-E signals, the startling meteor bursts of s.s.b. or high speed Morse and if you really go for it, you could even hear your own signals echoing back from the Moon! The v.h.f., u.h.f. and microwave bands offer many different modes of propagation and techniques have increased so much that now almost every opening is recognised and exploited.

From the UK, Radio Amateurs have worked all over western and central Europe on the 144 and 430MHz bands but our horizons don't end there. The 50MHz band can cover the world at the height of the sun-spot cycle and moonbounce (e.m.e.) has brought the Worked All Continents (WAC) award within our reach on the v.h.f. bands too.

Working weak-signal DX on 50MHz and above is one of the growing-points where Amateur Radio shows that it still has a real future. And that's the prime purpose of this column - to record the achievements of the skilled operators and to keep you informed of the specialist operating and technical requirements that enables contacts to be made over mind-boggling distances on the v.h.f. and u.h.f. bands.

MONTHLY REVIEW

One of the most exciting modes of propagation on the 144MHz band is Sporadic-E (Sp-E). This is a relatively rare mode at these frequencies and enables contacts to be made over paths in excess of 2000km.

During the summer Sp-E season, normally reckoned to be the 10-week period around June-July, it is expected there will only be 5 or 6 days when sporadic openings might occur at these frequencies. However, in my opinion and that of many other DXers, this summer's season has been truly exceptional.

In May there were four days of Sp-E openings, in June there were eight and in July there were a further nine days of openings - a grand total of 21 days when Sp-E events occurred on the 144MHz band. In addition to this other exotic modes were recorded in July such as meteor scatter (m.s.), field-aligned irregularities (f.a.i.), ionospheric scatter and auroral back-scatter.

Of course if it was this good on the 144MHz band then the 50MHz band will be equally good if not better. Indeed this was the case with daily European Sp-E openings intermingled with multi-hop paths into Asia and across the Atlantic Ocean to North America, trans-equatorial propagation (t.e.p.) to Africa and South America interspersed with occasional auroral and auroral-E openings.

It's been so good that **Neil Carr G0JHC** (IO83) managed to contact 100 DXCC countries on the 50MHz band this summer in only a three month period. He started with V51KC (Namibia) on May 1 and completed the century with 5A1A (Libya) on July 30.

Neil also mentions making over 200 QSOs outside of Europe in this period, mainly with stations in North America. And when the Sun disappeared and it started raining out came the 10GHz DXers to make numerous rainscatter contacts around the country. Phew - I just don't understand how I found time to do all that and write this column!

YOUR REPORTS

Now I'll take a look at your reports of the exceptional Sp-E openings that occurred during July on the 144MHz band. As far as I can ascertain (and I'm not usually wrong!) openings occurred on July 1, 2, 9, 10, 11, 12, 22, 24 and 25. Some of these events were fairly brief lasting no more than 20 minutes but those on July 2, 11 and 24 were quite spectacular.

Interestingly the first Sp-E openings of the month took place over the weekend of July 1-2. These dates, as any contest minded person will tell you, coincided with the large v.h.f. national field day contest. With numerous v.h.f. groups situated throughout the UK, on top of a hill with a good take-off, running high power into a large antenna system the scene was set for some interesting DX contacts.

The opening on July 1 around 1600UTC was relatively brief, 30 minutes or so. However, the opening on Sunday July 2 was of a far greater duration 1125 to 1300UTC, allowing plenty of time for teams to make numerous DX QSO's before the contest finished at 1400UTC.

Stations located throughout much of England, Wales and Scotland reported making contacts into Bulgaria (LZ), Croatia (9A), Czech Republic (OK), Hungary (HA), Moldova (ER), Romania (YO), Slovakia (OM), Yugoslavia (YU) and Ukraine (UT).

DAVID BUTLER G4ASR WELCOMES YOU TO THE EXCITING WORLD OF VHF DXING.

Allan Duncan, operating as **GM4ZUK/P** (IO86), entered the field day contest as a single-operator single-band entry. On the 144MHz band he used a TS-940S h.f. transceiver, a Mutek TVVF144a transverter and a Henry 2002A amplifier running 400W into an array of four 13-element Cushcraft Boomer Yagis at 16M above ground.

Allan reports that although the tropo conditions were nothing special the Sp-E opening on Sunday afternoon was the best he had ever experienced in 15 years of v.h.f. activity. In a 51-minute period between 1125-1216UTC he made 53 s.s.b. QSOs with stations located in HA, LZ, YO, YU and 9A. A total of 45 contacts were made over paths in excess of 2000km, his best DX being LZ1KWT (KN32) at 2553km. Really amazing!

Reg Wooley G8VHI (IO92) operating from his home QTH reports working LZ1JY, LZ1QS and LZ1ZP on July 1 and ER6A (KN47), OM3KWM, OM3RRC/P and six YO stations in the midday opening on July 2. **Alec Trusler G0FIG** (IO90) worked three Bulgarian stations on July 1 and a total of 10 European stations between 1123-1155UTC on July 2. His best DX of this event were the Ukrainian stations of UR5YM (KN28) and UT5OH (KN27).

Later in the afternoon between 1430-1630UTC (after v.h.f. field day had finished!) the 144MHz band opened up again with stations in I (Italy), IT9 (Sicily), T9 (Bosnia), Z3 (Macedonia), 9H (Malta) being contacted by G and GW operators. Alec G0FIG reports s.s.b. contacts with I1JIT (JN71), IZ5AUD (JN90), I8MPO (JN70) and IT9VDQ/P (JM68). Other DX stations known to have been worked at this

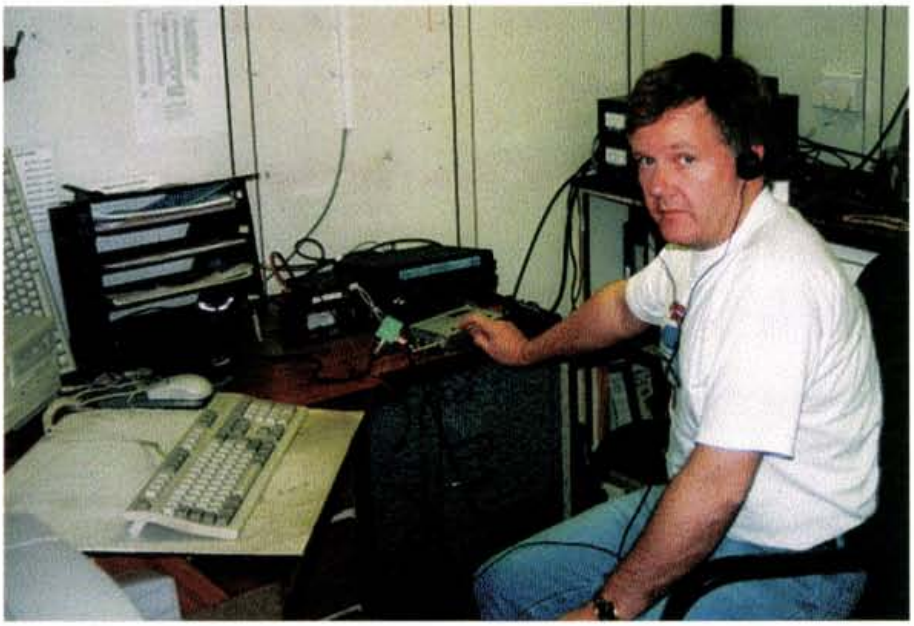


Fig. 1: Andy Adams G0KZG/MM on board the Royal Research Ship *Charles Darwin*.

time included IH9/IZ0AHC/P (JM66), T91ASU (JN94), Z39AVJ (KN02) and 9H1CG (JM75).

Ian McCabe G0FYD (IO83) also got in the action. On the 144MHz band he uses either a Trio TS780 or an Icom IC-706 transceiver, both running 100W into a 9-element G4CQM Yagi. During the event on July 2 he contacted ER6A/P (2370km), OM3KXR/P, YO5BLA/P and YO5CRI. The next Sp-E opening he encountered was on July 11 between 1730-1800UTC. (There was an earlier opening in the day between 1110-1240UTC mainly to Italy.).

Ian reports that the evening opening was very unusual in that propagation was to the north-east of his QTH. He mentions that from the UK most Sp-E openings are to southerly locations. (This is correct, I can recall only one Sp-E opening in over 25 years that was to northern Europe. It was in 1981 and gave me contacts into northern Sweden and Finland.)

From his QTH in Blackpool Ian made s.s.b. contacts with Lithuanian stations LY2BIL (KO24), LY2IC and LY2SA (both in KO14). He also contacted EW6FS (Bylorussia) and UT8AL (KO61) for his best DX ever at 2470km. Other Russian stations worked from the UK around this time included EW6GB (KO45), RA3AQ (KO85), RA3PG (KO84), RA3LW (KO54), RW3PF (KO93), RW3QR (KO91), UA1XP (KO55) and UY5UG (KO50). Tremendous. But not as tremendous as events on July 24!

INTENSIVE OPENING

A number of Sp-E events during the morning of July 24 heralded an intensive opening that occurred later in the afternoon. The day kicked off with a brief five minute opening to Malta at 0900UTC. This was followed at 1050UTC by another event into the Mediterranean area lasting around 10 minutes.

Another opening followed at 1200UTC but only lasted for 15 minutes or so. However, during this event the stations of EB8ALZ and EB8BTV (Canary Islands) were both heard calling 'CQ' on the s.s.b. calling frequency 144.300MHz by stations in south-east England. The distance for this extended path was an astonishing 3000km.

At 1445UTC the main event really got going. This lasted, depending on your geographical location, for up to three hours before petering out at 1745UTC. The propagation covered all of central Europe ensuring very high activity rates. Some of the DX being worked from the UK included the stations of DH0GHU, F4AZF, HA8BE, HB9JAW, IZ5EME, OE6IWG, OK1YA, OM1CT, SP2IQW, S56ECR, T94KU, UT5DA, YO2II and 9A1CAL.

David Cawley EI4IX (IO53) remarks that he was really amazed with the Sp-E opening. He was using an Icom IC-746 transceiver, 100W into a 9-element F9FT Yagi and mentions that he had previously only made three contacts into continental Europe. During the event he made 160 s.s.b. SOS with stations in 12 countries and a total of 49 new locator squares. His furthest contact was with IK7UXU (JN81) at 2388km.

If you're interested you can view his log of Sp-E event on the Internet at **http://members.xoom.com/ei4ix/loga.txt** David remarks that he owes a real debt of gratitude to **Charles Coughlan EI5FK** who hassled him into putting up the 9-element Yagi. It really paid off!

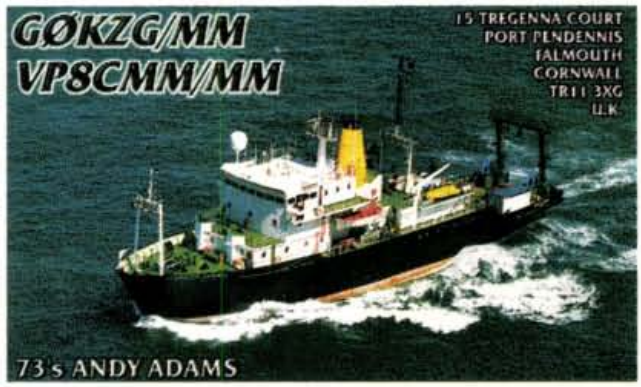
Coincidentally EI5FK (IO51) reports making 220 contacts during the opening. Charles runs 150W into a 9-element Yagi and mentioned that his best contact was with the station of I8/DL9AN (JM88) at 2408km.

Unfortuantely I missed most of the openings during the day. However, I had been tipped off (the only advantage of being a v.h.f. columnist!) that conditions were hot.

Running a 20-year old Yaesu FT-221R transceiver with MuTek front-end, a Henry amplifier and an 18-element DL6WU Yagi I made 31 s.s.b. QSOs in a 20 minute session between 1600-1620UTC and four further QSOs between 1626-1628UTC. A total of eight countries, DL, HA, I, OE, OK, OM, S5 and 9A, were worked with my best DX being the station of HA0HO (KN07) at 1805km.

Even stations located to the north of the Scottish mainland managed to make a sizeable number of contacts. **Andy Adams G0KZG/MM** on board the Royal Research Ship *Charles Darwin* (**Fig. 1**) E-mailed me directly after the opening.

Operating from 'wet square' IO59 Andy reports that he first noticed the Sp-E opening at 1630UTC. He then went on to make 28 contacts with stations in France, Germany, Italy and Switzerland before the event faded out at 1747UTC. His best QSOs were with Italian stations I4XCC (JN63) at 2251km and I5THT (JN53) at 2213km.



Andy mentions that his main mode of operation is meteor scatter (m.s.) and during his recent trip he worked 31 different stations via this mode whilst operating from locator squares IO59, IO68 and IP60. He needs to use this mechanism as the *RRS Charles Darwin* is normally out of tropo range of most stations. However, on July 22 he did catch a period of good tropo enhancement enabling him to make c.w. contacts with the stations of PE1LCH (1100km), DL9MS (1341km) and DK1KO (1348km).

DEADLINES

That's it for this time. I'm sorry there was no room for reports of the tremendous auroral opening on July 15-16 and all the exciting activity on the 50MHz band. I might find space for these next month assuming of course that no more major events occur in the next few weeks.

Please don't stop sending in your reports. 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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AKD HF-3 TARGET 0-30MHZ 12V RECEIVER £99
DRAKE R-8E 150KHZ-30MHZ ALL MODE RECEIVER MAINS £625
GRUNDIG YB-206 PORTABLE RECEIVER WITH FM £69
GRUNDIG YB-400 X2 PORTABLE RECEIVER WITH FM STEREO AND SSB £79
GRUNDIG YB-400PE PORTABLE RECEIVER WITH FM STEREO AND SSB £89
GRUNDIG YB-500 X2 "0.15-30MHZ PORTABLE WITH SSB + FM STEREO , RDS" £69
ICOM IC-R71 100KHZ-30MHZ ALL MODE RECEIVER MAINS £349
ICOM IC-R72 X2 BASE STATION RECEIVER £325
ICOM IC-R72 DC "100KHZ-30MHZ AM,CW,SSB 12V WITH PSU" £325
KENWOOD R-5000 100KHZ-30MHZ ALL MODE RECEIVER MAINS £499
LOWE HF-225 X4 30KHZ-30MHZ ALL MODE RECEIVER 12V £249
LOWE HF-250 X2 30KHZ-30MHZ RECEIVER 12V PC COMPATABLE £325
ROBERTS R-809 "PORTABLE 153KHZ-30MHZ AM,FM STEREO" £59
ROBERTS RC-828 PORTABLE RECEIVER WITH SSB AND CASSETTE £125
ROBERTS R-861 "PORTABLE 150KHZ-30MHZ SSB , FM STEREO RDS" £149
SONY ICF-SW33 PORTABLE RECEIVER WITH FM STEREO AND SSB £175
SONY ICF-SW77 PORTABLE RECEIVER WITH FM STEREO AND SSB £199
SONY ICF-SW7600 PORTABLE RECEIVER WITH FM STEREO AND SSB £75
SONY ICF-SW7600G PORTABLE RECEIVER WITH FM STEREO AND SSB £89
YAESU FRG-8800 150KHZ-30MHZ ALL MODE + 118-174MHZ MAINS £325

SCANNERS MOBILE/BASE

ICOM IC-PCR1000 500KHZ-1300MHZ ALL MODE PC CONTROLLED £799
JIL SX-400 "26-520MHZ AM,FM,WFM 20CH 12V" £225
UNIDEN UBC-9000XLT "25-550,760-1300MHZ AM,FM,WFM 300CH. 12V" £225

SCANNERS HAND HELD

ALINCO DJ-X1 X4 "100KHZ-1300MHZ AM,FM,WFM 100CH." £99
ALINCO DJ-X10 10KHZ-2000MHZ ALL MODE 1200CH £199
AOR AR-900 "10-950MHZ (WITH GAPS) AM,FM,WFM 100CH." £85
AOR AR-2000 "0.5-1300MHZ AM,FM,WFM 1000CH." £115
AOR AR-8200 500KHZ-3040MHZ ALL MODE 1000CH £259
COMMTEL COM-214 "66 - 956MHZ (WITH GAPS) AM, FM" £69
ICOM IC-R1 0.1 - 1300MHZ AM/FM/WFM 100CH £99
ICOM IC-R2 "0.495-1309MHZ AM,FM+WFM 400CH." £109
ICOM IC-R10 500KHZ-1300MHZ ALL MODE 1000CH. + RS-232 ..... £199
SONY ICF-PRO80 X2 "150KHZ-108MHZ,115.15-222MHZ AM,FM & SSB" £99
WELZ WS-1000 "500KHZ-1300MHZ AM,FM,WFM 400CH." £89
YUPITERU MVT-3500 "66-1000MHZ (WITH GAPS) AM,FM 200CH." £89
YUPITERU MVT-7000 "200KHZ-1300MHZ AM,FM,WFM 200CH." £125
YUPITERU MVT-9000 0.5-2109MHZ ALL MODE 1000CH. £219

HF HIGHLIGHTS

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

I'm writing this column in late July and as usual the bands have taken a bashing with the usual summer atmospheric conditions. When I have been able to operate there has been little or no activity, just static crashes and bangs making the odd QSO extremely difficult!

I have however noticed an increase in the number of special event stations active on the bands, especially on 7 & 14MHz. Listening in to these I can't help but wonder why some of them insist on working by lists. Not only does it slow down their QSO rate, it also means that quite often, by the time you are called up, at best you can barely copy them or worse, you have lost them altogether!

Surely the object is to promote your special event and give as many stations as possible the chance to work you? I would be interested to hear your views on the subject!

ACTIVE DX

Steve VK8AM will be operating mainly on c.w. as AX8AM from Darwin Northern territory until 2 November. He has been heard between 0630 and 1300UTC on 14MHz. QSL via **1 Elliot Point, Larrakeyah, NT 0820, Australia**.

Gerard F2JD will be active from Martinique on c.w. and s.s.b. as FM/F2JD from early August for four months. He also hopes to be active from some of the other Caribbean Islands during this period. No other information is available at this time.

YOUR REPORTS

First report this time is from **Eric Masters G0KRT** in Worcester Park, Surrey, who, despite a new job, managed to find sometime to operate in the Original QRP contest with his QRP+, 4W and a modified W3EDP antenna. On 3.5MHz Eric's log includes c.w. contacts with PA0RDT (Netherlands), DJ6NS/P (Germany) and ON6WW (Belgium) all between 2030 and 2130UTC. I hope the job is going well Eric.

● Robin Trebilcock GW3ZCF uses an IC-775 with 50W and PSK31 on 21MHz.

THE 7 & 14MHZ BANDS

On 7MHz now and the Isle of Sheppey, Kent, where **Ted Trowell G2HKU** found the bands very poor. Just as well as it appears the weather has not been too kind either.

"Thunder storms, lightening and heavy rain have made it unsafe to operate" says Ted. "I can't even mow the lawn!' Using a Ten Tec Omni 5 and G5RV Ted used c.w. to work J75KG (Dominica) at 0500UTC and 3A/N5JJ (Monaco) at 2100UTC.

Don McLean G3NOF in Yeovil, Somerset, has found the short skip on 14MHz to his advantage to work several new Islands. Using s.s.b. Don bagged OH1TD (Finland) EU-096, SM3TLG/3 (Sweden) EU-176 and UA1TBK/1 (European Russia) EU-147 all around 1700UTC.

Operating a little later in the evening was **Sean Gilbert G4UCJ** in Milton Keynes. Sean also used c.w. between 2200 and 2300UTC to pull in some nice DX in the shape of VR2BG (Hong Kong), 3W2KYU (Vietnam), V29TBK (Antigua) and a 5W QRP contact with JT1BH (Mongolia).

Sean said "I have now worked 197 countries this year with a few all time new one's like A52 (Bhutan), VP6 (Pitcairn Island) and TT8 (Chad). All this despite some very shaky conditions"! I don't know how you find the time Sean?

Using QRP again was Eric G0KRT who used 2W of c.w. to hook-up with K9GA (USA) at 0815UTC followed by RA9AUT (Asiatic Russia) and 5A8LNT (Libya) at 1945UTC.

THE 18 & 21MHZ BANDS

Ted G2HKU lists 18MHz c.w. contacts with EP2AC (Iran), VQ9VK (Chagos Island) and 9M2TO (West Malaysia) between 1500 and 1700UTC.

Over now to 21MHz and **Robin Trebilcock GW3ZCF** in Bishopston, West Glamorgan, who has been using his IC-775 with 50W and PSK31 to work A41MA (Oman) at 0938, A5X1P (Uganda) at 1624, LU4DDM (Argentina) at 1905, ZP5YW (Paraguay) at 1937 and JA2UJ (Japan) at 2023UTC.

THE 28MHZ BAND

Finally, to **Mike Evans MW0CNA** in Swansea who managed to weed out a few stations on 28MHz s.s.b. Mike uses a Q-TEK penetrator vertical antenna that he has now fixed up on the roof of his house.

Mike says "This has made a big improvement to received signals. With the antenna in its new position I was pleased to work VK6APZ (Australia) and 7P8AA (Lesotho) both around 0930UTC followed later in the day by K4JPD/VP5 (Turks & Caicos), 8R27CC (Guyana) and 5I3A (Tanzania) all between 1800 and 2100UTC". It looks like the antenna is working well Mike!

CARL MASON GW0VSW REPORTS THAT ALTHOUGH THINGS HAVE BEEN QUIET ON THE BANDS THERE'S STILL DX TO BE FOUND.

THE QSL CORNER

Here's this month's selection of QSL information: 5I3A & 5I3B via A47RS, POB 981, Muscat 113, Oman, 7A32AR via YB0FMT, 7P8AA via DL7VRO, 9J2RA via K6SLO, A35IQ via G4PIQ, A52NL via JA6NL, Nisshin-Cho 2-5-710, Kawasaki City, 210-0024 Japan. E4/OE1GZA via POB113, Ramallah, Palestine. FO0MOT via OM2SA, FO0PT via DJ0FX, TO0DX via K1WY, W1S via K1JN, ZK1AXU via PA3AXU and ZY3PEI via PY3MHZ.

SIGNING OFF

Well that wraps it up for this month and as you can see, poor conditions don't necessarily mean poor DX! Many thanks to all our reporters. I hope I managed to squeeze you all in. Thanks also to Tedd Mirglotta and the OPDX bulletin for the DX information.

73, Carl GW0VSW

KEYBOARD COMMS

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ROGER COOKE G3LDI LOOKS AT PILE-UPS, FREE PACKET PICTURES AND STARTS OFF WITH AN AMSAT UPDATE.

As you see from the heading, the column has a new look and new title. My hope is that it will encourage more feedback from you, more news from the various Data groups, and also lots of input regarding activity, such as DX worked on the different Data modes. Note that I said 'hope', but if the August column has any effect on you perhaps **you will get down** to communicating!

Following on from my comments, it cannot be just me that has noticed the decline. I received a very worrying letter from **Martin Sweeting G3YJO**, Chairman of Amsat UK. The membership of that organisation has dropped dramatically and is now at less than one-third of what it was ten years ago.

With the imminent launch of Phase 3D and the proposed activity from the Space Station, this is a great indictment on our support and participation in the hobby. The future of communications is with Satellites, and it would be a real shame to see the demise of Amsat UK.

Please take the message to heart, and support the Satgate Network. Send your Packet mail destined for overseas via that route instead of E-mail. I received quite a few responses from my previous 'Use it or lose it' message. All were supporting my comments so I know that with a stir, this cake could become edible once again!

PILE-UP!

Pile-up! is a basic data communications program for c.w. enthusiasts! This program, which is free, will enable you to practice at your desktop, on your PC, and hopefully encourage more to use this super mode. Handling a 'pile-up' on c.w. is very enjoyable, satisfying and lots of fun. The URL to look at is **www.babbage.demon.co.uk/pileup95.html** see **Fig 1.**

The latest version of the program is 1.10, written by **G4ZFE** and although free is subject to copyright. *Pile Up!* is a program which simulates a Morse Code pile-up using a Sound Blaster card. The greater the number of voices used by the Sound Blaster card the more difficult it is to read individual callsigns. The idea is based on tapes used at Amateur Radio Conventions to test people's c.w. skills. *Pile Up!* is good to use as practice before a contest and also helps improve keyboard skills.

Features include: Up to nine stations be able to call at once, the speed and volume of each calling station is random to simulate the 'layering' of stations found in a pile-up. The tone (frequency) of each calling station is random to simulate the spread of stations in a pile-up.

When in competition mode 50 callsigns are sent. As each callsign (or partial callsign) has been copied it should be typed into the keyboard. At the end of the session a list of received and transmitted callsigns is displayed and your score calculated.

To run *Pile Up!* you need to be running *Windows 95*, it will not work on *Windows 3.1* or *Windows NT* and a Sound Blaster compatible card.

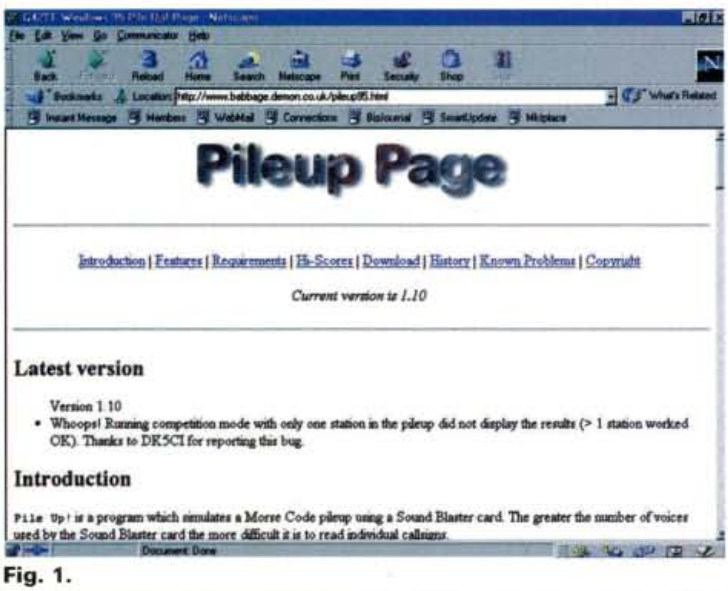

Fig. 1.

DOWNLOAD INFORMATION

Version 1.10 of *Pile Up!* is available for download as a self-extracting archive. Save the program to your hard disk and then run the program. The installation program will then automatically be run. To uninstall the program use the *Windows 95* Control Panel called 'Add/Remove Programs' applet.

Download *Windows 95 Pile Up!* program v1.10 UK site (size: 1.33Mb). The source code is also available for download. The code was written using Microsoft Visual C++ 5.0. Download *Pile Up!* source code (size: 250KB)

Please E-mail any bugs, suggestions for additional features or comments to Richard Everitt G4ZFE or use the form on High Scores Page.

KNOWN PROBLEMS

A few problems I have come across with *Pile-up!* include: The fuzzy logic used in competition mode to pair up RX and TX callsigns requires 'fine tuning'. Occasionally when a pile-up is stopped mid-flow the sound card produces 'strange' noises. Also c.w. spacing in RUFZ mode is not perfect. Selecting a large number of callsigns in competition mode (e.g. over 500) will result in the program taking a number of seconds to score the entry.

Upgrading from a pre v1.05 version of *Pile Up!* to a current version using *pileup.zip* may not work. This is because the run-time DLLs have changed. Please de-install the program and install from fresh using the latest pileup.exe program.

PICTURE PACKET

Another free program I've come across is aimed at the packet enthusiast. Look at: **www.huntting.com/picturepacket/index.html**. See **Fig 2.**

PicturePacket is a *Windows95/98/NT* control program for Terminal Node Controllers.

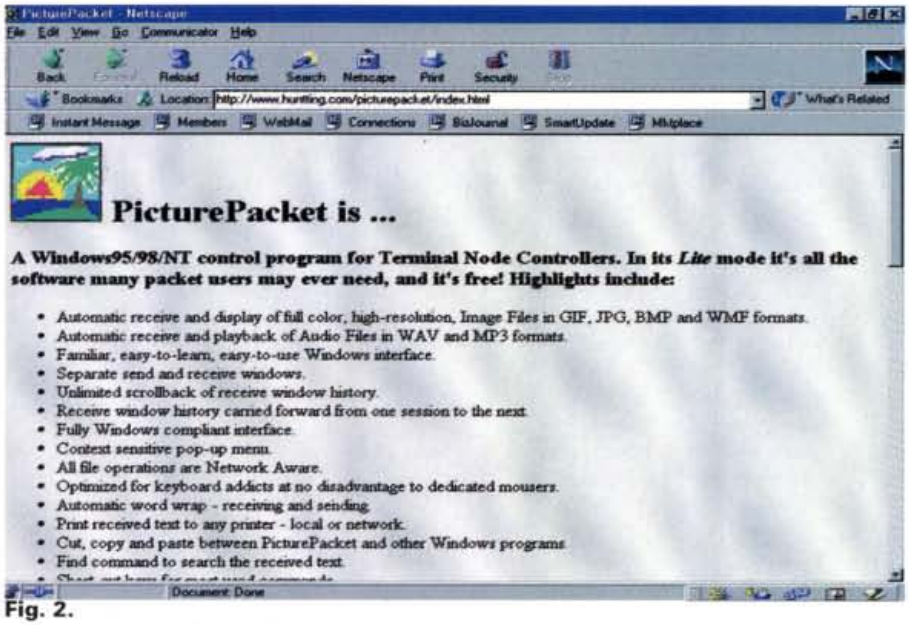

Fig. 2.

In its Lite mode it's all the software many packet users may ever need, and it's free! Highlights include:

Automatic receive and display of full color, high-resolution, Image Files in GIF, JPG, BMP and WMF formats; Automatic receive and playback of Audio Files in WAV and MP3 formats; Familiar, easy-to-learn, easy-to-use Windows interface; Separate send and receive windows; Unlimited scroll-back of receive window history; Fully Windows compliant interface; Context sensitive pop-up menu; All file operations are Network Aware; Automatic word wrap - receiving and sending; Print received text to any printer - local or network; Cut, copy and paste between PicturePacket and other Windows programs and there's no charge, no registration, license for use of *PicturePacket*/Lite in the Amateur Radio Service.

If you register you can gain access to advanced PicturePacket/Plus features which include: A permanent registration ID which is valid with future updates; Advanced support of popular callsign databases and the ability to send and save Image Files in GIF, JPG, BMP and WMF formats.

Download *PicturePacket*143.exe. (2.3Mb). The PicturePacket installation file, last updated: 12 December, 1999. This 32-bit self-installing file will install *PicturePacket* into the directory of your choice.

Note: *PicturePacket* requires the latest Microsoft run-time support files. If you experience problems installing *PicturePacket* such as 'missing files' errors it may be that you do not have these latest files. In that case, download and install the self-extracting file, Vbrun60sp3.exe, from the Microsoft Visual Basic Run-Time Files site, then reboot Windows and reinstall *PicturePacket*.

Packet Radio Editor of *CQ* Magazine, **Buck Rogers K4ABT**, is featuring *PicturePacket/Lite* on his new CD-ROM. Buck's CD has over 100Mb of additional Packet material, DOCs and all the drawings that you find on his web pages plus the printable PicturePacket Manual and several other books and articles in PDF format. Order your copy of this exciting new CDROM from Buck's PicturePacket web page.

MULTI-RIG OPERATION

Recently there has been a lot of discussion, and some vehement objections to, the use of multi-rigs in RTTY contests. This is a subject that can be chewed over until the cows come home, with varying opinions, but following on the statement from BARTG, there has been another, this time from ANARTS. These discussions were on the WF1B RTTY reflector. If you are a keen RTTY contest operator, it is worthwhile subscribing to this site.

The ANARTS Committee had a meeting recently regarding some issues that have arisen on the Reflector, and in response to a specific question from an Amateur.

"We, Anarts Committe wish to make the following statement regarding:

1. Single Operator and Multi Operator entries.
2. Our definition of Single Transmitter.
3. The use of DX Clusters and other DX information.

Single Operator and Multi Operator entries.
"We define Class A - Single Operator, as an Operator contesting on His/Her own, at a specific, named, location, using one Transmitter. This is backed up by two statements in our rules, and we quote - "Not more than 30 hours of operating is permitted for Single Operator station"
This rule is intended that a person operating on his or her own gets sufficient time to rest and have refreshment.

"Multi Operator logs must contain Signatures and Callsigns of each operator". This statement quite clearly suggests that Class B entries must have more that one operator. It also ensures we, Anarts, are aware of all stationswho took part in the contest, and also ensures that any such operators are mentioned in any awards. Entries without these signatures and Callsigns do not qualify for entry as Class B - Multi Operator. Naturally in these days of E-mails, we realise logs cannot actually be signed, we accept the word of the Operator submitting such logs.

We feel that it is in the 'Spirit' of the Contest that Class B is intended for use by Two or more operators working at the same location; even if not actually stated.

SINGLE TRANSMITTER

"Our definition of a Single Transmitter is - "One Transmitter in use at any given moment in time, at a specific location".

We have not objection whatever to a station having more than one Transmitter or Transceiver for His/Her use. A station can have a hundred Transmitters up and ready for use, if it likes, as long as it only keys **one** at a time.

The use of DX Clusters and other DX information during Anarts Contest
"Anarts has no objection to DX Clusters, or the practice of passing information to other contesters regarding which band a wanted station is working on. We have probably all at one time or another told a friend that so and so station is up on a specific band.

However, we do not agree with any argument that this assistance qualifies a contester to enter Class B - Multi Operator. As far as we are concerned DX Clusters and the like are an 'Aid' to operating, and the same information is available to all stations tuned to the Cluster. There are many 'Contester Aids', such as the use of Computers, in lieu of the old Clanking machines, Software designed for Contest logging, Beam Antennas and Linear Amplifiers. We believe that DX Clusters and the like fall into this Category.

Anarts cannot prevent any Single Operator station entering as Class B, at least this year. We would however, request that station provide a list of the Callsigns who took part. We feel that such an entry would contravene the 'Spirit' of our Contest.

Next years rules will be amended to reflect the Committees decision, and hope this makes our position clear, as far as our Contest is concerned."

Thank you ANARTS Committee! I look forward to your feedback on the statements.

AND FINALLY...

Something to make you laugh...

Customer: "I can't get past the fingerprinting password on my Apricot computer".
Tech Support: "So you're typing in the password exactly as you wrote it down?"
Customer: "Yes".
Tech Support: "Have you tried the back-up password"?
Customer: "Yes, that does the same thing. I type the password in and nothing happens".
Tech Support: "You are pressing Enter after typing the password in aren't you"?
Customer: "I'll just try that ...Oh it's worked"!

That's all for this month so until next time keep those keyboards communicating!

NEWS VIEWS AND PICTURES TO ME PLEASE - USE THE DETAILS AT THE TOP OF THE COLUMN.

Roger G3LDI

TUNE-IN

BY TOM WALTERS

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WE WELCOME A NEW AUTHOR AS TOM WALTERS JOINS THE *PW* TEAM - SO HERE'S THE FIRST OF HIS MONTHLY REPORTS ON THE WORLD-WIDE HF BROADCAST BANDS.

Governments are still chopping back the money for international broadcasts. In recent times severe budget cuts have been imposed on some famous international broadcasters, forcing slimming operations at **Radio Canada International**, **Radio Australia**, **Radio New Zealand International** and **Deutsche Welle.** These stations have had to lop off services, reduce their frequency coverage and look at other ways of reaching audiences. This often means increasing programmes on the Internet.

Radio Austria International's (ROI) budget will drop in 2001 to just 50% of the 1999 amount. This seems to me to be a savage cut and several services will probably have to close.

German language programmes will include much more from the domestic services, and there will be less broadcasting in English. Technical facilities will be shared with the domestic broadcaster. No change in short wave for Europe, but h.f. transmissions to other parts of the world will probably have to be cut.

Roland Machatschke, Director of Radio Austria International.

The Director of Radio Austria International, Roland Machatschke, sent this personal message for the readers of *Practical Wireless*:

"As everywhere in the world when politicians or financial managers pore over the costs of short wave transmission the now familiar argument cropped up: why pay for an expensive transmitting station? No one is listening to radio any more since the Internet came into the world. Quite apart from the fact that even in the so-called First World only a minority has access to the Net so far, and apart from the question What about travellers?

Roland continues "Spectacular breakdowns and virus infections have demonstrated convincingly that there will not be an alternative to short wave for international radio for a long time. This applies to satellite transmission as well. Satellites are vulnerable to events like solar flares and can easily be jammed either by cranks or in case of an international conflict

"The ROI station uses the only short wave station in Austria capable of reaching every corner of the world. The station in Moosbrunn where two new 100kW transmitters are due to go into operation is a national asset. ROI certainly sees it in this way. It is to be hoped that the government thinks likewise".

At the time of writing, ROI English schedule for Europe was (times in UTC): 0400 6155, 13730; 1600 (Sat) 1476; 1800 5945, 13730; 1830 (Fri) 1476; 2100 1476; 2300 5945; 2400 6155, also on satellite. If you have Internet access then full information can be found on ROIs site at **http://roi.orf.at/english/welcome.html** or by writing to: **Radio Austria International, A-1136, Austria**.

As Roland Machatschke has found out, the temptation is for broadcasters to move towards Internet broadcasting. This is nice and cheap for them - no more forking out for those horribly expensive short wave transmitters. Swiss Radio International is seriously considering doing away with short wave altogether, would you believe?

INTERNET BROADCASTING

Internet broadcasting seems very modern and sophisticated, but it's just not the same, is it? Clicking on the mouse to hear programmes through your computer, which in the UK means clocking up the telephone charges, is a rather dull business compared to the magic of picking up transmissions on a radio, isn't it?

There are new radios which will receive from the computer, but that's cheating. And then there are the many interruptions because of congestion. Internet broadcasting has a long way to go to match real radio. If you have strong opinions about Internet broadcasting for good or bad, let me know.

EDITORIALLY INDEPENDENT

Voice of America (VOA) is now editorially independent, but not financially stable. Money is still in short supply, services have been cut back and there may even be some attempt by the US government to tell VOA what languages to broadcast in. What kind of independence is that?

Meanwhile, for Europe, VOA still has an almost continuous service in English. Frequencies used at the moment are: Medium wave: 792, 1197, 1260, 1548; Short wave; 6040, 6095, 7260, 9530, 9680, 9700, 9760, 9770, 11805, 11965, 15205, 15255 (space precludes full schedule). For more details look at their website at: **www.voa.gov** or write to **330 Independence Avenue, Washington, DC 20547, USA**

After decades of cuts, British governments have realised what a wonderful job the BBC is doing with the World Service. A large chunk of government money is coming the BBC's way over the next three years. So relay transmitters will be upgraded at Cyprus and Singapore, in addition to setting up a new short and medium wave transmission station on the mainland of Oman, to replace the Masirah Island site.

The BBC frequency schedule always was complex. Now it's just plain amazing.

Once upon a time, the World Service in English was basically a single stream of programmes, with regional variations. A few years ago, it was split into three streams. Now its eight - the Americas, Europe, the Middle East and the CIS, West Africa, East Africa, Australia, South Asia, and New Zealand - each with its own special blend of programmes.

If you've got Internet access, you can read everything about BBC World Service programmes and the frequencies - where they are expected to be heard and when. The complicated but highly informative look at **www.bbc.co.uk/worldservice/schedules/frequencies/index.shtml** or write to **BBC, Bush House, London WC2B 4PH**.

THAT'S ALL FOR THIS MONTH - SEND YOUR THOUGHTS, COMMENTS TO THE ADDRESS AT THE TOP OF THE COLUMN.

Tom

IN VISION

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GRAHAM HANKINS G8EMX IN HIS NEWLY RETITLED ATV COLOUMN HAS NEWS OF A NEW REPEATER FOR BIRMINGHAM, HURDLES FOR DEVON ATVERS AND PROBLEMS 'DOWN UNDER'.

First news from Birmingham, where the **Beacons Repeater Group** (BRG) has been trying to find a suitable site for a 1.3GHz (24cm) ATV repeater. The offer of a private house in Erdington may have brought to an end what has been a very difficult and lengthy search for a site that would pass the BATC's critical 'path loss prediction to Clee Hill Radar' test. A transmitter and receiver are already completed, so the next stage will be for the BRG to carry out tests from the site on 1316MHz, which is the frequency that the BATC recommends from that particular location.

The offer for installing a 24cm ATV repeater will be the fifth venue that has been suggested and investigated over the last ten years. Previous problems have included poor microwave locations, site acquired by mobile 'phone companies and difficult liaison with site owners. So, 'fingers crossed' for a 1.3GHz Birmingham ATV repeater this time!

BROADCAST HURDLE

Yet another hurdle faces ATV repeaters installed at broadcast transmitter sites. **Roger Jones G3YMK**, the representative for the RSGB Repeater Management Committee Zone D, explains: "Many repeater groups have been faced with site rental increases. Despite the RSGB having obtained a seven year period of graduated increase to a fraction of commercial rents, even the first year is beyond the means of many. This is especially so for specialist ATV groups."

One group faced with this dilemma is the **West Devon ATV Group**, operating the 24cm **GB3WV** repeater in central Dartmoor. Roger says: "The group has decided to share the new site of voice repeater GB3CH in Cornwall. Unfortunately, the move of GB3WV from North Hessary Tor will eliminate coverage in the very active Torbay area of Devon".

In order to provide an ATV service for the Torbay area, a new Repeater group has been formed, the **Torbay Amateur Television Group.** They are proposing a new repeater, **GB3TB**, to be co-sited with the 2m (144MHz) voice repeater GB3TR provided by Torbay ARS.

Ken Harper G0EKH, says: "The situation is that 'WV has to move from its present site and will probably be relocated near Caradon Hill, to serve Plymouth and Cornwall. A letter of intent has been sent to the Repeater Management Committee requesting that the callsign GB3TB be reserved for the new 24cms ATV repeater which it proposes to site at the existing site of the Torbay ARS voice repeater GB3TR in Torquay".

He continues: "Site tests are being organised and carried out so, hopefully, a new ATV repeater will be appearing by the end of this year". Roger Jones adds: "In the longer term it is intended to link GB3WR and GB3TB. This is an excellent example of how groups can help each other".

Roger Jones also reports that: **The Solent Club for Amateur Radio and Television** has been testing the **GB3IW** voice repeater site for its new unit to cover the Portsmouth area, **GB3PT**. The site at Stenbury Down, the third highest hill on the Isle of Wight, gave **G7JTT** and **G8CKN** excellent results and some 20 stations were worked two-way during an evening portable session in late June.

The **Mendip Repeater Group** newsletter reports that **GB3UT** has been restored to full health following water damage to the feeders and antennas. This repeater is unique in the UK as it operates in with amplitude modulation of the vision carrier. The group has been considering conversion to the more usual frequency modulation and would be interested in hearing your views. They can be contacted via **PO Box 73, Wells, Somerset BA5 3YB.**

● Leicester ATV repeater GB3GV received in north Birmingham, which may soon have its own unit.

TO NEW ZEALAND

Michael Sheffield ZL1ABS, has a concern about frequency allocations: "The New Zealand Association of Radio Transmitters (RSGB quivalent) and individual amateurs are making submissions opposing the re-allocation of the band 440-449.75MHz to wide band frequency modulation (w.b.f.m.) studio transmitter links and wind profiler radars". Michael adds: "It hasn't helped that the Ministry of Economic Development have, even before the closing date, licensed a w.b.f.m. link on 444.675MHz to the detriment of amateurs using the band as an input to the ZL1BQ ATV repeater".

Hugh Railton ZL2MT, MED Manager Spectum Planning, responds: "Late last year there was a review of the 400-450MHz band, due to heavy congestion in the trunked dispatch radio bands and the introduction of digital land mobile systems for national security which has meant moving some existing fixed links. In the International Radio Regulations (RR) the allocation to the Amateur Service in this band has changed to where there is now no allocation shown in the band 440- 450MHz except in some countries by footnote.

"In New Zealand, the allocation of 430-449.75 has been allocated to the Radio Amateurs on a secondary basis only for many years. It was recognized that there should be an exclusive allocation for Amateur Radio and that has been included as the band 430-440MHz. Change is inevitable as each country attempts to meet the requirements of all spectrum users.

Hugh concludes: "The Ministry still continues to support the concept of Amateur Radio and NZART is part of the ITU Radiocommunications Sector. The challenge now lies with the Amateur Radio Service to find ways in which it can meet all its requirements within the 10MHz bandwidth set aside for this service".

THAT'S ALL FOR THIS MONTH, SO UNTIL NEXT TIME KEEP ON AIR AND IN VISION!

Graham G8EMX

SCENE USA

BY ED TAYLOR N0ED

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USA

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PLEASE SEND REPORTS AND INFORMATION FOR THE JANUARY COLUMN BY 15 OCTOBER

ED TAYLOR N0ED LOOKS AT HOW EMERGENCY NETWORKS ARE CONSIDERED AN ESSENTIAL PART OF AMATEUR RADIO IN THE USA AND ASKS IF IT'S TIME THAT THE UK FOLLOWED SUIT.

For an example of the cultural gap between Britain and the United States, look no further than the provision of back-up radio communication in the event of an emergency, which is considered very important in the USA. Here it's well organised, thoroughly planned, and has a high profile. American Radio Amateurs are proud of their achievements in assisting at man-made and natural disasters, as well as in less serious emergencies.

In Britain, you could say that there is **good news** and **bad news** for amateur participation in such events. The good news is that there are far fewer emergencies needing volunteers and that Britain is generally free of tornadoes, hurricanes and forest fires.

The bad news is that when emergency communication is needed, Radio Amateurs are not always the first port of call for 'User Services' that need help. This is compounded by the fact that emergency communication by Radio Amateurs is not well known from a public relations point of view.

The image that we have (as Radio Amateurs) of participants in the UK's emergency network does not boost their cause. Perhaps the British are suspicious of 'do-gooders,' preferring to sneer rather than giving a hand.

NATIONAL APPROACH

Support for emergency communications comes from a high level in the ARRL. The system is based on an organisation called Amateur Radio Emergency Service (ARES), which is set up by the ARRL and forms part of its services to the membership and the community. Amateurs offering emergency communications facilities do not have to be members of ARES, but most of them are.

In addition, the legal rules governing Amateur Radio have always recognised "the value of the Amateur Service to the public as a voluntary, non commercial communication service, particularly with respect to providing emergency communications" (quoted from part 97.1 of the regulations relating to Amateur Radio in the USA).

It's also interesting to note that Radio Amateurs in the USA have remarkable freedom in the case of a genuine emergency. The law states that an amateur station may use "any means of radio communication at its disposal to provide essential communication needs in connection with the immediate safety of human life and property when normal communication systems are not available". What this means is that under certain circumstances, US amateurs are given blanket coverage to use any frequency and any power – a rarely used option, but one that has saved lives in the past.

EMERGENCY CO-ORDINATOR

For a better picture of ARES, I went to see Mike Morgan N5LPZ (**Fig. 1**), who is Section Emergency Co-ordinator (SEC) for Colorado. His job is to coordinate, train and mobilise the Amateurs who have volunteered. as well as acquainting the User Services (known as 'Served Agencies') with the capabilities of ARES.

Mike is very enthusiastic about his ARES work: "We have 650 members in Colorado, which is a lot of people to administer, so we have to make sure that we are properly organised. Then we can get down to our real job of helping the public via various government and non-government agencies."

He continues, "I am always presenting ARES to the Served Agencies. They have to know what we can offer, and what to expect when they call us in – if they don't know about us, they'll never ask for our help.

"We work with government bodies at national level, and with state, county and city administrations. We co-ordinate with police, fire and medical services. But we also assist non-government organisations such as the Salvation Army and Red Cross."

I asked Mike if he had any problems in getting the Served Agencies to take ARES seriously. "We are **amateur** only in name. The key to working successfully with outside bodies is to be thoroughly *professional*. That begins the moment I sit down in front of, say, the Communications Manager of a Fire Department. I give a slide presentation, and explain how we work".

Mike showed me copies of some of the visual aids he uses – see **Fig. 2.** He explains: "I refer to the aims of the Amateur Radio service, and explain how ARES operates. It's important set out clearly what is possible, and what the procedure is if we are called out. I leave them with lots of information about previous co-operation with Served Agencies such as their own".

"We also try to be extremely professional in our training and exercise programme. The members of ARES need instruction in what has to be done in an emergency.

"Then they participate in our various Nets and exercises. By the time they are sent off to a real emergency, they will have comprehensive skills. They need to know about using the radio equipment and observing good practice in passing traffic, but they must also act calmly and sensitively with people who are dealing with very trying circumstances."

I wondered how the Served Agencies reacted to the presence of Radio Amateurs? "Services are generally more fragmented than in Europe," Mike told me.

"There are sometimes co-ordination problems, and emergency teams may not be able to talk to each other because they don't have common frequencies between radios. Then they're *very* pleased to see us! At the county level, we've been invited to send our members on the same training courses that the 'professionals' attend. They're happy to pay for us to be trained in emergency procedures, because they recognise that we're likely to be there working alongside them one day".

It seems to me that this aspect of the work of ARES is exceptionally valuable to the cause of Radio Amateurs in general. It is of great benefit at all levels – not least, when we are asking governments for more frequencies (or asking for existing bands to be retained).

PORTABLE REPEATERS

One of the weapons in the armoury of any ARES member is the portable repeater. This is an idea which is unknown in most countries, because the usage of amateur repeaters is strictly controlled. However, in the USA, repeaters may be set up anywhere, the only proviso being that the frequencies must not interfere with other users. Since the most popular v.h.f. band, 2m (144MHz), is 4MHz wide, there is not generally the same problem with finding channels as there is in Europe.

Whenever a communications emergency requires it, Amateurs will find high ground (or

● Fig. 1: Mike N5LPZ, leads the ARES in Colorado

tall building) near to the incident, and set up an antenna. In the huge flat plains of the mid-west United States, amateurs would put up a portable mast.

Compact repeater systems are available at fairly low cost, and need not use high power. If there is a mains supply available nearby, permission will be sought to plug in as necessary – property owners are generally happy to oblige. Otherwise batteries or generators will be used.

● Fig. 2: One of the slides used to explain Amateur Radio to the Served Agencies in the USA.

In addition, ARES has arranged with many of the Served Agencies to install antennas on their buildings. When an emergency occurs, it is a simple matter to plug in the necessary equipment, and become operational in a matter of minutes. It is a mark of the close links with organisations throughout the USA that this sort of cooperation is common.

In urban areas, portable repeaters are usually unnecessary. There are hundreds of permanent v.h.f. and u.h.f. repeaters in the state of Colorado, which is about the size of mainland Britain. Of course, these repeaters are mostly concentrated in towns, so the option to install a repeater temporarily is a great benefit.

OPERATION ON HF

In remote parts of the state, it is sometimes a requirement to communicate with other stations outside the normal v.h.f. range, or in places where it is not feasible to set-up repeaters. This could be because an impassable or snow-covered mountain range gets in the way. I asked N5LPZ what facilities he could provide.

"In ARES, we always take h.f. radios. We most often use 80m (3.5MHz) and 40m (7MHz). Our aim may be communication over a distance of perhaps 10 to 100 miles. For this, we will normally use s.s.b., although c.w. and Packet are also used."

I wondered how reliable h.f. would be. Mike said, "It's not perfect. But we can achieve a surprising level of reliability. We have a few tricks up our sleeves!

"For instance, on 40m, with a long skip distance, we might set up a relay through a distant station. Once we sent messages via an amateur in Iowa, 500 miles away.

"We have also used Near-Vertical Incidence (NVI), communication, with fairly low power on 80m. This can be successful with a dipole about 6-8ft off the ground, giving a ranges of 20 miles and beyond".

Using NVI is a technique which reverses the goal of most amateur practices. Normally, we want to reach as far as possible, and put our h.f. antennas as high as we can. If we can arrange to direct the r.f. perpendicular to the earth, reflections from the ionosphere will take place directly downwards. By putting antennas close to the ground, signals will be sent almost vertically upwards, and then down again close to their point of origin. Military users are known to use this method with very high power, but Amateurs have been successful with 10 – 100W.

EMPHASIS ON EMERGENCIES

I was very impressed by what Mike had told me. The work of ARES is supported by most US Amateurs, even though only a minority actually take part.

● Fig. 3: Portable TV coverage can be provided by ARES. This camera being used to help the Sheriff's Department with traffic control.

Things are different in Britain. The work of RAYNET, the British Amateur Radio emergency service, is not always held in high esteem with Amateurs who participate in exercises and attend emergencies often thought to be 'anoraks' with nothing better to do.

Sometimes, contesters and DXers say that have the best experience in passing traffic, and that they would be the best people to help when things really go wrong. This would only be true if they also had the necessary training to work with other Amateurs co-operatively, and could learn how to set up radio stations under difficult circumstances and under direction from outside agencies. I think RACES and Raynet would benefit from the skills of experts in these and other fields of amateur radio.

It would also make sense for the several Field Days in Europe (or, at least, in Britain) to be oriented more towards emergency communication and creation of public awareness. It would be a pity if the British field days became even more 'just contests' than they are now.

The US Field Days put an emphasis on message passing and on encouraging 'lay' visitors to the site. Doing this in Britain might focus attention on amateurs' responsibilities to the community, which ARES is ably promoting in the USA.

Many thanks to Mike N5LPZ, for his time and permission to use photographs. I hope you have been informed and interested by my remarks. Please let me know; I appreciate your feedback. Give me a call on the air during the contests organized by US magazine *CQ* – s.s.b. is 28-29 October and c.w. is 25-26 November.

73 Ed NOED

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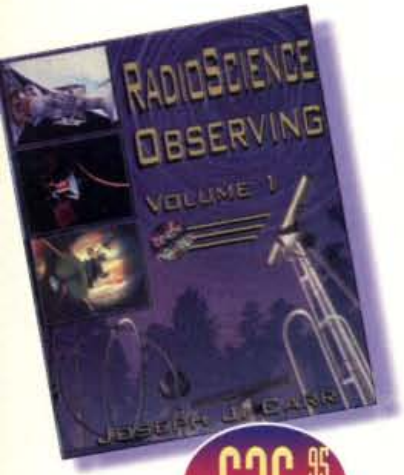

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Rob Mannion G3XFD, an avid reader with a very large library of radio (plus railway and medical!) books takes a look at some titles he thinks will be of interest to readers. Trouble is Rob's never too keen to give them back to the PW Book Store!

Radio Science Observing Volume 1

Joseph J. Carr K4IKP

Joe Carr K4IKP is an extremely well known author to the Amateur Radio community and I'm pleased to say he's also now a *PW* 'regular', having joined our team of 'Antenna Workshop' writers. However, this book is a departure from Joe's usual specialist output and I consider it to be of immense potential interest if, like myself, you're interested in radio science observations, propagation and the many fascinating electromagnetic effects that continually surround us.

This book covers (and describes how you can participate) Natural radio sources and observations, radio astronomy, propagation, signals, noise and reception, 'Whistler Hunting' (No - not those pests on 144MHz and the h.f. bands - but a natural phenomenon), solar flare and SID hunting, and monitoring the planet Jupiter, radio phenomena during solar eclipses. For the Very Low Frequency specialist there are receiver designs covering frequencies from 10 to 100kHz. Truly comprehensive, Joe has also written the book so you can join in by building your own equipment, receivers, antennas and specialised instruments including mechanical and computer recording. There's even a contributed chapter on the Search for Extra Terrestrial Intelligence (SETI) via radio.

For those of you with a CD ROM equipped computer there's a free CD with data on radio frequencies and how to identify them, together with detailed information on the Sun, planets and planetary bodies. For the scientists and budding investigators amongst us - I think this book provides a superb introduction to radio science observing and will add yet another truly fascinating dimension to our hobby. **It's certainly going on my bookshelf (News on Volume 2, etc., when it arrives).**

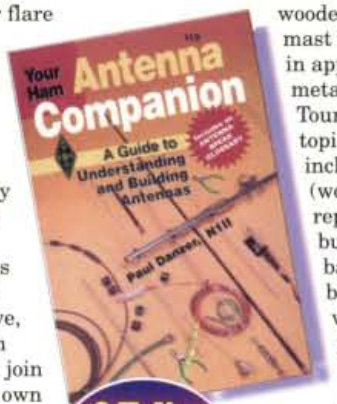
Your Ham Antenna Companion

Paul Danzer N1II

Many Radio Amateurs tell me that the antenna is the only true area where they think they can really build, test and innovate. This is backed up by the tremendous interest shown by *PW* readers in anything we publish on antennas. I enjoy it too, as I've recently been making and using a portable trapped dipole system which now goes in my car whenever I intend to operate /P.

£7.95

Although obviously very American in approach I can assure you everything I've seen in this book is applicable to all Radio Amateurs. There's even a simple wooden 'drive on' mast base similar in approach to the metal *PW* 'Tenna Tourer'. Other topics covered include 'Hitting (working) more repeaters, buying a multi-band antenna, building a v.h.f. ground-plane in a few minutes, what feed line to use, Yagis for the beginner. Of particular interest to Radio Amateurs who have the rule 'No antennas' with their accommodation is a fascinating chapter on 'hidden antennas' - although I can't see many of our readers erecting flagpoles (antenna disguise) in the same way as it's done in the USA. **An excellent book - just like a miniature antenna manual. Highly recommended, especially for first time antenna book buyers.**



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33 Simple Weekend Projects (For The Ham, Student and Experimenter)

Dave Ingram K4TWJ

Although most certainly aimed at the American 'home' market this book will definitely prove to be of interest to the keen home-brewer and there's even some fun QRP type projects included (a James Bond type of transmitter is one idea!).

Sections include: Hints and tips on home-brewing, useful theory and practice for the beginners covering coils, capacitors, resistors, transformers, etc. Antennas include h.f. and v.h.f. projects, rejuvenating old receivers and transmitters and transceiver. In short, if you're a keen 'weekend builder' you'll enjoy this book especially if you follow G3RJV's 'Carrying On The Practical Way'. **An Enjoyable book and projects.**

Your Mobile Companion

Roger Burch WF4N

Another very American book which, as its title suggest is a 'companion' rather than a full technical manual. The book has lots of advice, hints, tips, many ideas and photographs but does not pretend to be a source of circuits. If you want a 'guide' to mobile working this is for you. Includes: Going Mobile, What Bands?, Selecting equipment, installation, antennas (to drill or not to drill - answering that very difficult question), operating and 'automotive' interference (many hints and tips here). **A helpful first book for the (American talk) 'Mobileer'.**

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Yaesu FRG-100 receiver + p.s.u. and f.m. option, absolute mint condition, £270 o.n.o. Tel: 0191-565 2482.

Yaesu FT-290 MKII 2m (144MHz) multi-mode v.g.c., hardly used with mic, manual, original antenna and five element beam, looks like new, £250 buyer collects or pays postage. Tel: Simon G1VGO on Bristol 0117-924 8719.

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KW Viceroy MKIV s.s.b. transmitter. I am looking for a copy of the Manual, circuit or any information. Perhaps an old TX for spares. All costs and postage covered. Tel: Brook G0VEB, QTHR, 0208-882 4110.

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Looking for manual or photocopy for the IC22A v.h.f. f.m., on behalf of Walter G3EBG (92 year old). All costs refunded. Tel: Bob G0GUZ, (01223) 413401 or E-mail: bob.grimes @btinternet.com

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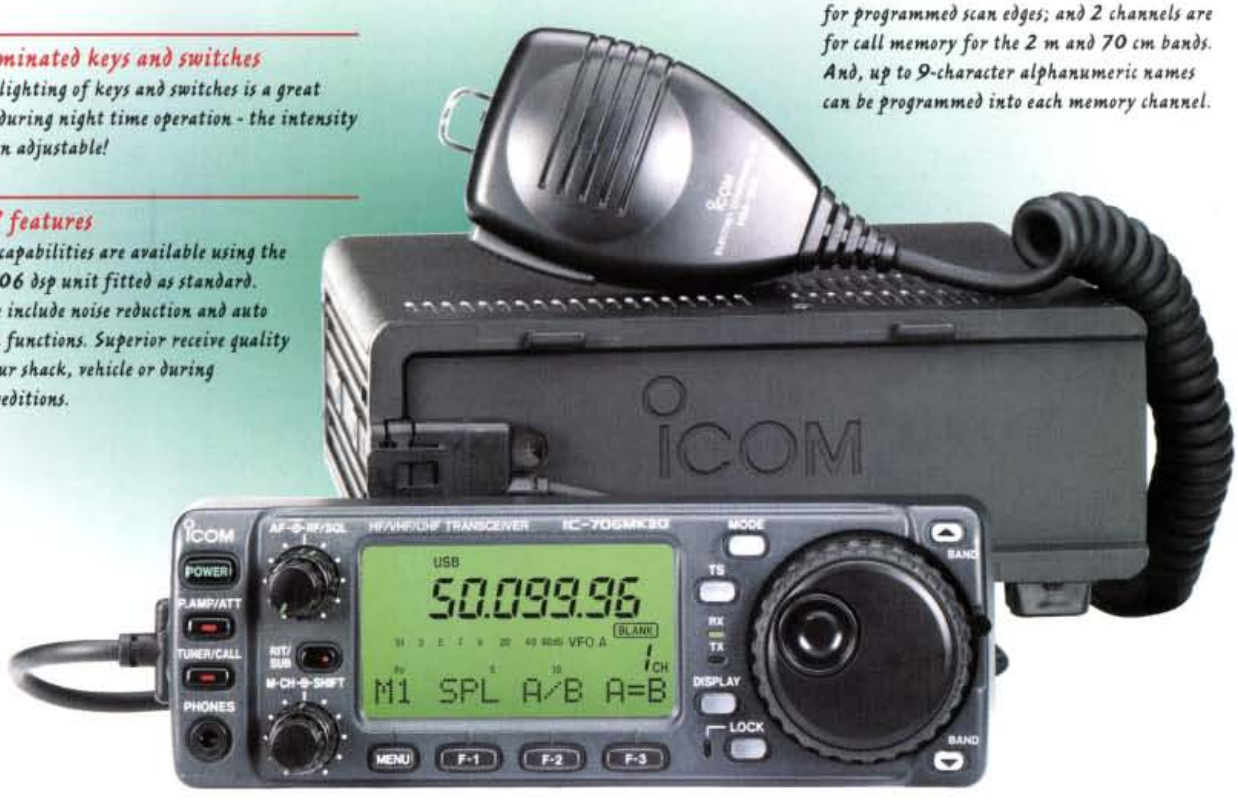

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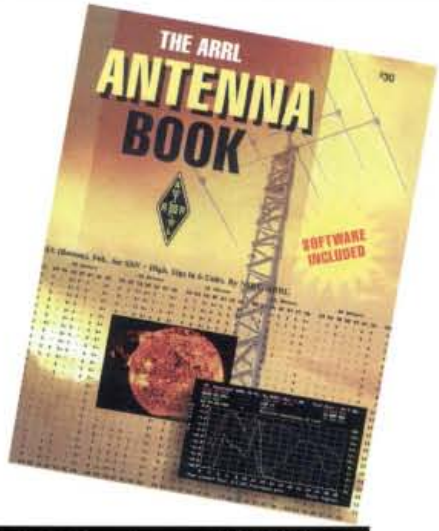

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I. IDBT: Interlocked Digital Bandwidth Tracking System

The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system monitors the settings of the SHIFT and WIDTH controls, and automatically sets the DSP bandwidth to match the user settings within the net bandwidth of the Analogue IF Filtering.

IDBT: A Breakthrough in Selectivity!

10-pole Collins® Mechanical SSB Filter

II. VRF: Variable RF Front-End Filter

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

VRF Features Large, High-Q Coils and High-Quality Relays

VRF Typical Bandpass Response (3.5 MHz)

III. 200 Watts of Transmitter Power Output

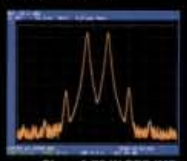
Utilising two Philips® BLF 147 Power MOSFETs in a 30 V push-pull configuration the MARK-V's Transmitter generates up to 200 Watts of the cleanest RF Power output available thanks to the conservative design of the PA Section.

Philips Power MOSFETs

High-Speed Automatic Antenna Tuner

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!

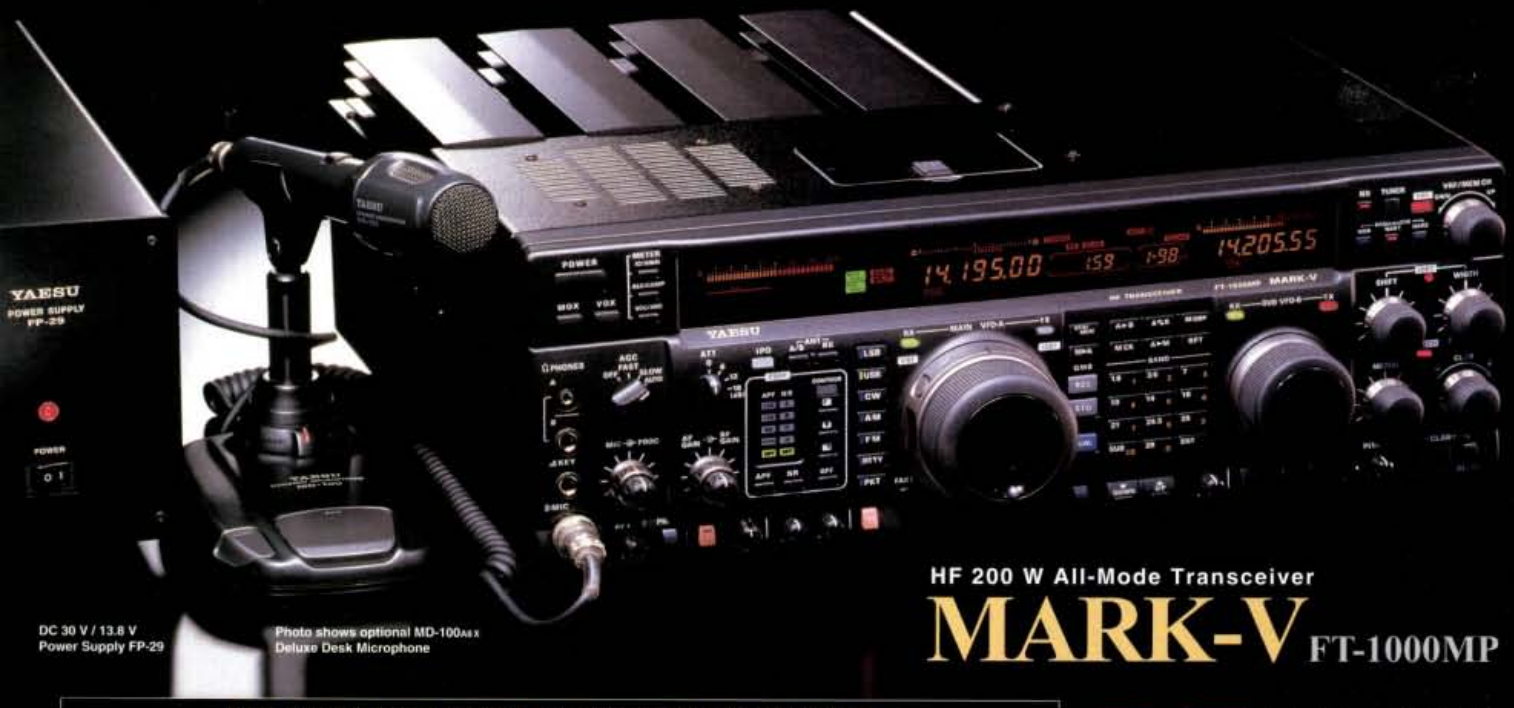


Class A 75 W PEP IMD

V. Multi-Function Shuttle Jog Tuning/ Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

Access VRF and IDBT Features via Shuttle Jog Dial

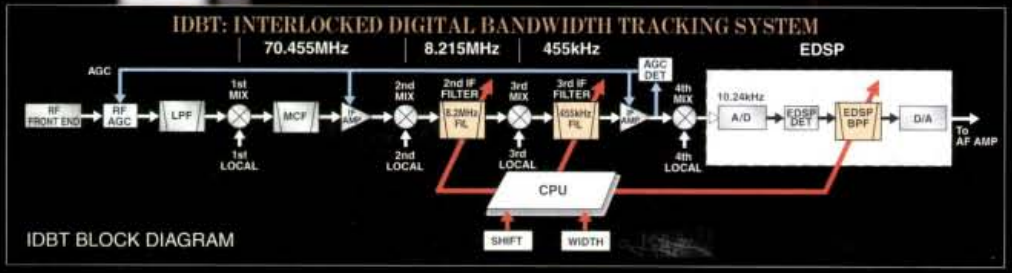


DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



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