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Freq (MHz)	Step	Mode
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30.000-87.495	5.0kHz	n.f.m.
87.500-107.995	50.0kHz	w.f.m.
08.00-136.995	12.5kHz	a.m.
37.000-224.995	5.0kHz	n.f.m.
225.000-400.000	12.5kHz	a.m.
400.005-520.000	12.5kHz	n.f.m.
760.000-1300.000	12.5kHz	n.f.m.

- **1000** memory channels
(100 channels x 10 banks)
- **10** limit search banks
- **100** monitor channels

■ Accessory:

Telescopic antenna and
owner's manual

■ Display:

Large l.c.d. with l.e.d. backlighting

- Large **rotary** or
keypad frequency control

■ Dimension:

Approx **232** (W) x **210** (D)
x **90** (H) mm

■ Receiving wave mode:

- Wide f.m. ➤ TV sound
- f.m. broadcast
- Narrow f.m. ➤ Business
- Communication
- Ham radio
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■ Scan and search speed

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and 50 steps/sec.

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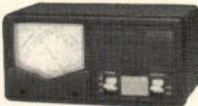
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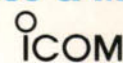
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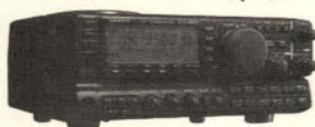
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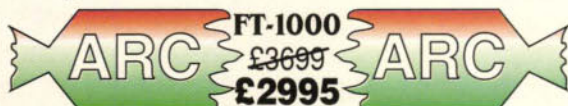
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Everyone at PW Publishing Ltd.
would like to wish all our readers,
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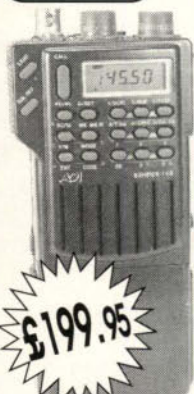
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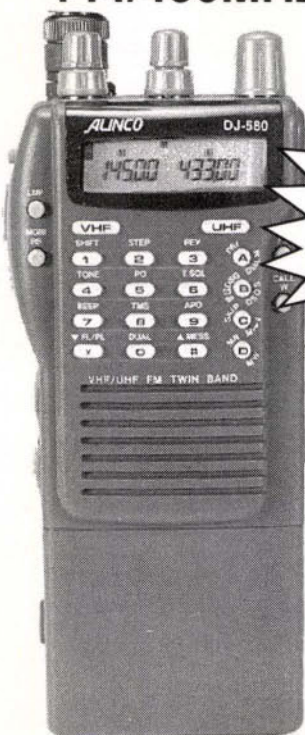


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As we say this Christmas is an ideal time to snap up these little beauties at prices that will leave you some change for the mince pies!

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EDITOR'S *Keylines*

As I write my first 'Keylines' of 1995 I'm extremely concerned with the future of 'home-brewed' and equipment built from kits for amateur radio and the requirements of Electromagnetic Compatibility or EMC. (This, incidentally in my opinion could be better known as 'Electromagnetic Incompatibility'!)

There's a tremendous amount of confusion regarding EMC requirements with respect to kits and home-built equipment and nobody (and that includes Government departments!) seems to know exactly what's going on. I even wrote to the Brussels headquarters of the European Economic Community to ask if they could tell me anything. Eventually I received a FAX reply telling me that (despite the apparent legal requirement for all member countries of the EEC to adopt the full regulations!) that interpretation of the regulation was up to the individual administration!

The problems associated with EMC have got many people worried and (in his article on kits and kit building this month) Clive Hardy G4SLU sums it up very well in saying "the only thing that is clear...is that it's as clear as mud"!

So, just what is happening on the EMC front as regards home-built equipment and those items assembled from kits? At the moment everything seems to be totally confused. It's impossible to get a straight answer (or at least one you can understand or quote to someone with any real meaning) from **any** source.

I challenge anybody in the UK - or the rest of Europe for that matter - to explain to the wider amateur radio community exactly where we lie in regard to complying with the EEC law. Personally, I think I'm on quite safe ground because there doesn't appear to be anyone, even within the EEC hierarchy, who understands the position themselves!

Strange Signals

While on the subject of EMC, I'm reminded of the strange signals which are appearing on the bands nowadays. I've been used to the multitude of TV line time-base harmonics throughout the h.f. bands and the r.f. 'hash' from computers but these have now been joined by a whole new series of signals which seem to be connected with communications.

Down here in Dorset I've heard the new transmissions on 1.8 and 3.5MHz. Although I have not had much experience with 'spread spectrum' communications in recent years...the signals received are similar to those heard in the past.

The odd transmissions seem to manifest themselves as strange frequency-hopping unresolvable single sideband signals. They can be heard within our frequency allocations and outside, and at times they can cause a great deal of noise on an ordinary communications receiver.

Obviously, if there's any newly-introduced 'spread spectrum' communications that have been authorised on the h.f. bands, it's not necessarily any business of mine. However, **it is** of concern to me that something is causing interference to the legitimate amateur radio service.

Normally I would pass on my comments to the RSGB's Intruder Watch. But...how do you identify a possible intruder or interfering station which by its very mode of operation is not confined to one frequency?

I am not even sure whether or not that it's a 'spread spectrum' system operating and causing the odd 'skittering' signals which can be detected on the bands. Have

you heard anything, or can you shed a light on what could be yet another form of interference we've got to put up with on the (already shared and overcrowded) bands?

Planning Permission

Every now and again I hear of the difficulties faced by some radio amateurs when they've fallen foul of planning laws. It seems that some local authorities really do go out of their way to make life difficult for 'non professional' or 'non essential users' of radio equipment, especially with regards to external antennas.

Personally, I think the reaction from local authorities is quite understandable! I have this opinion because it's obvious from the reports I read in newspapers (regional and national) that County and District Councils seem to have their hands tied when it comes to planning permission for the ever growing multitude of cellular radio telephone sites spread throughout the British countryside.

It appears (although I must admit I'm no expert on planning laws) that the cellular radio telephone service operators **do not need** any form of planning permission! They, as my research indicates, only need to prove that a site is required. It then appears that the local authority can only appeal to the Central Government against the decision (quite ironic!).

Unfortunately however, I feel sure that the ever growing problem of the multiplying cellular repeater sites is indirectly influencing local authority decisions. You can imagine a hard-pressed council planning committee reviewing an application from a radio amateur for a beam antenna and tower!

An overheard council meeting could sound like this: "Not another aerial mast" says Councillor Mrs Mary Liberation. "But we can turn this one down" retorts Councillor Gerald Conservation. "So, the decision is unanimous" said Councillor Fred Wirker "This is one aerial system we can refuse planning permission for".

The scene I've described is from my imagination. However...I'm left wondering if there really is some form of backlash which could work against our hobby. I hope I'm wrong, but if I'm right perhaps we should volunteers our homes to be used as cellular radio telephone sites....we could then use the mast for amateur radio purposes too!

Rob Mannion G3XFD



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

RECEIVING *You*

Amateur Radio On BBC Radio 4

Dear Sir

On the BBC Radio 4 'PM' programme and the 6 o'clock news on October 27 1994 there was a report of a tape recorded telephone call, released by Humberside Police, and alleged to be between a prisoner and his wife prior to his escape from prison on Humberside. The tape recording was described as "of poor quality, made by a radio amateur".

I complained to the BBC Duty Officer and other appropriate organisations that the news item - especially the reference to a 'Radio Amateur' - encouraged the public to believe that unauthorised telephone tapping and the monitoring of private radio communications by an unauthorised person can in some arbitrary circumstances be considered to be legitimate and was condoned by the police. Also, that it encouraged the public to believe that such activities are closely associated with those of Radio Amateurs, which is not the case.

As we know, people who acquire monitoring equipment, or transmitters and use them illegally are invariably described by the press and broadcasters (most recently by the PM programme) as 'Radio Amateurs'. This view is damaging the public - and possibly governmental - perception of Amateur Radio.

Does the fact that Humberside Police released the recording and seemingly attributed it to a Radio Amateur, give some legitimacy to telephone tapping and other such dubious activities? It would have been sufficient to say that 'police had intercepted part of a 'phone call....'

This sort of news story is damaging to Radio Amateurs, may harm innocent people who have their 'phone calls monitored and also undermines the law. I will let you know if my complaints show some positive result.

Alan Clayton G7HZZ
Nottingham

Editor's reply: Alan's action should be commended. It's an uphill battle but we must react in a positive way to counter this frequently occurring problem. Fortunately, the 'Duty Officer' approach works well with the BBC and ITV Regional contractors, although unfortunately it doesn't work with newspapers...but I will keep trying to make it work!

Power Down On FT-747

Dear Sir

Reference 'What A Good Idea', Power Down An FT-747 by Ken Fisher GOLKX (PW November 1994).

I have a Yaesu FT-747 and was very interested in Ken's method of reducing output power on s.s.b. mode.

This got me looking at my instruction manual for this information. My manual states the microphone level control controls the output power on s.s.b.

I think Ken's method might also reduce 12V d.c. input power as well as reducing s.s.b. r.f. output power. Can anyone out there confirm this or make any useful comments? And why didn't Ken use the 12V d.c. output socket at the rear of the FT-747?

John Wood G3EAY
Essex

Burglar Alarms & Radio

Dear Sir

Regarding Mr Wood's problem (PW November 1994) of setting off nearby burglar alarms every time he transmitted ... a friend of mine had exactly the same experience.

As he normally went on the air early in the morning, the installer of the alarms was not amused at being called out before 7am!

He blamed my friend for interfering with his new equipment, but it was pointed out that the problem was actually in his alarms, which were acting as wireless receivers instead of merely detecting burglars!

Eventually he had to fit suppressors to all the alarms. This cured the break-through, but at least he had the grace to admit the problem was his and not that of the radio amateur, whose signal was beyond reproach.

Douglas Byrne
G3KPO
Isle of Wight

Motorcycle Mobile

Dear Sir

How's this for a tough question? I wonder if you could suggest a 430MHz radio and a headset that would be suitable for mobile use? Ha! Not so tough after all, I hear you say. The catch is, I ride a motorcycle so there are a few problems.

1: The radio must be small (my TR-2300 is far too large, and it works on 144MHz). I guess I'll probably be looking at a hand-held stuffed inside a coat pocket.

2: The headset must be robust, able to be attached to a full-face helmet and able to work in the most extreme of noisy environments.

3: I'm also trying to find a suitable small waterproof switch to mount on the handlebars.

Short of asking the local police if they have any surplus equipment, I'm running out of ideas. I wonder if any of your staff or readers know of anyone who's done this before?

Practical Wireless is a great magazine by the way! And on the subject of SSL, I knew my call-sign 12 days after the cheque arrived at Bristol. The Validation Document took about two weeks longer, but that's another story...!

Jeff Moya G7TAT
Essex

Editor's reply: We've got several 'motorbike mobiles' in this area (one happens to be a motorbike policeman!) and they seem to use rigs mounted on their machines, with the headset/microphone built into their helmets. I've no doubt other 'mobile' readers will respond, but I've sent Jeff a photocopy of the 'Safety First...On The Air & On The Move' article from the June 1991 PW.

Component Suppliers

Dear Sir

Mr Lewis's statement that component suppliers do not advertise lists of basic components, (PW Oct '94) must surely be one of saving on advertising costs. Most component shops have an adequate stock of basic components and seen only too keen to accommodate any such enquiry.

The last time I needed some transistors, John Birkett of Lincoln despatched them to me in Spain the same day.

J. R. Cubitt
Spain

Editor's comment: Nowadays I hear many stories of amateurs (especially abroad) FAXing their component enquiries and receiving lists of what's available the same day. And, if I win the new British lottery I'm getting a FAX machine!

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.

Trio TS-700G Review

Dear Sir

Owing to pressure of work, I went QRT some seven years ago and sold all my equipment (both h.f. and v.h.f.). I have recently retired and have become active again, albeit starting in a very low key manner, by purchasing a second-hand Trio TS-700G 144MHz transceiver.

As I am a pensioner now, I have to watch finances! Being old fashioned, I rather like 'real' capacitor tuning and loading rather than stepped synthesised tuning and automatic loading. I feel I am more in control of the rig. The TS-700G seems a reasonable rig for my re-start in Amateur Radio but I am wondering if it can be improved at all.

My original letter to *PW* was to ask if you ever reviewed it, or, preferably, published anything on modifying it. If you haven't published any articles on it, there is no problem. Rigs come and go with such rapidity that I expect you have difficulty in reviewing more than about half of them, so it is quite possible that you haven't covered this particular one. However, if you have published anything on it, I would be very grateful for any information.

I appreciate that you are very busy and will receive much mail, so I don't expect a letter from you answering the points I have raised in this letter.

Finally, thank you and your team for a high standard and exceedingly interesting magazine, and thank you once again for your letter to me.

Keith Powell G4JVX
South Yorkshire

Editor's reply: We don't seem to have reviewed this transceiver. Can readers help Keith on this matter?

Radio 'Hams'

Dear Sir

I read with interest the 'Keylines' editorial in the November *PW* about 'Radio Hams' in the press and wonder what all the fuss was about.

Why do intelligent people, as I am sure you are, spend time and probably money, chasing up misuse of a word, which in itself is

general and wide ranging?

If we choose for ourselves a name which by its very nature is open to mis-use and abuse, why do we complain when it is?

The dictionary does not give us the exclusive use of the word, 'Amateur' or 'Ham'. As far as radio amateurs are concerned, we are licensed operators at a non-professional level.

When newspapers

report a 'Pirate Radio Ham', causing interference, they are not talking about a licensed operator, or a professional operator. They are talking of a person who is at the low end of the word (Amateur), i.e. a person who messes up everything he/she does and who is very unprofessional.

I am sure that they are not referring to the top end of the word, i.e. a person who pursues his chosen hobby with a professional attitude and integrity.

If we wish to avoid public misuse, I suggest we get ourselves re-classified as 'A Licence Class 1 Operator', 'B

Class 2', 'Novice Class 3', 'CB Class 4'. Dropping the word Amateur and Ham altogether.

I am sure the media would not say 'A Class 1 operator was causing interference to Airport services' or, 'A Pirate Class 1 operator was causing interference'.

So, if we are to maintain our name as Radio Amateurs or 'Hams' like our friends in the theatre, we must endure both uses of the word. The actor who is near to professional level but takes acting as a very serious hobby. And the Ham who should be sweeping the stage, not acting on it.

All in all, those who know about our hobby, also know we do not engage in deliberate interference to other users.

Those who do not know of our hobby are not sure of what the word Ham or Amateur means. They (perhaps like I did before getting into radio) envisage a Radio Ham as being, some old very wise looking guy with wire protruding from all parts of his person, stuck in a shed or attic talking to an equally eccentric bunch of fellows in other sheds!

Dennis Barber
GOUFS/KB8GCF
Manchester

★ ★ ★ ★ STAR LETTER ★ ★ ★ ★

Closure Of GB2SM

Dear Sir

I read your 'Keylines' concerning the closure of GB2SM within a few weeks of visiting the Science Museum with my son Matthew.

I took Matthew to London for his 11th birthday. We spent a few days visiting the places of interest and the museums including the Museum of The Moving Image and The Natural History Museum.

I'm afraid to say that GB2SM does not stand out amongst the highlights of the trip!

Whilst I appreciate that in 1958, the visit to the station may have captivated you, there has been a revolution in learning since then, and interaction is a must if young people are to be interested in any museum exhibit.

If Matthew had been handed the mic and some cue cards and invited to pass a greetings message to a distant amateur, or if there had been opportunities to tune a crystal set or engage in many of the interesting experiments associated with our hobby it would have been a different story.

In fact, the nearby feature on domestic appliances was far more exciting to the young museum visitor.

Amateur radio is far from 'out-dated', but perhaps the station could do with a fresh approach. I am not diminishing the dedication of those who give their time to operate the station, but I am sure that they would agree with the importance of showing the hobby in the best possible light.

At the end of the day, if GB2SM is replaced by an interactive display featuring modern communications, perhaps more young people will become interested in the hobby as a result.

Noel Moore G17CMC
Belfast

Editor's reply: I think your comments are well judged Noel, and the GB2SM operators were well aware that 'something had to be done' to improve the station. Geoff Voller G3JUL (associated with GB2SM for almost 40 years) and his colleagues had plans on the same lines as you suggest but the Science Museum decided on closure. Let's hope that when the station re-opens there will be a better 'hands-on' demonstration station showing amateur radio off to best advantage. You never know...the DTI may even grant a special licence where it's even easier, with fewer restrictions for visitors wanting to 'have a go' on the air under supervision.

Contest Winners

At the Annual Leicester Amateur Radio Show held over the weekend of October 21 & 22nd 1994 the winner of the *PW* 1994 QRP Contest was presented with his prize. **Mike Cowley G0GAG/P** was presented with the prestigious *PW* Winners Cup and a Kenwood TH-22E hand-held transceiver by David Wilkins G5HY of Trio-Kenwood (UK) Ltd.

Also presented at the Leicester Show was the Novice Natter *PW* Elmer Award. Barry Cooper from Yaesu UK presented **Alan Turland G7LNV** with his prize of a Yaesu FT-815.



(L-R) Dave G5HY presenting Mike G0GAG/P with the *PW* QRP Contest winner's prizes. (photo courtesy of G6XYU)

Surrounded by friends and supporters Alan G7LNV is presented with his FT-815 by Barry Cooper.

(photo courtesy of G6XYU)



Lake Brochure

The *PW* Newsdesk has recently received a copy of the latest Lake Electronics brochure. The A5 sized brochure covers the Lake Electronics Kit range and includes the DTR7-5 Transceiver, the TU4 a.t.u. and the CPO-5 Morse Practice Oscillator. All Lake kits are supplied complete with hardware.

If you would like a copy of the November 1994 edition of the Lake brochure just send a s.a.e. to **Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX.**

Far Eastern Communications

National Transcommunications Ltd. (formerly part of the Independent Broadcasting Authority) have opened up their first overseas office - in Hong Kong. This new office will enable NTL's Advanced Products Division to grow in the market for digital video compression technology.

James Sinclair who is a specialist in digital and satellite communications will be in charge of operations in NTL's Hong Kong office. The opening of this office will mean that NTL are one of the few British companies in the broadcast or telecoms sectors to establish a presence in Hong Kong. This means there will be better support for existing customers and the demand for video compression technology especially multi-channel TV will be met more easily.

NEWS '95

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

New Cirket Catalogue

The Winter 1994/5 edition of the *Electronic Constructors' Catalogue* published by Cirket has just arrived on the *PW* Newsdesk. The catalogue has been enlarged to 280 pages, with 26 product sections, 4000 lines and for the first time has a section containing feature articles, news and two special projects.

Cirket have also increased their range of kits and have introduced some new designs including an electrical wattmeter, an infra red remote control system and a breath alcohol tester. Many other new products have been added to Cirket's vast range giving a wide choice of products from batteries to transformers.

The *Electronic Constructors' Catalogue* includes £21 worth of discount vouchers and is available for £1.95 from larger newsagents or direct from **Cirket Distribution Ltd., Park Lane, Broxbourne, Hertfordshire EN10 7NQ.**



£50 Prize Winner

The lucky winner of the £50 Prize Draw for the November 1994 issue of *Practical Wireless* was **Mr Tony Cooke** from **County Kildare, Ireland.** If you place an order for books from this issue your name will automatically be entered into the £50 Prize Draw (see Book Service pages for more details).

Jandek Closes

Practical Wireless is sorry to have to pass on the news that after seven years **Derek Pearson G3ZOM** of **Jandek** has ceased trading. Derek is returning to college and this means that Jandek kits will no longer be available. He would like to thank all customers and traders past and present for their support.

The *PW* team would like to wish Derek every success in the future and hope that one day he may be in a position to resurrect the Jandek range of kits.



Morse Code Classes

As a result of his successful Radio Amateurs' Examination class Ray Oliver G3NDS will start running a Morse Code class on January 13 1995. The class will run on Friday evenings from 6 to 7.30pm at Newbury College.

Anyone who is interested in joining the class should call **(01635) 37000/35353** and quote course **99208B** or contact **Ray Oliver G3NDS** direct on **(01672) 870892.**

Can You Help?

Do you know of a company who specialise in spare parts for vintage radios and who can supply cotton covered headphone leads (the old Y shaped leads) for rewiring headphones? If you do **Richard Walker G4PRI, QTHR** would like to hear from you.

Coker Kit

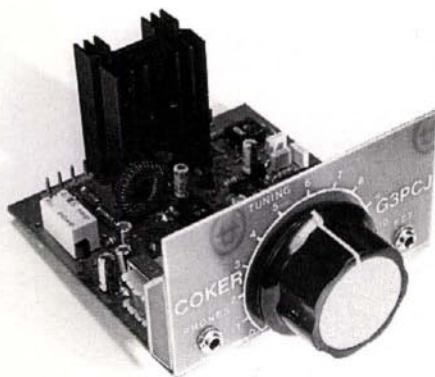
Walford Electronics, who are based in Somerset, have added the 'Coker' kit to their range. They are also pleased to announce that the Coker has been selected as the winter construction project by the Yeovil Amateur Radio Club.

The Coker is a direct conversion c.w. transceiver for 3.5MHz. The receiver side has four f.e.t.s, a single knob v.f.o. that uses a varactor diode with a stabilised supply voltage and although the audio filter is meant for c.w. it is possible to copy s.s.b. The transmitter provides 5W of power, supplied from a tuned Mosfet output stage and semi break-

in operation is included.

Tim Walford G3PCJ the designer of the Coker says that it has been specifically designed as a low cost, simple kit and is ideal for the newcomer to construction. The Coker kit is supplied complete with all the hardware and costs £45, there is also a version available to cover the 1.8MHz band.

If you would like more details on the Coker or any of the kits in the Walford range send an s.a.e. to **Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ.**



Universal Radio



The Universal Radio Inc. company of Ohio, USA have announced the publication of their new expanded

Communications Catalog 94-10. The 108 page catalogue contains equipment from a variety of manufacturers, for the amateur, short wave and scanner enthusiast. There is also a wide selection of antennas, headphones, books and other accessories.

There are several new items featured in the *Communications Catalog* including the Lowe Europa Receiver, Sony ICF-SW7600G and ICF-SW100 and a selection of Optoelectronics counters and receivers. If you'd like a copy of the catalogue it's available free from **Universal Radio Inc., 6830 American Pkwy, Reynoldsburg, Ohio 43068, USA** on request by fourth class mail or for \$1 first class mail (USA). It's also available outside North America for four IRCs.

Bulletin Board Anniversary

The CQ Centre BBS celebrates its first anniversary in February 1995. The CQ Centre is a computer bulletin board system that is dedicated to all aspects of amateur radio and short wave listening.

Access to the CQ Bulletin Board is free and is available 24 hours a day at all speeds between 300 and 14400bps. The system provides news, electronic mail and conferencing as well as the latest amateur radio software for IBM PC compatibles and Amiga computers.

It's reported that in early November the BBS had approximately 100Mb (compressed) of radio related files as well as 500Mb (compressed) of general interest software. The files are available for downloading and the system can take two simultaneous callers on **node 1** on **(01753) 595468** and on **node 2** on **(01753) 593524**.

Computer Kits

Ernie Bailey G4LUE and Nigel Horne G0LOV of the **G0LOV/G4LUE Amateur Radio Software Barn** are pleased to announce that they have arranged with Badger Boards for them to sell their kits. The newest kit, Hamfax, allows radio amateurs to transmit and receive computer data.

The Hamfax kit is designed to be used as an interface between a radio and an IBM PC or compatible. The modes included are Morse, Slow Scan Television, FAX, RTTY and Amtor.

The Hamfax kit, complete with full instructions costs £19 or ready built the Hamfax can be bought for £23. The price also includes a nine way 'D' type plug to connect to the computer, a five pin DIN plug to connect to the radio and software drivers which are distributed as shareware.

If you'd like to have a go at building Hamfax you can buy your kit from **J. Bailey, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN. Tel: (0836) 748958** or from **Badger Boards, 80 Clarence Road, Erdington, Birmingham B23 6AR. Tel: 0121-384 2473.**

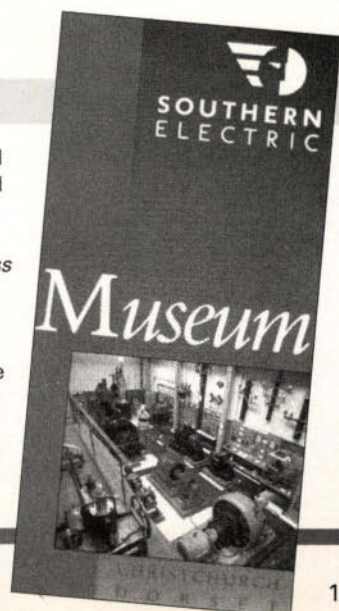
Electric Launch

Southern Scanning & Shortwave (SS&S) was set-up by **Bob G6DUN** and **Colin G3XAS** and started trading on June 1 1994. Bob and Colin can supply most leading makes of amateur, s.w.l., airband and scanning equipment and are also an authorised Kenwood dealer for the south coast.

On Sunday January 15 1995 SS&S will be holding their official opening launch at the Southern Electric Museum, The Old Power Station, Bargates, Christchurch, Dorset. Readers of *Practical Wireless* are welcome to join Bob and Colin at their launch. Visitors will have the opportunity to see the Southern Electric Museum's 700 exhibits enabling them to go back in time to when electricity was a luxury.

The Museum will be open from 10.30am to 4pm on January 15 and refreshments will be available throughout the day. So why not make a day of it and join Bob G6DUN and Colin G3XAS as they officially launch Southern Scanning & Shortwave?

More information on the range of equipment available from **Southern Scanning & Shortwave** or on the official launch is available by writing to **PO Box 2126, Bournemouth BH11 9YH** or telephoning **(01202) 590779** or **(0836) 246847/246955**.



Costs Steep

I've recently had a letter from **Mark Holmes**, who at 14 finds that the costs involved with taking the RAE and purchasing equipment too steep. Is it true that there's a cheap alternative, he asks? Sort of, is the answer.

Mark has probably heard about 'The Novice Licence' that will allow limited power on a limited number of bands. To get a Novice Licence you must take part in a short course that teaches you all you need to know about getting your licence.

My first suggestion to Mark is to write to the **Radio Society of Great Britain at Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE** to get a list of the places where Novice Courses are being held (*Don't forget to regularly read this column too, for hints and tips.* Ed). There's bound to be a Novice Course nearby, if not then there is the possibility that the local instructor will start a course.

Don't be put off by the idea of a course. There's loads of practical work involved and if the course is being run by a local radio club then you'll have lots of opportunity to see them operating on the air.

Going along to a nearby radio club is also a good idea once you've got a licence. Most clubs have got a station for use by members, some of the larger clubs have the station open most evenings in the week too.

If you're looking for a book that gives you a good idea of what you'll be getting into, then *The Novice Licence Student's Notebook Book* by John Case GW4HWR is a good start. It costs £5.99 plus £1 P&P (UK), £1.75 P&P (overseas) and can be bought from the *PW* Book Service.

NOVICE Natter

For Radio Beginners of all Ages.

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

This month's 'Novice Natterings' include more news on the winner of the Elmer Award, the Leicester Amateur Radio Show and amateur radio 'pigeon holes'.

Stations Logged

Novice operator **R.W. Moore 2E0AHQ** has sent me a log of stations he worked during the months May to October - impressive I must say. He thinks it has been a very good year for the 28MHz band - or 10m if you prefer.

When you consider that as a Novice, 2E0AHQ only uses 3W, it's surprising how well he has done. He has a home-made 3-element Yagi and a Belcom 28MHz rig.

The best month listed was May with 19 different stations logged. They came from far and wide too.

There was DL7ULZ in

Germany, F6BXQ in France, CT1DVA in Portugal and IK0OER in Italy amongst the European contacts, then there was LU2ATR in Argentina and CX9BP in Uruguay amongst the stations from farther afield.

June and October had 17 and 16 different contacts respectively with stations like YL3CW (Latvia I think), N2WXP in the USA, HB9HVF (Switzerland), I4JMY (Italy) and OZ9JH in Denmark as an example of those he worked. There were even a couple of UK stations with GM0HSU and G0ROF appearing in the lists. It's really good to see how well a new licensee is doing and the enthusiasm with which he's going on the air.

Pigeon Holes

You know how we always try and 'pigeon hole' people, well I've been sent a very tongue-in-cheek list of 'pigeon holes' for amateur radio. The trouble is I'm sure I fit into too many of the categories!

But, of course, no-one who reads this column will fit into any of the ones I list over the next few months as you are all much too good to be pigeoned holed! Here's a few to get you started:

Morse Apostle: This is the person who is convinced that Morse is the only 'proper' means of communication and is sure that there's a campaign to outlaw its use on h.f. To them, Judgement Day will be when all Morse keys are consigned to eternal silence!

Contest Crowders: These operators rubber-stamp their way around the world - 5 & 9, 1002, 73 Next - even when there isn't a contest on!

If you would like your log mentioned in a forthcoming issue, send them in and I'll try and use as many as possible. It's always interesting to see how many different stations and on what bands people have managed to work. Let me know about how well the QSL cards are going too.

Leicester Amateur Radio Show

I'm writing this less than a week after visiting the 1994 Leicester Amateur Radio Show. It was good to meet many new faces and to greet lots of old friends.

I was lucky enough to spend some time on the *Practical Wireless & Short Wave Magazine* stand and even got to meet **Alan G7LNV** - the winner of the Novice Natter Elmer award. I have now got some extra details on the group that Alan is involved with.

Alan G7LNV, **Paul G0SPA, John G0NPV** and **Tony**

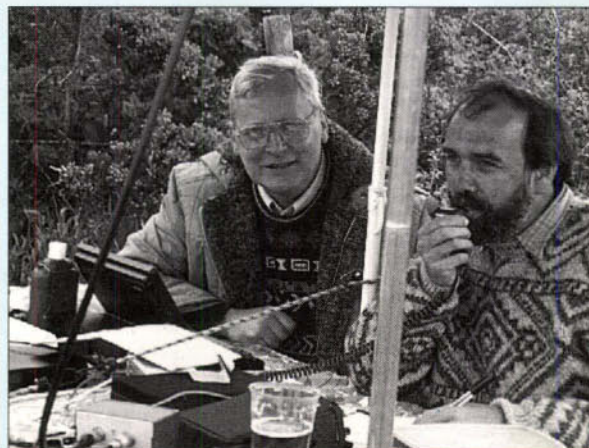
G7MED got together to form a Novice instructors group. As a group they offer a quality course in instruction for students who want to get their Novice licence. The course meets on Wednesday evenings between 7 and 9pm at the GPT Radio Club in Beeston near Nottingham.

Apart from teaching the Novice course, Alan, Paul, John and Tony try to advise students on what equipment to construct or buy when they get the licence. They also run on-air sessions in the week to improve the

students operating techniques and run slow Morse transmissions for anyone who wants to try for the Novice A licence.

There are even several Novices who

are now helping out on the course, **2E1BJG, 2E1CLL** and **2E1CXH**, which goes to show what an enjoyable experience the group must provide. I must admit



Techno Wizards: These can describe the inner workings of their new/old/dead or restored Ickensu/Heinz 57 in greater detail than the importer's own Sorcerers' Apprentices can. But then who else has ever heard of the model?

Packet Racketeers and the **Fuzzy Picture Brigade:** These operators simultaneously use one frequency to send funny noises and another to explain each step. Even when not using the mode, they spend all evening discussing how it all went wrong!

Having now upset at least half the amateur population, I'll leave the rest until next month! If you've got any 'pet hates' about the hobby drop me a line and I'll see if I can't give them an airing.

I'm sure there's something about the hobby that annoys you, but perhaps I can explain it a bit and put things into perspective. Light-hearted letters only please!

Greetings

As this is the last issue you'll read before Christmas and the New Year, it just remains for me to wish you all a Happy Christmas and Prosperous New Year. I hope to be hearing from many more readers as we go into this new year, drop me a line and tell me what you'd like to be reading in 'Novice Natter'.

that there was no shortage of enthusiasm when I was speaking to the group. I'm sure I'll be hearing lots more from the group as the year progresses.

Are there any other groups like Alan's around. It doesn't matter whether they are involved with Novice courses or not, let's hear about them.

(L to R) Alan G7LNV logging the contacts that Paul G0SPA was making.

First Steps

In this month's **First Steps** I'm taking a look at Repeaters. I'm asked to remind you that there was a 144MHz datacard given away in last month's issue of *PW* and that if you missed the issue, back copies are available for £2 from *PW Publishing Ltd.*'s Post Sales Department.

Repeaters

With the 145 and 430MHz bands playing such an important role in local amateur communications, the often abused and ignored repeater deserves a special mention.

If you've not come across them, a repeater is actually a relay station that allows low powered or poorly located stations to take advantage of the good location of the repeater. To do this, the repeater is fitted with a good quality receiver and transmitter that are connected to an omnidirectional antenna system.

In order for the repeater system to work, the transmitter and receiver have to be on different frequencies or they would start howling a bit like the noise that is produced between a microphone and speakers in a poorly set-up public address system. To make sure that everyone can use them, a standard frequency difference is used for each band.

On 145MHz the transmitter operates 600kHz higher than the receiver, whilst on 430MHz this difference is 1.6MHz (but the shift is the other way round). Despite these frequency shifts the repeaters still need to be fitted with some **very** good filtering to keep unwanted r.f. out of the receiver.

Another problem for repeater users is making sure that the repeater only forwards reasonable quality signals. There's no point in re-transmitting a signal that's too weak to be intelligible or, even worse, is just a load of local interference.

Repeaters use a few tricks to overcome the potential problems. The first is to employ a tone-burst system to start the repeater. The standard here in the UK is to use a half second burst of 1750Hz.

Once past the initial hurdle the repeater then checks the signal strength and modulation (deviation) level. These latter checks continue throughout the transmission and result in the repeater stopping re-transmitting if the signal quality drops below an acceptable level. As a final safety precaution, repeaters usually limit the transmission time for any single over to typically three minutes.

As repeaters are used by so many there needs to be some guidelines to ensure that they are used effectively. The first is to control your transmitter power.

You should always use the minimum power that will give a good quality signal. This is particularly important during good propagation conditions as repeaters share frequencies up and down the country, and you could end up causing interference by operating through a distant repeater as well as your local one.

The next most important is to 'check the input'. This is where you listen for the direct signal from the station you're in QSO with on the input frequency of the repeater.

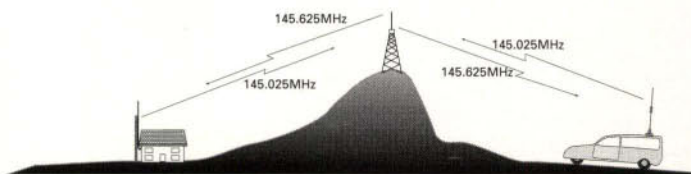
Most modern rigs have the 'check input' as a standard feature so it's very easy to do. If the other station is a good signal then you should move to a simplex frequency leaving the repeater free for those that really need it.

Finally, a word for the repeater groups. Repeaters don't just magically appear on the air, they are built and financed by ordinary (or extra-ordinary) amateurs.

The repeater groups are usually a small band of local enthusiasts that set-up and maintain the network of repeaters. It's important to note that this is completely voluntary work with all the equipment and site rent paid for by the repeater group. The key here is that they rely totally on donations from users to keep the repeaters going.

So, if you use repeaters please contact your local radio club or the RSGB to find the treasurer for the local repeater group and make a donation. Please treat a repeater with respect, there are plenty of others around who won't - don't join them.

Illustration showing how a repeater assists in extending the operating range of mobile and portable (using hand-helds) working.



That's it for this month, keep sending your letters, I'm always pleased to hear from you.

Elaine G4LFM

COMPETITION

Corner



Spot The Difference

Living in North Wales our cartoonist John GW3COI is in demand for making and fitting radio control kits to extend the range of sheep dogs, unfortunately now and then John crosses one or two wires!



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

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

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

Send your entry (photocopies acceptable with corner flash) to: **Spot The Difference Competition, January 1995, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.** Editor's decision on the winner is final and no correspondence will be entered into.

Entries to reach us by Friday 27 January 1995

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TM-251E	2M FM Compact Mobile Transceiver, 70cm Receiver, Packet connector, 50W	P.O.A.	D
TM-451E	70cm FM Compact Mobile Transceiver, 2M Receiver, Packet connector, 35W	P.O.A.	D
TM-551E	23cm FM Compact Mobile Transceiver, 70cm Receiver, Packet connector, 10W	P.O.A.	D
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Icom IC-251E 2m multimode base station	£585.00
Kenwood TS440 SAT HF transceiver with general coverage receive. Fitted with auto ATU, SSB filter and narrow CW filter. This unit is mint and as NEW	£1050.00

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FT-890AT	100W Compact HF All Mode Transceiver Built-in Automatic Antenna Tuner w/MH-188 Hand-held Microphone	P.O.A.	D
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IC-T21E	2m FM Hand Portable incl Nicad/Charger	P.O.A.	D
IC-275H	2m Transceiver, SSB/FM/CW, 100W 12v	P.O.A.	D
IC-281H	2m FM mobile, 50W 84 memo 12V	P.O.A.	D

430MHz

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

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IC-W21E	2m/70cm FM Hand Portable incl Nicad/Charger	P.O.A.	D
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IC-X21ET	70/23cm FM Handportable incl Nicad/Charger	P.O.A.	D
IC-2700H	2m/70cm FM mobile 50W/35W 120 memo 12V	P.O.A.	D
IC-820H	2M/70cm all mode Transceiver 45W/35W 12V	P.O.A.	D
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IC-R72E	General Coverage Receiver with Stand By Battery	P.O.A.	D
IC-R71E	General Coverage Receiver	P.O.A.	D
IC-R1	Handportable Receiver	P.O.A.	C

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History Of Bredhurst

The Bredhurst Receiving And Transmitting Society

was first formed in February 1982 under the name of the Bredhurst Breakers Club (BBC). The Club was best described as an up-market CB Radio Club, due mainly to its interest in the technical side of radio (CB) and the lectures.

Within a short period of time, the limitations of CB were realised by many of the members, and a steady progression into Amateur Radio and Short Wave Listening took place. To reflect this wider interest, the club also changed its name to The Bredhurst Receiving and Transmitting Society (BRATS).

The Society meets every Thursday at the Parkwood Community Centre, Parkwood Green, Gillingham, Kent with meetings commencing at 8.15pm. There are also outside activities such as special event stations, contest groups, JOTA and DF contests.

Once a month on the first Sunday, there is a club 'Net' on 145.375MHz where news and ideas are exchanged, all are welcome to join in!

For further information you can contact **Martin Pearson G7JBO** on (01634) 365980.

CLUB Spotlight

Club Logos

When sending in items for inclusion in 'Club Spotlight', if your club has a logo we would also appreciate a copy, so that it can be used when featuring your club. If there is a history behind your Club Logo we'd like to know about that as well.

Moved into a new club room? Won a contest? Got a funny story or news of a special event?

*Send your information to the 'Club Spotlight' newshounds
Donna Vincent and Zoë Shortland at the PW Offices.*

Top Class Radio

The **Mid Glamorgan Amateur Radio Group** recently set up an amateur radio station at Nantymoel Primary School in Mid Glamorgan. With the help of Headteacher **Mr Geoff Roberts**, they were able to demonstrate radio communication to the 'Top Class' at the school.

The special event call sign was **GB2NPS** (GB2 Nant Y Moel Primary School). With this special call sign, using a Trio 830 and a G5RV antenna, the children were able to get on the air, under supervision, and pass greetings to certain stations.

Contacts were made all over Europe and also a few more from the USA. The children were thrilled by this and are now awaiting QSL cards from the stations they contacted.

This special event tied in



Children from the Nant Y Moel Primary School operating GB2NPS under supervision.

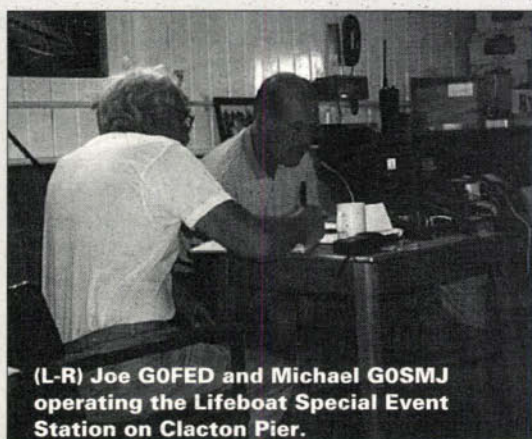
Lifeboats On The Air

'Club Spotlight' has recently received a letter from **Derek Jackson G7JTX** whose father, Michael Jackson (not the pop star!) **G0SMJ**, Secretary of the **Clacton Radio Club**, took part in the Lifeboats On The Air Special Event Station. Over the weekend of July 16 & 17th, radio amateurs from all over the UK set-up to take part in an event to raise money to buy a 'D' class lifeboat for the RNLI.

Walkers along Clacton Pier would have seen a 30m wire strung along the pier attached to the flag pole of the Lifeboat boathouse, like a redundant washing line! At Clacton and Walton on the Naze, the Clacton Radio Club's Chairman Arnold Haberman set-up a radio station at the lifeboat house at Walton. Secretary **Michael Jackson G0SMJ** also set up a radio station, but at the boat house on the pier at Clacton.

The task was to contact other lifeboat stations around the UK. If a minimum of 10 contacts were made, you qualified for an award. To claim the award, a donation is sent. This then creates a chain reaction throughout, hence a sizeable donation is received by the RNLI.

Various members of the Clacton Club took part and a very enjoyable time was had by all. To find out more about the events of Clacton Radio Club you can ring **Michael Jackson G0SMJ** on (01255) 815207.



(L-R) Joe G0FED and Michael G0SMJ operating the Lifeboat Special Event Station on Clacton Pier.

Chesham & District

The **Chesham & District Amateur Radio Society** have asked 'Club Spotlight' to remind readers that they meet on Wednesdays, 8.15pm in the ground floor meeting room at the White Hill Centre, Chesham. **Ian Clarke G0RTF** Chesham & District's Events Secretary has written with details of the clubs December events, which are A Christmas Lecture on the 14th and a Christmas Club Evening on the 21st.

New members are always welcome to the club and if you're interested in finding out more you should contact **Ian G0RTF** on (01494) 676391.

New Forest Special

For the first time ever in 1994 the New Forest Show, which is held over the weekend of July 26 - 28, went 'on-air' with the special event callsign **GBONFS**.

The GBONFS station was active on h.f. and v.h.f. from July 26 - 29th and was operated by members of the Bournemouth & District RAIBC Group together with guest operators. The Southern Scanning & Shortwave Exhibition Stand provided the location for GBONFS.



John GOSKR pictured on the key having made contact with ZL land whilst operating GBONFS.

Poldhu News

The **Poldhu Amateur Radio Club** have recently informed *PW* of some changes to their committee following the departure of Wally G4NBF and Liz G7JTO from the club. The newly appointed committee is as follows:

Chairman
Mr Davey-Thomas G3AGA
Vice Chairman
Barry Barrett G3KDD
Secretary
Carolyn Rule G1ZPC
Treasurer
Peter Cole G1IXP

Carolyn G1ZPC reports that the Poldhu club is thriving and have many interesting activities

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

lined up for 1995. They meet on Tuesdays and Fridays at 8pm in their club house, which is situated on the Lizard Peninsula overlooking Poldhu cove and have a club net on 3.5MHz.

On a sadder note G1ZPC passes on the news of the sudden death of **Dennis (John) Treloar G0FLF**. Dennis was one of the founder members of Poldhu ARC and will be sadly missed by all associated with the club.

If you would like to join in with the activities of the Poldhu Club you can call **(01326) 290638** for more information.

PW SUBS CLUB

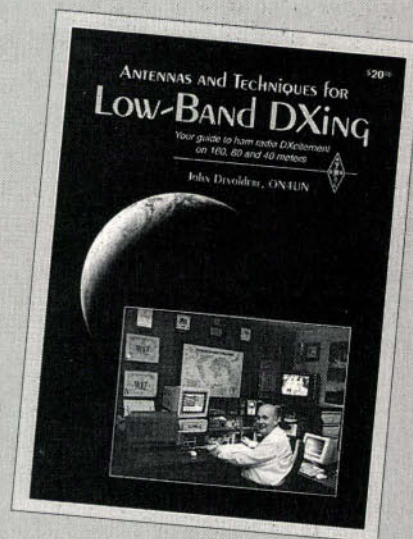
Be sure of your copy of Practical Wireless every month and qualify for our Subscribers' Club as well. Special offers and discounts are normally available to members, including those abroad.

Our special offer for *PW* Subscribers' Club Members this month is an unusual book which will be of particular interest to our many 1.8, 3.5 and 7MHz operators. Entitled *Antennas And Techniques For Low-Band DXing*, this ARRL title is in fact a 'handbook' on low h.f. operations.

Written by John Devoldere ON4UN, the book is packed with information on antennas and operating tips for 'Top Band to Forty' fans. Of particular interest to many readers will be the section dealing with 'large loops' (especially when you've read the article 'Top Band Forever' in this issue of *PW*).

The author starts off with a chapter dealing with low band propagation, then leads on to operating techniques and equipment. For the computer minded there's also an interesting chapter on the newly available Low Band software. Other sections in this interesting book are: antennas, feed line and antennas, special receiving antennas, dipoles, verticals, large loops, vertical arrays, other arrays, yagis and cubical-quads for the low bands. He rounds off with a literature review.

All in all, this book will please the 'low band' specialists and provide good reading (with many practical ideas) for anyone starting off on the bands.



Isn't it time you became a member of the Practical Wireless Subscribers' Club and had your favourite magazine delivered direct to your door?

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	\$45 (USA)

Normal price for *Antennas and Techniques For Low-Band DXing* is £15.50 including P&P (UK), £16.25 including P&P (overseas) but Subscribers' Club members can get their copy for **£12.50 including P&P (UK), £13.25 including P&P (overseas)**.

However, if you're not a member of the *PW* Subs Club why not take out a subscription now - get the magazine delivered straight to your door, save money on *PW* and save on the special offers we have for Subs Club Members!

To take advantage of this offer just fill in the coupon on page 68 of this issue and send it together with payment to **PW Publishing, FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**. Alternatively call our Credit Card Hotline on **(01202) 659930** to place your order.

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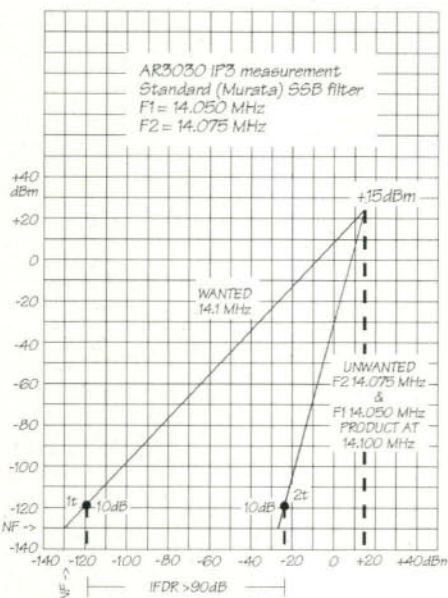
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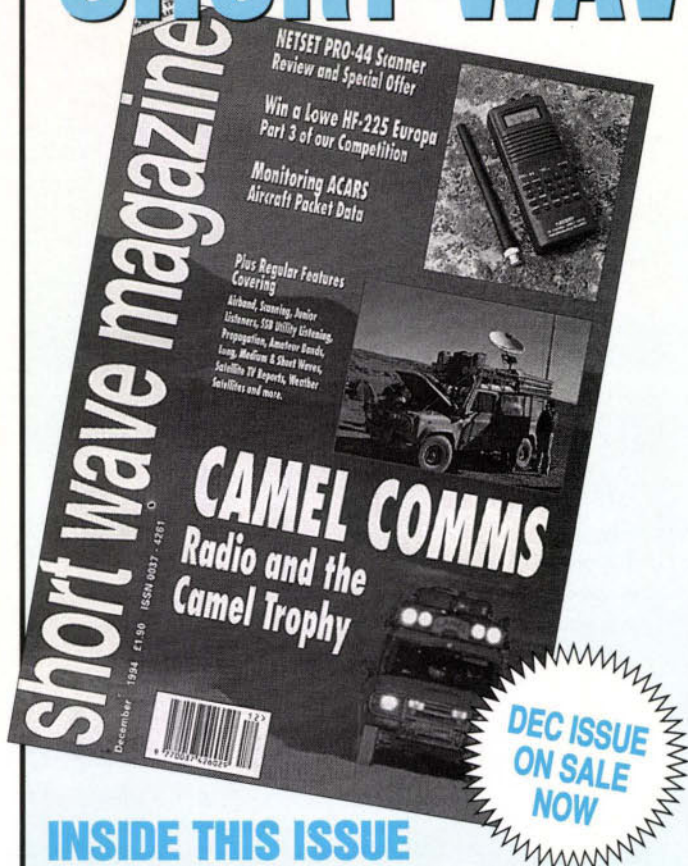
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ECF92	3.00	OD3	2.50	3828	20.00	6F07	7.50	813	27.50
ECF93	3.50	PCF80	2.00	4CX250B STC	55.00	6GK6	4.00	833A	85.00
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Two books of particular interest to the short wave enthusiast that have been recently updated are the *Short Wave International Frequency Handbook* and the *UK Scanning Directory New 4th Edition*.

The *Short Wave International Frequency Handbook* compiled by Bill Laver is now in its second edition and contains 188 pages packed with chapters containing information on everything from the basics of short wave listening to explaining FAX and RTTY. The main section of the book is of course the comprehensive list of radio frequencies ranging from 400kHz - 30MHz.

The updated edition of the *Short Wave International Frequency Handbook* includes many new broadcast and utility stations as well as some unidentified stations that are thought to broadcast regularly, despite the lack of information. 'The Country List Of Radio Callsign Prefixes' has also been updated and offers many new and revised callsigns.

If you want a book that will give you a good idea of where to listen for those stations of particular interest then the *Short Wave International Frequency Handbook* will make a welcome addition to your bookshelf. This book is available from the Short Wave Magazine Book Service for **£12.95 plus £1 P&P (UK), £1.75 P&P (overseas)**.

The *UK Scanning Directory New 4th Edition* is another publication, available from the Short Wave Magazine Book Service, that no short wave listener should be without. This new edition is spiral bound and contains 335 pages packed with over 20 000 spot frequencies ranging from the 25MHz right up to the 1.6GHz band.

Each page of the *UK Scanning Directory* is set out in five columns under the following headings: Base frequency, Mobile frequency, Mode, Location, User and notes. There is also a list of abbreviations and terms used throughout the book.

A copy of *The UK Scanning Directory New 4th Edition* will cost you **£17.50 plus £1 P&P (UK), £1.75 P&P (overseas)** from the SWM Book Service.

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TH79E - Small wonder!

The new Kenwood TH79E has been with us for a month or so now and what a winner it is proving to be. Just how do they fit so much into such a small space! I'm sure my first mobile radio had a bigger microphone! Many of the features of the TH79E are hidden away, not even revealed in the manual but trust Lowe to take care of that for you. Everyone buying a TH79E from any branch of Lowe Electronics or by mail will get absolutely free of charge our wonderful booklet *The secret life of the TH79E*, detailing all the modifications and hidden functions in this marvellous little transceiver.

We have the power



The Manson is back! We've increased our orders once again for these superb power supplies but you just keep on buying them! Sorry to keep so many of you waiting. If you don't yet know what all the fuss is about check this out! The EP925 is a variable voltage PSU that gives a continuous 25A current, peaking on 30A. Twin meters give you current and voltage readout and the thermostatically controlled fan keeps things cool, ideal for powering any of today's HF transceivers. When you check out the price of a matching power supply for your rig, you'll see just what great value it is at just £99.95.

If you don't need all that power then the EP815 may be the one for you. Case size and style is the same as the EP925 but without the metering. Output is 13.8V at up to 15A, just right if you use your mobile radio at home. Ideal too for running all your shack accessories, like your Packet or GTOR equipment, backlighting your Diamond SWR meters or even a stand alone transverter or VHF linear amplifier. Like its big brother it is superb value for money and you get change from seventy quid!

New!

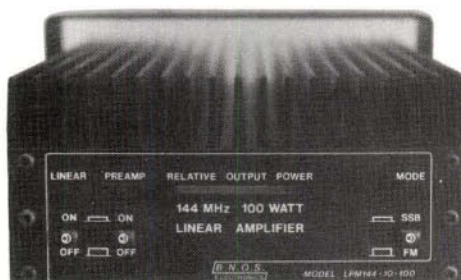
Half catalogue, half price list - why not get your copy of our new CataList! Just send us four first class stamps and we'll send you one by return. Crammed full of interesting new products and some good old favourites as well.

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If you'd like all the secrets of the top Dxers, we've a great book written by the experts themselves. It's called the VHF UHF DX Book and contains chapters on propagation, antennas, transceivers, transverters, linears, pre-amps, accessories and most importantly, the techniques you should use to get the most out of VHF and UHF operating. Its bang up to date.

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Check out Kenwood's twin FM transceivers - The TM251E puts you straight on to 2m or the TM451E for 70cms. Both run more than enough power to get you right into the network and feature dedicated data ports tailored to the needs of high speed packet.



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The new Kantronics KPC9612 is fast becoming the new standard in TNCs and when you see what it can do you'll know why! This is the only dual speed, dual port TNC on the market. It will let you connect two transceivers to it

for working on two bands, or two frequencies on the same band if you prefer. One port is 1200 baud and the other can be configured to 4800, 9600 or 19k2 as standard! If you are already on Packet, imagine doing what you are doing already but eight times faster! With many new 9600 baud user ports fast becoming available on many BBS's this is the way forward! The new KPC9612 is available direct from Lowe Electronics, the Kantronics distributor - who better to buy from! If you want a complete package, we can supply you with everything from the power supply to the antenna and all the bits in between, including all the interconnecting leads. We can't supply the computer but we've got some great software we can offer! Ask now if you are considering upgrading, we're doing super deals on trade-ins and some great package deals on complete 9600 baud stations. Don't miss out!

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New V7.1 upgrades for KAMPLUS and KAM Expansion Boards

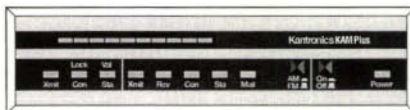
That's right the new V7.1 upgrades are available at last, promising new, easy functionality of all TOR modes, including AMTOR, PACTOR and the ever growing GTOR. The upgrade allows identical changeover commands for all three modes and uses the same mark and space tones and introduces TOR Standby.

TOR standby allows access to your mailbox in any of the three modes and allows other stations to link to you in AMTOR, PACTOR or GTOR automatically. The mode in which you are linked is displayed in the linked message on your screen.

The KAMPLUS is available now with all the new features but if you have an older KAM you can still upgrade via the KAM Expansion board.

Finally, you may be interested to know that there is now a book about GTOR.

Called GTOR: The New Mode, it is nearly 100 pages of collected published articles and a full description of the GTOR protocol - just the thing for the more inquisitive who likes to know what is going on in the background or those that really like to know their subject!



KAMPLUS £399.00 KAM Expansion Board £95.00 V7.1 Upgrade £35.00 GTOR: The New Mode £15.95

Lowe takes away the pain of mobile operating!

These days so many cars are just not conducive to operating mobile! Fewer and fewer places to mount a radio and when you do find someplace, someone breaks in and nicks it! Many people today are using handhelds in their vehicles which presents two problems - how do you operate it safely and where do you put it? Trust Lowe to solve the problem!

The QS200 is a superb little gizmo that everyone will want to buy for two reasons - it is so good and it is also so inexpensive! Just look at the picture. The QS200 holds the radio in a convenient place on the dash where you can still see the display and operate the major controls be it a handheld transceiver or a scanner. The QS200 mounts into the vents of your car dashboard with no drilling or cutting and your handheld just slots into it using its belt clip - fits in seconds and you can remove your handheld just as fast when you want to take it from the car - beats any quick release mount! Get one now while stocks last!



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MISSISSIPPI SIGNALS

- The MFJ-784 Digital Signal Processing Filter

Ed Taylor G3SQX looks at a digital processing filter system from the USA where the electronics really 'gets its finger out' to sort out reception on the crowded amateur bands.



It seems only yesterday that I was testing the W9GR Audio Filter for *PW*. But when I checked...it was actually in the April 1994 issue.

The idea of Digital Signal Processing (DSP) was then just moving from theoretical possibility into practical reality. Several filters became available, albeit at fairly high prices.

Facilities in the W9GR unit were adequate, although (in retrospect) it became clear that it was a 'first generation' model, and better filters would be close behind. What I was not expecting was the speed at which development would take place.

Given that my initial contact with DSP was a little disappointing, I was prepared to be underwhelmed by Mississippi-based MFJ's offering. In fact, I can report that this latest filter has performed extremely well - the initial promise of DSP is now starting to be fulfilled.

Digital Processing

As its name implies, Digital Signal Processing has something in common with the technology which has given us computers and packet radio. At the heart of the MFJ-784 filter is a processor on a chip.

Audio signals from the speaker output are fed into the MFJ-784, where they are converted into a stream of binary digits. In this way the signal becomes numeric in form, and all sorts of interesting manipulations can be carried out.

In digital form the audio is operated upon mathematically. In this way, undesirable characteristics are removed, and wanted characteristics are enhanced. The binary (or mathematical or digital) signal is then converted back to analogue form so that the binary values become audio again.

To perform DSP successfully, the circuitry needs to be fast in operation. Otherwise the audio output which eventually appears is delayed (in other words without high speed 'real-time' processing is impossible).

It's also desirable that the chips which do the work are reasonably small, so that the resulting

filters are not too bulky. However, until recently, it was difficult to get this combination of power and size at a reasonable price.

When the unit arrived, my impression was that the appearance of the MFJ-784 is not likely to win any design prizes. It has a workmanlike metal box with operations indicated in black. But, it was time to try it out for real!

Impressive In Use

However, first impressions can be deceptive! The front panel seemed more impressive after a few minutes in use. There are many functions, and they are not hard to understand thanks to the instruction manual.

The filter needs 12V (or thereabouts), and the main sockets on the back are for audio input and output. There's also a socket for data modes, so you can connect directly to a Terminal Node Controller (for packet radio).

I was pleased that both loudspeaker and headphone sockets were located on the back panel rather than the front. Despite this, it would be convenient to be able to change from headphones to loudspeaker without having to push a jack in or out (with a switch).

The main functions of the MFJ-784 are: It provides 'brick-walls' at any two user-defined audio frequencies, so that all signals outside these frequencies are eliminated.

It also notches out interfering heterodynes, either automatically or under manual control and reduces the noise level on any signal.

The MFJ-784 can also store customised filter settings. This is in addition to the unit providing several pre-set options itself.

The term 'brick wall filters' is quite accurate. You set up the two frequencies that form the filter edges, and you really don't hear anything outside these limits - they really are as effective as brick walls!

By the standards radio amateurs are accustomed to in analogue filters (such as those in most transceiver pass band controls), the effect is startling. It's almost disconcerting!

Looking at the specification explains why the

filters are so effective. There's 50-60dB of attenuation for signals outside the brick wall.

The attenuation provided corresponds to approximately 9 S-points. This means that even a loud interfering signal will be reduced to below the audible noise floor. As long as the interference is not directly on the frequency of interest, you have a very good chance of removing it.

Capabilities Remarkable

The band-pass capabilities of the MFJ-784 are remarkable. They can be used in two main ways.

The first method is by selecting lower and upper cut-off frequencies, and the second by setting bandwidth and a centre frequency. The adjustment is done with a **Filters** switch and two knobs which control frequency settings.

On s.s.b., I found the **LRHR** filter more useful than the unit's **SSB** filter. In **LRHR** mode, you adjust the **Low Reject** with one knob, and **High Reject** independently with the other. This means that the cut-off for low frequency interference can be changed without reference to the high frequency cut-off, and vice versa.

So, if you are listening quietly to a station, and someone starts interfering at high audio frequencies (for example), you can reduce this QRM without affecting the lower cut-off.

In **SSB** mode, you select the bandwidth and the centre frequency. I found this to be less intuitive than expected, but other operators might feel differently. You're certain to find that one of the **LRHR** or **SSB** options suits you.

Select Frequency

When using c.w., it's customary to select the audio frequency at which you prefer to listen. This could be perhaps 750Hz, starting off with a filter 800Hz wide, for example.

The choice I've mentioned means that your pass band is 350 - 1150Hz. If interference occurs, you might then reduce the bandwidth to 300Hz, so that your pass band is now 600 - 900Hz.

I found the MFJ-784 to be excellent in the CW position, where it could separate signals as close as 50Hz. Usage corresponds closely to the way that c.w. operators think.

The maximum bandwidth of the MFJ unit on c.w. is 700Hz, which is rather low. But the same facilities are available from the BP (Band-pass Position), with a bandwidth up to 2100Hz. This gives plenty of choice.

There are facilities in the MFJ-784 for setting up two band-pass filters independently. This could be useful for any future (as yet undefined) modes.

In addition, there are preset options for filtering RTTY, h.f. Packet, AMTOR, PACTOR and SSTV/FAX, with (internal) jumper selectable frequency shifts. There is a wide range of possibilities.

Notch operation is available on the MFJ-784DSP, as well as the filter options already mentioned. With **Automatic** selected, interfering heterodynes are detected and eliminated almost instantaneously.

The **Automatic** facility is impressive, particularly since four whistles can be coped with simultaneously. The impolite people who tune up without checking, or who swish around on your frequency will no longer trouble you!

The **Manual Notch** selection provides a method of doing the same thing as that provided by **Automatic**, but under front-panel control. This might be suitable for a persistent carrier, or for c.w. operation next to a continuous signal.

I found the noise reduction facility on the filter to be very good. There's an immediate reduction in background noise on s.s.b. signals.

Weaker stations also become more readable, and ignition-type interference is much reduced. A little harshness is introduced as a result, but readability is generally increased.

The noise reduction level control operates in a similar fashion to that of a conventional noise limiter. But there's more scope for interference elimination.

The manual warns against causing distortion by setting the audio input level too high. This is particularly noticeable with **Noise Reduction** selected.

Storing Positions

As well as the variable filters, which can be obtained from adjusting the controls mentioned, the MFJ-784 has a facility for storing ten user-defined filter positions.

What happens is that any time you are using a combination of values which you find useful, you can store the settings. You can then get them back whenever conditions seem to require the same filtering.

The storage facility means you can decide on a bandwidth, centre frequency and other options which you often use. You can recover them at any time simply by switching to **Custom** mode with the appropriate pre-set number.

On s.s.b., I found it convenient to set-up a bandwidth corresponding roughly to the minimum which could realistically be used while still maintaining intelligibility. If a signal was unreadable after switching to this position, it was likely that it was never going to be readable at all!

When operating c.w., I defined several pre-

Manufacturer's Specifications

Filters (attenuation)	
Low reject/high reject:	60dB at 74Hz outside passband (s.s.b.)
Band Pass:	Two band Pass 50dB at 60Hz outside passband (c.w.)
Manual notch:	40dB at 90Hz outside passband
Auto notch:	Up to 50dB
Random noise:	Up to 20dB
Power requirement:	10 - 16V d.c., 350mA
Audio output power:	1.2W into 8Ω
Dimensions:	232 x 150 x 59mm
Weight:	1.20kg

sets with bandwidth decreasing for each one. The wider selectivity was useful when first copying a station. By switching quickly to a much narrower position, I could maintain readability even when QRM later appeared close by.

The pre-set facility is a winner when working DX or in a contest. A carefully chosen set of parameters for s.s.b. and c.w. make it very easy to get the last ounce out of a signal, with little possibility for error.

The procedure for programming the ten custom settings had to be followed carefully. But it became second nature after a short time.

One of the chosen settings would be the right place to store frequencies for a mode which was new or experimental. There's certainly a lot to be said for a system in which filtering can be done in software rather than hardware.

Designers Listening

It soon became apparent to me that the MFJ designers have been listening to amateurs who used the first batch of DSP filters. Some of the less desirable aspects have been eliminated, and facilities have clearly been introduced to overcome practical perceived problems.

One of the problems I came across occurred on c.w. If the station you were listening to was not on the same frequency as the monitoring sidetone, and your bandwidth was set narrow, you could not hear your own c.w. This made it difficult to send!

The MFJ designers have solved this problem by allowing a connection to the transceiver's transmit push-to-talk (p.t.t.) line. This works well, but may not be possible with all radios.

An alternative to the p.t.t. approach, selected by jumper inside the filter, allows a fixed audio frequency to pass through the filter regardless of the front-panel settings (but in the c.w. mode only). This is not such a good solution, but one or other of these methods should cover all eventualities.

But, the designers still have a little more work to do! I think the audio output power on the MFJ-784DSP is slightly meagre into an 8Ω speaker, and it's easy to distort.

I would like to see 3 or 4W of audio available, if possible. However, the level of audio going into the headphone socket ought to be attenuated - a comfortable level on the

speaker becomes unbearably loud when headphones are plugged in!

Automatic Gain Control

The MFJ-784's internal automatic gain control (a.g.c.) can be disconcerting in use. It tends to make all signals sound similar, which runs counter to intuition, especially on c.w.

Of course, the a.g.c. facility can be switched off. This was the way I preferred it.

Thumbs Up

I give the MFJ-784DSP the 'thumbs up'. Sometimes I wish I could keep the equipment I've reviewed, sometimes I'm not bothered but in the case of the MFJ-784 I would like to keep it!

The 16-bit quantisation on the MFJ filter is a big improvement on the 8-bit predecessors. The facilities are good, well thought out, and ergonomically sensible. I particularly liked the **Custom** filters, and the handling of c.w. sidetone.

The MFJ-784 is going to find a deservedly welcome place in many shacks. It's not cheap, but for a serious DXer or contester it would be a good investment. It could make the difference between 'station worked' or 'the one that got away'.

My thanks for the loan of the review unit go to Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, Tel. (01702) 206835/204965, FAX (01702) 205843, who can supply the MFJ-784DSP for £249. PW

After seeing a copy of the G3SQX review, Jeff Stanton G6XYU of Waters & Stanton sent us the following comment:

I was very interested to read Ed Taylor's comments about the new MFJ-784 Digital Speech Processor. I've passed his comments about the relatively low audio output to speaker and the need to attenuate the levels at the headphone socket back to MFJ's technical department who hope to incorporate these simple modifications into future production.

Jeff Stanton G6XYU

KITS & HOMEBREW

BUILDING ON EXPERIENCE

Rob Mannion G3XFD has enjoyed radio kit building for many years. Rob's taken a little time away from the Editorial desk to introduce our kit and home-brew theme and pass on some advice to encourage you to build on your foundation of radio knowledge - by tackling some home-brew projects.

I think my enjoyment of kits and kit building go back to my interest in boxes, and I've always had a fascination for boxes...whatever shape or size they come in. And, after thinking about it it's obvious that the interest in boxes goes back to my schooldays just after the Second World War when everything - especially packaging - was in short supply.

In reality, boxing up the finished radio project was often the first or last item to be considered! Sometimes I would find a delightful box and think of something to build into it, or I'd get carried away and build another project and find that it was extremely difficult to make a box or case to provide an attractive finish. That's not a problem with most kits fortunately.

Tremendous Fun

Over the years I've built many kits, had tremendous fun and learned a great deal. In fact I can honestly say that the sense of satisfaction from completing a kit...was that I was able to be very proud of the finished result.

So, why don't you 'build on experience' and provide yourself with a firmer foundation for your radio hobby? It doesn't matter whether or not you're building a dip meter, crystal calibration unit, transceiver or receiver - you will have built it yourself and you can be assured that your project will have a professional look without you having to pay a 'professional' price!

To help you decide what to try, in our kit and home-brew special this month we've got an interesting article with a novel approach on kit building from Clive Hardy G4SLU, a specially commissioned 1.8MHz project from George Dobbs G3RJV and a review by Peter Barville G3XJS of a new transceiver kit from the USA and lots more to keep you busy for a while.

Good luck and good kit building and home-brewing!

G3XFD

KITS & BITS

- BUILDING YOUR HOBBY

Now that the long winter evenings are here Clive Hardy G4SLU takes a look at just what can be achieved with some of the kits on the market.

Winter is traditionally the season for construction in the radio amateur calendar. Now that the long dark evenings are well and truly upon us, it's the ideal time for building a kit or two.

Those who have built kits before know that it can be great fun, providing education and hands-on experience. They can be 'stepping stones' to greater achievements and so on!

But when deciding to build a kit, in what order do you look at the options? Do you casually look through the catalogues, find a kit you think you could build and then find a use for it?

Or do you decide what equipment you want and then look for a kit to fit the bill? Why build kits in the first place? Is it to save money? Not always.

The bulk buying and mass production capability of 'black box' manufacturers puts them at an advantage over kit suppliers. So, is the idea behind the kit building to obtain equipment unavailable from black box manufacturers? Certainly in the minority interest areas of amateur radio this is true. Amateur television (ATV) and low power (QRP) operating are just two examples.

Radio amateurs with specialist interests, such as ATV and QRP almost always have to build kits for their needs. The kits may be sophisticated or simple and some contain every part necessary to build the finished article.

Other kits are little more than a printed circuit board and a parts list. Simple kits like these really are only one step away from home-brew!



There's a good choice of kits on the market.

The Satisfaction

For most of us, the main reason for building kits must be for the satisfaction it brings. From my own experience I know it's always pleasing when something you have built bursts into life when put to the test.

Kit building also fulfils the self-training aspect of the amateur radio licence and I think there's no better way of learning than by 'doing'. It's surprising what results can be obtained from even the simplest circuits.

Having decided to enter the world of kit building, where do you start? Simple test gear is ideal. Dummy loads, v.s.w.r. bridges, audio filters, for example, are available from several manufacturers.

If you're a first time builder, look for those manufacturers who supply all the parts to finish a kit, including the case and front panel. For the more ambitious, what other kits are available?

Scanning the kit catalogues it's pretty apparent that

QRP/c.w./h.f. enthusiasts are well catered for. Direct conversion receivers and c.w. transmitters abound.

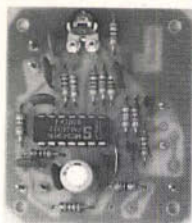
But what about kits for those of us who are left stone cold by Morse? What about Novices and B licence holders? It's in these areas where the choice starts to get a bit thin.

Kits Available

To get an idea of the different standards of the many kits available today I built 10 kits from seven manufacturers. In order to have a reason to select the kits, each one was chosen as a building block in a 50MHz s.s.b./c.w. transceiver.

The end product might not be the best transceiver about, but I needed some basis for choosing the kits to build. Some kits were quite simple, but others were somewhat more complex.

Although the quality of the components in all the kits was similar, the big difference that I noticed in the kits was the quality of the instructions.



Jandek mixer

Some instructions were excellent, but others made me wonder how many of those kits actually got built.

The 50MHz project was built in the open 'chassis' style onto a piece of p.c.b. material with front and rear panels soldered to it. It formed a sort of 'half box' assembly.

I adopted the p.c.b. 'chassis' method because the transceiver was not intended as a project for anyone to reproduce exactly. It was intended to be an indication of what can be done with kits. Better performance may well be obtainable with different kits.

Although I have described building specific kits, I have to assume that other kits from the manufacturers are of a similar standard to those I have built. Hopefully that's the case, and my article will give some indication of what to expect when buying other kits from those manufacturers.

Cirkit Audio Amplifier

Starting with what I thought would be the easiest, the first kit I built was the **Cirkit 5W Audio Amplifier**. Cirkit is a large company, and many amateurs in the UK will be familiar with their products.

Quite a number of Cirkit's products are designed for the amateur radio market. The audio amplifier, having less than 25 parts, took me only 15 minutes to construct.

Screen printing of the audio amplifier's p.c.b. made

component positioning easy. All the instructions and information are on one double-sided piece of A4. No problems were encountered during the construction.

However, the project is described by Cirkit as suitable for newcomers to the hobby, but a newcomer could struggle to build it. Why? For a student-rated kit it lacked any component identification information.

Component identification is just the area where newcomers have problems. Without knowing the resistor colour code it wouldn't be possible to build this kit.

Strangely, another similar size kit from the same manufacture, that I built a few years ago had plenty of



Kanga changeover board

construction guidance and component identification information. Perhaps the audio amp kit slipped through the net?

However, I'm pleased to report that the amplifier works fine, although I had to file bits out of the heatsink because it obstructed the p.c.b. mounting holes. The completed project is used in the receiver side of the 50MHz project to drive the loudspeaker.

Maplin Microphone Amplifier

Maplin Electronics is probably the most well known of the kit manufacturers and I built their **Microphone Pre-amplifier with a.g.c.** This company's catalogue is a familiar sight on

newsagents' shelves in the UK and they also have an outlet in South Africa.

Although Maplin has a large range of kits, only a minority of them are amateur radio related. The microphone pre-amplifier kit is very slightly more complex than the Cirkit audio amplifier kit, but similar in size.

The p.c.b. is screen printed. It took me almost 20 minutes to complete the board. The pre-amplifier kit includes an electret microphone and this is used in the transmit side of the radio to provide sufficient audio input to the transmit mixer.

The instructions for this kit are extremely comprehensive. A Data File consists of five sides of A4 and is augmented by a ten A5-sized page constructor's guide.

Every Maplin kit includes the constructors' guide which has advice on soldering, component fitting, and identification. It's very useful.

Originally, I intended to fit the pre-amp into the 50MHz project, but I found that the board lacks mounting holes as it's intended to fit into a microphone.

I got around the problem with some minor bodging that is best left undescribed! Despite having to use a longer cable to run between the microphone and the pre-amplifier than recommended, I managed to fit it inside the radio. No problems came to light!

Jandek Kits

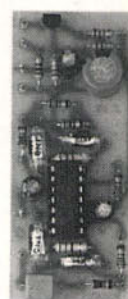
Having built two projects from large manufacturers I moved to one from Jandek Kits, a much smaller company. In fact the company is now so small as to be non-existent (see the news pages in this issue for more details).

After seven years operation Jandek stopped trading in September 1994, just before I had built the kits. Derek Pearson G3ZOM, the proprietor, has put Jandek 'on ice' for at least three years.

However, it may be that parts of the kits will be available from another source. It would be a shame to lose the kits completely.

The Jandek Carrier

Lake Electronics AF2



Insertion Oscillator is simply two crystal oscillators with a buffer amplifier. It's used in part of my 50MHz project in the transmit and or receiver chain to select the wanted sideband.

The board for the Jandek project is single-sided. What I noticed first was that the kit included the mounting hardware, which I think is a good idea.

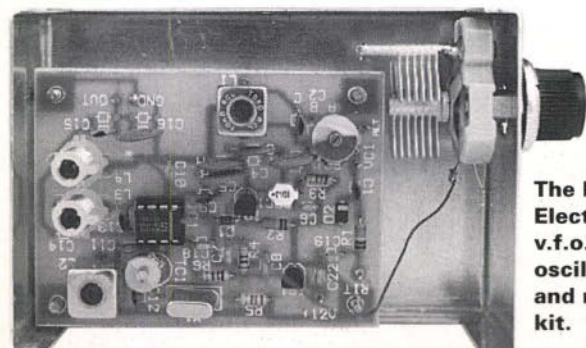
The hardware, consisting of the stand-offs and screws, has to be bought, so why not include it in the kit? It saves a lot of trouble.

The carrier insertion oscillator kit has instructions and information on three sides of A4. No component identification is given, but this is **not** the sort of kit a total newcomer is likely to build. The catalogue states that a knowledge of soldering techniques and the ability to recognise electronic components is assumed.

The board is not screen printed so component layout is shown by a drawing in the instructions. The board is single sided and the track pattern can easily be seen through the board.

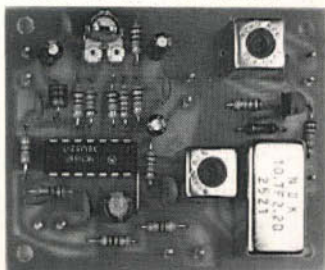
It would help component placing if the track pattern seen through the board was shown. This could be in half tone perhaps, on the layout in the instructions.

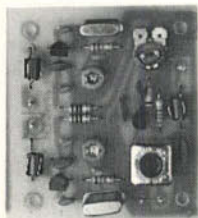
The difficulty of finding the location of components on an unmarked p.c.b. grow with the size of the board. Not a



The Hands Electronics v.f.o., crystal oscillator and mixer kit.

Jandek mixer with filter





**Jandek
carrier
insertion
oscillator**

particular problem for Jandek who specialise in small building block modules.

At h.f., complete transceivers can be built from the Jandek modules. Setting up the unit by following the instructions was quite straightforward.

I also built a couple of other Jandek kits, both mixers using the MC1496 i.c. One of the kits has a crystal filter and this was used in the transmit line of the radio.

The other Jandek project was used in the receive side. All of the kits worked first time and let's hope the Jandek range isn't gone for good.

Howes Practice Oscillator

The **Howes Morse Code Practice Oscillator** is the only stand-alone kit that I built. The project is fitted in a Howes case.

In my opinion the Howes project is a kit that a first time builder could tackle with confidence. Dave Howes has a reputation for supplying good instructions with his range of kits and it's a well earned reputation.

The instructions with the Morse code kit contained all the information required, right

down to what tools are needed. The instructions, which are on a total of six sides of A4, have useful line drawings to help with component identification and fitting.

They also clearly show how to wire the board to the sockets and controls.

Component positions are screen printed on the single sided p.c.b.

The case available for the kit is made of a good thickness of aluminium. With the case comes all the parts to fix the board into the housing.

Sockets and a knob are included although connecting wire isn't. The stick-on front panel adds a professional finishing touch.

Provided only low power is used (25W or less), the oscillator can be connected to the feed line between transmitter and antenna. Mounted in this way it uses r.f. sensing to operate as a sidetone. The tone of the oscillator can be varied by means of variable pre-set resistor.

To generate c.w. in the radio I have taken an audio output from the top of the volume control. This is fed to the tip contact of a stereo jack socket on the rear of the box.

The audio is then input via a variable resistor to the MC1496 transmit mixer. The other two connections to the socket are to ground and to the key, via a diode, to activate transmit switching.

I also added a d.c. socket and a small internal speaker. Total building time, excluding



**Maplin
microphone
pre-amp**

painting the case, was about two hours.

Kanga Kits

Kanga are probably best known for their range of QRP kits. And, the **VFO Kit** I built is in the category of the 'we only supply the bits' type.

Reading the general description, (there are no instructions as such), I got the impression that I should have had detailed knowledge of the product before buying it. The version I built was the MkII v.f.o., so perhaps all the useful information came with the MkI?

Kanga supply a circuit diagram and parts list with the kit, and the p.c.b. is double-sided with no screen print. The only building aid is a large (not to scale) component diagram.

There are no part numbers on the Kanga kit for resistors, diodes, or capacitors on this diagram, only component values. Diode orientation isn't shown either but I eventually worked out that the cathode (line) end went into the holes with the top layer of copper etched away in a square, rather than the usual round p.c.b. 'pad'.

It took me a couple of hours to build the Kanga kit. It worked, but there's no information as to what coil and capacitor to use for the coverage required.

The **Kanga Changeover Board** is a small kit consisting of a transistor switched double-pole double-throw (d.p.d.t.) relay with an adjustable delay on a single sided p.c.b. It provides semi-break in capability for c.w. operation.

The delay on the changeover can be varied from about a second to a few milliseconds. According to the instructions, the delay can be over-ridden for normal p.t.t. operation, but there's no indication in the instructions as to how it's done. Apart from that, the kit worked as expected.

I used the Kanga changeover board to switch power between the receive

and transmit sides on the 50MHz project and to operate the antenna changeover relay. And for low power applications the on-board relay can be used for the antenna changeover.

I spoke to Dick Pascoe G0BPS on the topics raised by G4SLU on the Kanga kits. In reply Dick says he's already corrected the diode orientation problem and is always looking for ways of improving his products. He also appreciates the help and suggestion on possible improvements and modifications to kits and documentation by constructors. Editor.



**Cirkit
5W
audio
amp**

Hands Electronics Kits

The **Hands Electronics VHF MX** is a v.f.o., crystal oscillator and mixer. The output is around 40MHz for use with 50MHz equipment having a 10.7 or 9MHz intermediate frequency. For the frequency coverage I wanted with the crystal supplied the v.f.o. needed to cover 5.5 to 6MHz.

The instructions with the Hands kit are good, with useful advice on soldering and component identification and fitting. The kit p.c.b. is screen printed, which always helps.

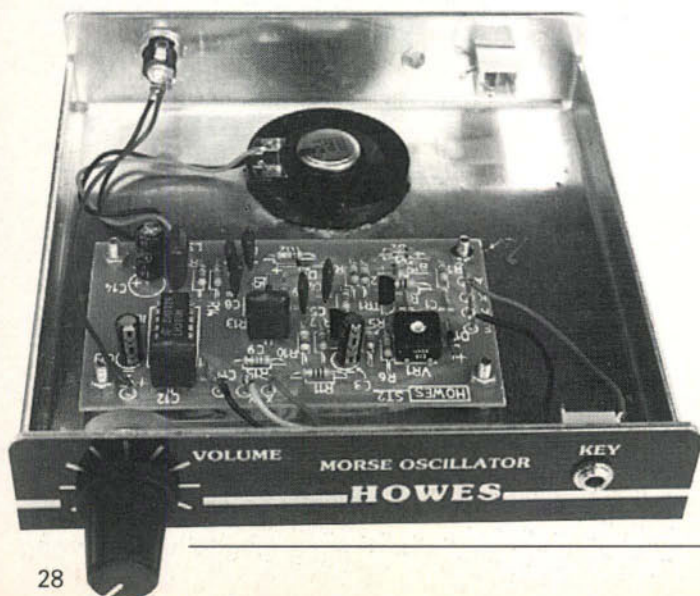
Assembling the kit was reasonably straightforward, but I found several problems. I discovered that a trimmer capacitor was missing and the wrong value radio frequency choke (r.f.c.) had been supplied.

I tried to use the r.f.c. supplied but it made the v.f.o. very unstable. Luckily I found a trimmer capacitor and a suitable r.f.c. in my junk box.

Whilst in the junk box I also located two screws to fit the Jackson air-spaced capacitor supplied with the kit. This is because it didn't have the expected nut fixing.

I also found the alignment instructions for the Hands v.f.o. are a little thin on information. For example, the instructions suggest fitting a trimmer

Clive G4SLU used the Howes Morse Oscillator Kit to provide sidetone for his project.



capacitor on the board to set the swing of the v.f.o., but there's no recommendations as to the value.

The space provided to fit the capacitor on the Hands kit is inadequate and I had to drill new holes for it in the p.c.b. To set-up the project, I used the 'trial and error' technique to obtain the v.f.o. coverage required.

With the v.f.o. operating satisfactorily, the crystal oscillator and mixer (a NE612) were set up. This turned out to be quite straightforward, and nowhere near as difficult as the instructions suggested.

The next Hands kit I built was a **50MHz Receiver 'front end'** and **3W Transmitter**. Transmitter input and receiver output to and from the board are at 10.7MHz.

The 50MHz project is designed to be used with other Hands kits, which is possibly why no information is given about what levels of input are required to obtain the 3W output. However, the board produced the output expected.

The Hands 50MHz kit is significantly larger and more complex than any of the others. There are 11 toroidal coils to wind and most are small (except for four), and the majority are trifilar wound. It took me the best part of four hours to wind all of the inductors. The coils were the major constructional part of the kit.

Fitting the remaining components was simply a

matter of following the instructions. Different types of components were supplied in separate labelled bags, which kept things tidy. The instructions were fine and like the v.f.o. kit, the p.c.b. was screen printed.

Other kits in the Hands' range are various sections of h.f. transceivers. Cases and front panels are also available and circuit diagrams of most of the kits are in the Hands catalogue. I think this sort of information being included in the catalogue is very helpful when you're considering purchasing a particular kit.

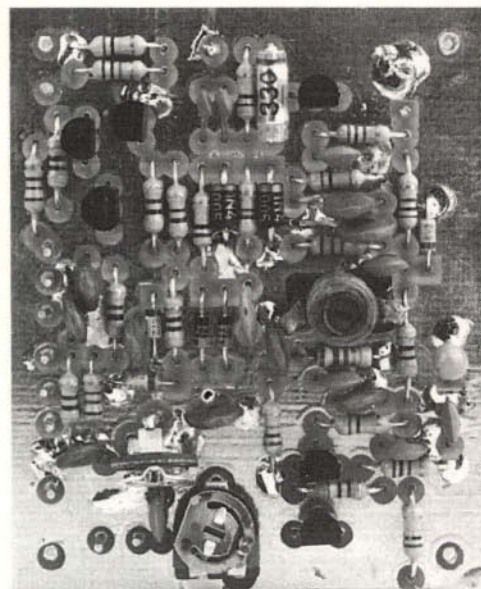
Lake Electronics

Lake Electronics is a small company whose kits are supplied with all the components needed to complete them. Alan Lake G4DVW says "right down to the last nut and bolt" in his adverts. Fascia panels for the cases are included, which means a neat looking end product.

I built the **Lake Electronics AF2 Audio Filter**, which is an active filter for c.w. use with a centre frequency of 800Hz. It can be used in line with the speaker output of a receiver, or in the a.f. line of a receiver between the gain control and the audio amplifier.

The only minor problem with fitting the filter inside a receiver is that there are no mounting holes in the p.c.b.

The completed Kanga v.f.o. board.



(which isn't screen-printed). Fortunately though, there's enough space to drill some.

Perhaps only by chance (but hopefully by G4VDW's design) the instructions for the AF2 were the only sample I found with the parts list and component layout on the same side of the paper. Not having to keep turning the page over, or look at another sheet of paper, made construction somewhat easier.

Building The Kits

I've enjoyed building the various kits, some more than others. However, please remember there are more kit manufacturers than those I have mentioned in this article.

Seeing kits from several manufacturers side by side it was interesting to make comparisons. And, from my experience I think some kit suppliers need to improve their documentation and provide better instructions.

It could be argued that anyone could build a kit with only the components, p.c.b. and a circuit diagram. Anyone with lots and lots of time, patience, self discipline, and motivation could, but few would. For the builder struggling with a kit at the edge of their capability every bit of help is useful.

To some kit manufacturers I would like to say **1:** Put as much information as possible in the instructions. **2:** Include more specifications for the kits in the catalogues. **3:** Don't rely on well stocked junk boxes. **4:**

And finally, although I know it costs money, **please** screen-print the p.c.b. However well practised or skilled at placing components the builder may be, screen printing makes life an awful lot easier!

If you haven't built a kit before, start by obtaining catalogues from the manufacturers. Look for their adverts in *PW*.

Choose a simple kit to start with. If you run into problems, seek help from another amateur. There are lots of them out there willing to help, so get soldering!

PW

My thanks go to the following companies for supplying the various kits

5W Audio Amplifier: Cirkut Distribution, Broxbourne, Hertfordshire EN10 7NQ. Tel: (01992) 444111.

Howes Morse Code Practice Oscillator: C. M. Howes Communications, Eydon, Daventry, Northamptonshire NN11 3PT. Tel: (01327) 60178.

Hands Electronics VHF MX, 50MHz Receiver Front End. Hands Electronics, Tegryn Llanfymach, Dyfed, Wales SA35 0BL. Tel: (01239) 77427.

Carrier Insertion Oscillator, & Two Mixer Kits Using MC1496 Integrated Circuits: Derek Pearson G3ZOM of Jandek (see text).

VFO Kit & Changeover Board: Kanga Products, Seaview House, Crete Road East, Folkestone, Kent CT18 7EG. Tel: (01303) 891106.

AF2 Audio Filter: Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: (0115) 938 2509.

Microphone Pre-amplifier With AGC: Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (01702) 554161.

No article about kit building today can ignore impending European Economic Community legislation. This may or may not be a dark cloud looming on the radio amateur's horizon. Regulations concerning EMC might have a drastic effect on the availability of many kits. It is possible that before any kit is sold it will require to have type approval of some sort. It may be that some kits fall outside of the regulations. The only certainty at present is that the situation is as clear as mud!

G4SLU

KITS & HOMEBREW

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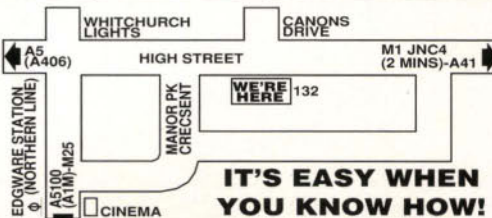
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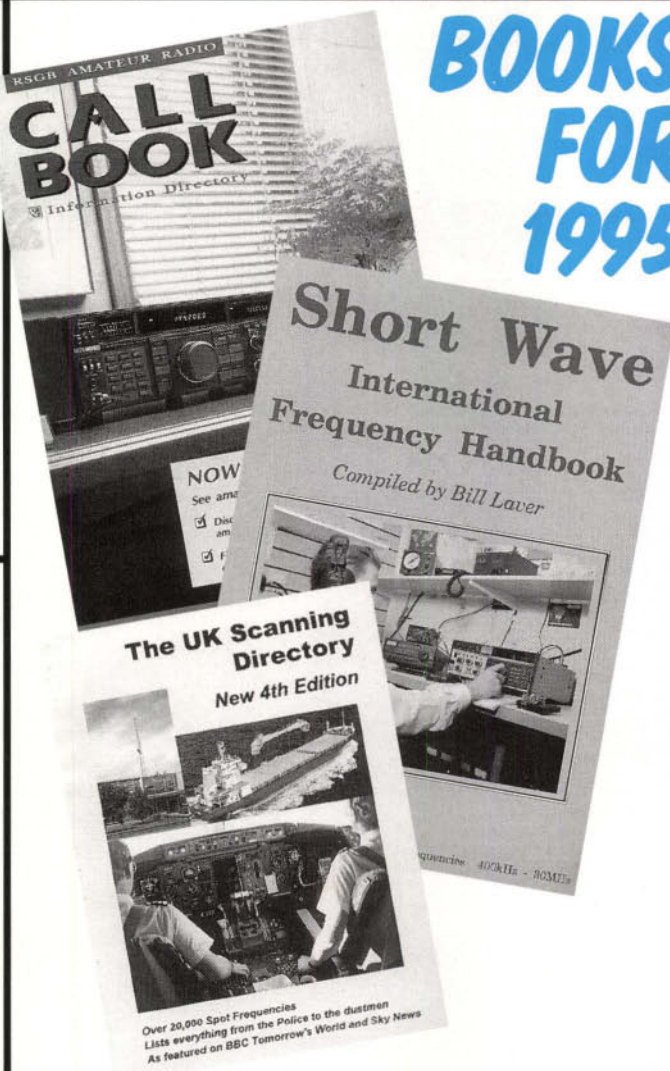
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KITS & HOMEBREW

Over recent years there has been a very pleasing increase in the number of suppliers offering kits for the home constructor interested in building QRP h.f. transceivers. These are usually single band c.w. rigs, with the simpler designs utilising a direct conversion receiver.

A relative newcomer to the British market is Oak Hills Research, from Michigan in the USA. They specialise in QRP equipment for the h.f. c.w. operator.

Oak Hills Research offer an impressive range of kits from the single band QRP Sprint transceiver, to a dual band rig with 5W output and superhet receiver. They also offer kits for a switched capacitor audio filter, QRP wattmeter and iambic keyer fitted with the Curtis keyer i.c.

The Oak Hills Research transceiver kits employ high component densities on double-sided printed circuit boards. They use plated-through holes, and are therefore not recommended for inexperienced constructors.

However, although the accessory kits are of sophisticated design, I think they are suitable for constructors looking to gain experience in advanced kit building. This is because these kits use fewer components.

The Sprint

The QRP Sprint is the cheapest transceiver in the Oak Hills Research range. It's available in versions for the 3.5, 7 or 10MHz bands.

A high performance direct conversion receiver is used in the Sprint, with a diode ring mixer, peaked audio filter and receiver incremental tuning (RIT). The v.f.o. has an 8:1 vernier dial and covers 100kHz of the chosen band.



As a keen QRP operator Peter Barville G3XJS was eager to chase after the new QRP Sprint Transceiver kit from the Oak Hills Research stables in the USA. Here's what he thinks of his latest catch....

HIGH PERFORMANCE SPRINTING

Unusually for a budget transceiver, the Sprint comes with a very good QSK (full break-in) circuit and sidetone oscillator. The transmitter is quoted at 1.5 - 2W output, current drain on receive 90mA, and 240mA on transmit (at 12V d.c.).

Oak Hills Research supply a painted and lettered case, and all other necessary components - nuts and bolts, alignment tools, etc. The inductors are all pre-wound, and minimal alignment is required.

A 10MHz frequency counter is useful for setting up the v.f.o., but it's by no means essential - another receiver covering the band will suffice if necessary. The four integrated circuits in the rig are mounted in holders.

Very Impressed

I built the 3.5MHz version of the Sprint, and was very impressed with the quality of the components supplied. The same applied to the screenprinted double-sided p.c.b.

The comprehensive instructions include a full parts list. There's also a blown-up diagram of the

component layout, and circuit diagram.

The introduction page contains very clear advice to be sure that the correct component is fitted in each board location **before soldering**. This is because (with the plated-through holes) it can be extremely difficult to remove a soldered component that has been incorrectly fitted.

The instructions, and clear screen-printing on the board, do everything possible to ensure you make no mistakes when you solder a component into place. So, if adequate care is taken at this stage then no problems should be encountered with construction of the rig. It should be one of those rare 'it worked first time' projects!

Low Power

Devotees of QRP (low power) operation will know that running just 1 or 2W of c.w. is not the handicap many others assume it will be. It's really not necessary to run 100W (or more) in order to enjoy successful operating on the bands!

The difference between 100 and 1W is 20dB. So, if

running 100W results in a report of S9+20dB (not at all unusual), then reducing power to 1W will still give an S9 signal.

I run QRP c.w. 99% of the time. I was therefore not surprised when some of the stations I worked with the Sprint gave me RST 599 reports.

I was pleasantly surprised, however, at the number of unsolicited complimentary remarks that were made about the Sprint's note. Their remarks confirmed what I was hearing in the monitor receiver, but the proof of the pudding is always what the station you are working hears!

Complimentary Comments

The complimentary comments included reference to the stability of the v.f.o. This was very good indeed, moving only (about) 400Hz in the first hour after switch on.

A direct conversion (d.c.) receiver suffers from one major disadvantage, when compared to a superhet design. This is because signals produce a double image in the receiver, one each side of the 'zero beat' tuning point.

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DCS2	S Meter for DC receivers	£10.90
TRF3	Shortwave Broadcast Rx	£15.50
MW1	160m & MW TRF Rx	£29.90
ASL5	Rx Audio Filter	£15.90
CTU8	SWL Antenna Tuning Unit	£29.90

Transmitters

CTX	QRP CW Tx for 80 or 40m	£15.50
MTX20	10W 20m CW Tx	£29.90
CVF	VFO for 80/40 or 20m	£11.90
HTX10	SSB/CW exciter 10/15m	£49.90
VF10	VFO for HTX10	£17.90
HPA10	10W PA 20-30MHz	£39.90
AT160	160+80m AM/DSB/CW Tx	£39.90
VF160	VFO for AT160	£17.90
CTU30	HF ATU 30w	£39.90

Antennae

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AA4	25-1300MHz Active Ant.	£19.90
AB118	Active Air Band Antenna	£18.80
SPA4	Rx Pre-amp 4-1300MHz	£15.90

Microphones

AP3	Auto. Speech Processor	£16.80
CM2	Microphone+VOGAD	£13.50
MA4	Mic. Amp + Filter	£6.20

Accessories

ST2	Sidetone/Morse AF Osc.	£9.80
XM1	Crystal Calibrator	£16.90
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DFD5	Digital Freq. Counter	£54.90
CBA2	Buffer for Counters	£5.90

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SPA4	Scanner Pre-amp, 4 to 1300MHz	£15.90

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AT160	80 & 160M AM/DSB/CW	£39.90
MTX20	20M 10W CW inc. crystal	£29.90
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HPA10	10 & 15M 10W Power Amp	£39.90

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CM2	Electret Mic with VOGAD	£13.50
CSL4	SSB & CW Filter for DcRx etc.	£10.50
CV100	HF Converter for VHF scanner	£27.50
DCS2	"S Meter" for DC receivers	£10.90
DFD4	Add-on Digital Readout	£49.90
DFD5	Digital Frequency Counter	£54.90
ST2	Side-tone/Practice Oscillator	£9.80
SWB30	SWR/Power indicator/load	£13.90
XM1	Crystal Calibrator LF to UHF	£16.90

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CA30M	Houses CTU30/SWB30/ST2	£34.90
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HA12R	Houses ST2 Side-tone	£10.10
HA30R	Houses CTU30 ATU	£17.90
HA33R	Houses TRF3 SW Receiver	£25.90
HA150R	Houses CTU150 ATU	£16.90

MULTI-BAND SSB/CW RECEIVER

The new **DXR20** covers 20, 40 & 80M bands plus any other HF frequency with optional plug-in modules. The photo shows the receiver built with **DXR20** and **DCS2** ("S meter") kits and **HA20R** hardware pack (case etc.). It has some great technical features hidden inside! **DXR20** electronics kit: **£39.90**. **HA20R** hardware pack: **£28.90**



GREAT VALUE ATU!

The new **HOWES CTU8** SWL ATU covers medium and shortwave bands (500kHz to 30MHz). Increases wanted signals by providing impedance matching, and at the same time reduces spurious signals and interference with "front end" selectivity for the receiver. Kit contains case and all parts. Top value general coverage receiving Antenna Tuning Unit.

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HOWES KITS contain good quality printed circuit boards with screen printed parts locations, full, clear instructions and all board mounted components. Sales, constructional and technical advice are available by phone during office hours. Please send an SAE for our **free** catalogue and specific product data sheets. Delivery is normally within seven days.

73 from Dave G4KQH, Technical Manager.

In other words, the same signal can be tuned in twice on apparently different frequencies.

The superhet receiver can filter out one of the 'double' images. It can thus halve the potential QRM level.

It's often possible to reduce QRM when using a d.c. receiver by tuning through the zero beat point to the other image using the rig's RIT. Unfortunately, the Sprint's RIT range is not sufficient to allow this.

Because of the double image, it's important to tune to the correct side of zero beat before calling a station. This is important, otherwise you'll be (approximately) 1.5kHz off frequency and the other station may well not hear you.

I've heard the 'off channel' effect happen many times on 3.5MHz. The instruction manual gives very clear guidance on how to tune the Sprint and avoid this problem.

Setting Up

When setting up the Sprint transmitter, I noticed a tendency to slight instability - dependent on the power level setting and driver stage tuning. This was not a serious problem, but constructors should perhaps bear in mind the possibility.

Another slight disappointment was that, despite otherwise being of such a high quality, the p.c.b. had two cut tracks in order to correct layout errors, and three components had to be fitted in such a way as to help correct them. I understand a MkII board is soon to appear, and will address both problems.

I also think the level of the side tone oscillator is a little low in the headphones. The side tone by-passes the audio gain control, and I sometimes resorted to turning down the receiver's audio gain in order to be able to hear what I was sending.

As I've mentioned already,

the rig has full QSK and you'll also hear signals on the band between each character you send. The QSK worked extremely well and, apart from slight clicks (noticeable in the headphones when strong signals were present in the receiver) it was 'transparent' in its operation.

I followed the instructions to set up the v.f.o., and found the dial calibration to be surprisingly accurate. I also found that the receiver was completely free from any sign of the broadcast station breakthrough, or mains hum, often found in other direct conversion receivers.

Audio Filter

The addition of a good audio filter will transform any d.c. receiver's performance. It will provide an apparent narrow response, although the double image remains.

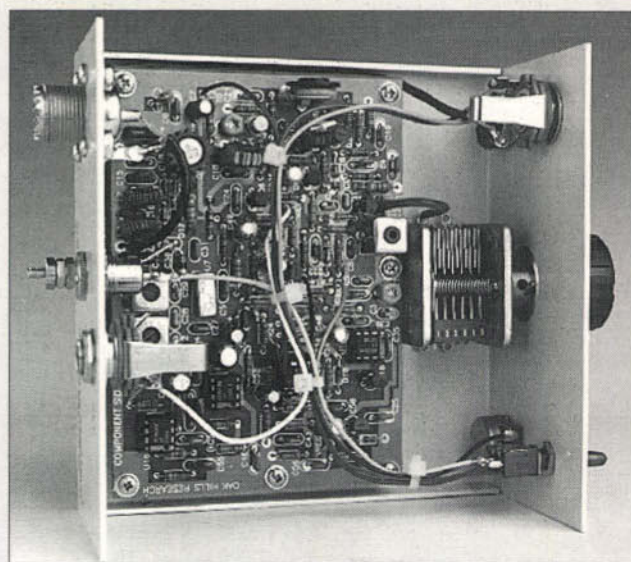
The peaked audio filter in the Sprint offers some slight help towards improving selectivity. But it doesn't approach the results obtainable from an out-board unit such as the excellent Oak Hills SCAF filter.

The use of a filter like the SCAF makes it much easier to pick out the individual signal you want to hear. But it's not essential - I used the Sprint without any external audio filtering throughout the review period.

Controls Simple

The controls on the rig are very simple. They consist of: **AF Gain**, **RIT** (which is normally left in the central detent position), **On/Off** switch, headphones jack, 12V socket and a Morse key jack on the rear panel.

The antenna socket is an SO239. Because it has such good QSK, the Sprint makes for an ideal self contained c.w. rig if one of the Oak Hills Keyer boards is built into the case. There is plenty of room if you wish to do so. The paint on the case is a



Inside view of the QRP Sprint 3.5MHz transceiver as built by G3XJS.

Manufacturer's Specifications

Transceiver	Single band direct conversion (3.5, 7 or 10MHz)
Transmitter output:	1.5-2W
Power supply:	12V d.c.
Current consumption:	240mA (transmit), 90mA (receive)
Dimensions:	177 x 165 x 90mm
Weight:	567g

little 'flaky', so take care when drilling the case (for external keyer speed control) if you decide to adopt this idea.

I have made some slight criticisms of the Sprint, but don't forget it's a budget rig - priced at £99.95. In fact, I believe it offers good value for money, with very good performance.

Professional Appearance

Although the transceiver is a 'Fun Rig', the Sprint has a professional appearance and feel to it. It also gives very good results.

In my opinion, the QRP Sprint transceiver is not a kit to tackle unless you already have some experience of home construction. (If you are any way unsure of the level of experience needed to build the QRP Sprint or any of the Oak Hills kits, Adur Communications would be

happy to advise you. **Ed**) The constructor must be prepared for the high component density on the board, with its plated-through holes.

I enjoyed building and using the Sprint very much indeed. I was delighted with the excellent reports I received.

My thanks for the loan of the review transceiver go to the British importers, Adur Communications at 13 Dawn Crescent, Upper Beeding, Steyning, West Sussex BN44 3WH. Tel: (01903) 879526, FAX: (01903) 879527, who can supply the QRP Sprint for £99.95.

PW

**KITS &
HOMEBREW**

THE ROCHE TOP BAND TRANSMITTER

The Rev. George Dobbs G3RJV has been busy at his workbench again. This time George has created a neat little 1.8MHz transmitter and of course he starts off with a suitable quote.....



Top Band represents amateur radio's strongest link with its own past. The very static on 160 seems to crackle with ghostly echoes from the old spark operators. And certainly the band bears memories of those amateurs who, operating some of the earliest vacuum tube oscillators, first ventured upward into the realm of 160 and higher to escape the bedlam of 200 metres.

Si Dunn K5JRN from *The Challenge of 160!*

'Top Band' is what makes winter worthwhile, so I was told when I first began amateur radio. And like many people in those days, it was on 1.8MHz where I began my amateur radio exploits.

In those days one 6L6 valve provided a rather chirpy few watts of c.w. for G3RJV. The

Morse operation was relieved by occasional excursions onto a.m. using a carbon microphone in the cathode of the valve.

A sad facet of amateur radio is that for many years h.f. band transceivers were produced without the facility for operating on 1.8MHz. Thankfully in more recent times, synthesised transceivers, which can be easily made to go anywhere, usually include 'Top Band.'

Easy Way

My little project is an easy way to get a few watts onto the 1.8MHz band. You can begin enjoying the challenges and fun of what has been called 'the gentleman's band'.

Used in conjunction with a receiver, or even the receive portion of a transceiver, the

Fig. 1: The v.f.o. circuit for the Roche 1.8MHz c.w. transmitter.

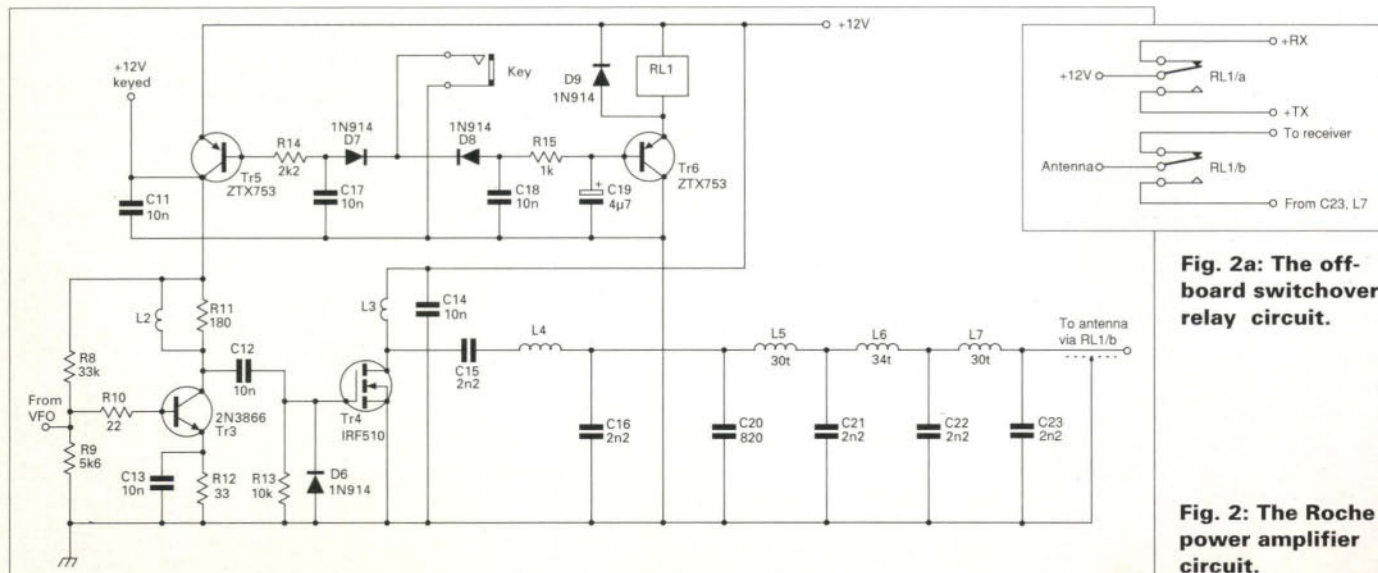
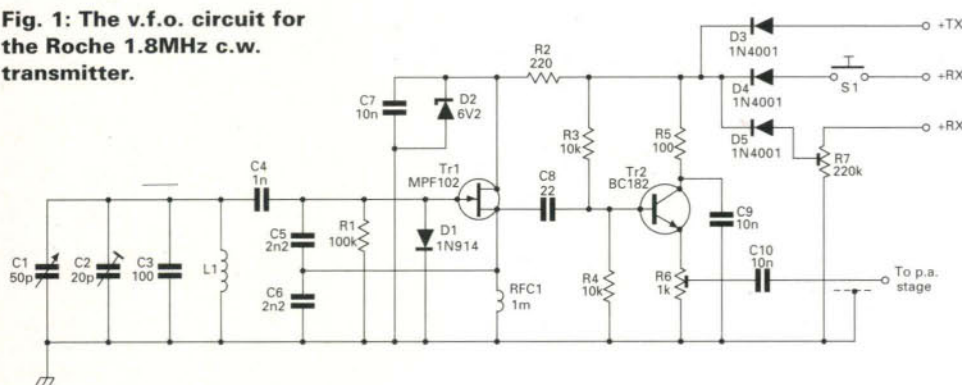


Fig. 2a: The off-board switchover relay circuit.

Fig. 2: The Roche power amplifier circuit.

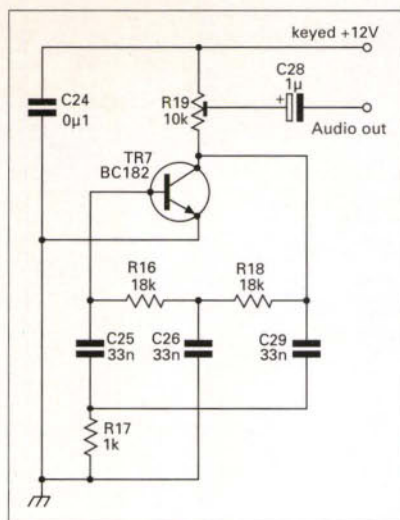


Fig. 5: A selection of optional 'extra' circuits suitable for use on the Roche.

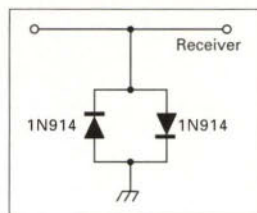


Fig. 5a: Receiver protection

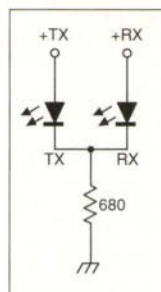


Fig. 5b: TX/RX Indication.

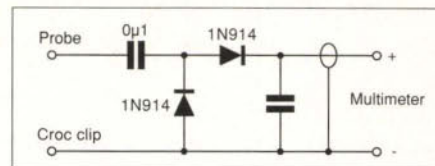
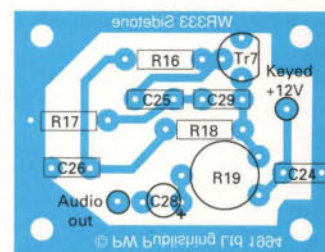
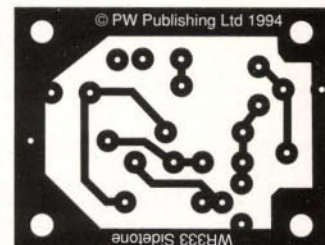


Fig. 5c: An r.f. diode probe.

Fig. 3: Side tone circuit suitable for the 1.8MHz transmitter (see text).

Fig. 4: The p.c.b. lay-out for the side tone circuit.



Roche transmitter should enable the constructor to get a feel for the days when all the transmitters on 1.8MHz were the work of the operator's own hands.

The transmitter is made up from two boards. These are the v.f.o. and the power amplifier (p.a.), with an optional side tone board.

The two main boards are of identical size. This is so that they may be etched as one board and then divided with a saw cut so each will fit into its own screened compartment.

The VFO Board

The variable frequency oscillator (v.f.o.) circuit is shown in Fig. 1. The oscillator itself bears no surprises as it's the parallel tuned Colpitts oscillator so beloved of QRP circuit builders.

What excellent service this little circuit has given over the years! I prefer to use the version which includes the clamping diode in the gate of the oscillator.

The capacitors in the frequency determining portions of the circuit, C3-6, should be of high temperature stability. I used polystyrene types in the prototype.

The tuned circuit, C1, 2, 3 and L1, can be somewhat of a problem at 1.8MHz. The arrangement shown here gives coverage of the most useful portion of the c.w. segment of the band.

To cover a larger portion of the band a larger value for C1 would be required, say 100pF. The current price of new airspaced 100pF variable capacitors is such that I decided to make use of one of the several 50pF capacitors I had available.

Should the constructor decide to increase C1, then the capacitance of C3 will have to be reduced to an appropriate amount to allow the desired band coverage.

Toroidal Core

The inductor L1 is wound on a T50-6 Micrometals iron dust toroidal core. But, I should mention that I usually prefer to wind v.f.o. inductors on conventional formers with a small amount of iron dust core inserted into the former.

My preferred coil winding approach allows for easy adjustment of the frequency of the oscillator. However, the availability and cost of such formers now makes this choice more difficult, especially as there's not a convenient 'off the shelf' inductor readily available with the correct value of inductance for such a circuit on 1.8MHz.

The use of the toroidal method means that adjustment of the tuned circuit has to be done with the trimmer, C2, or changes in the parallel capacitor, C3. The number of turns on the core can also be adjusted.

Winding Inductors

The way I tackle the winding of v.f.o. inductors on iron dust toroids goes like this: Each pass through the core represents one turn. And 50 turns of 0.4mm (28s.w.g.) enamelled wire are required for this circuit.

When the inductor is completed I plunge it into boiling water for a few minutes. Then I take it out of the water, while it's

still hot, and wipe both sides on a block of beeswax.

Some of the beeswax then melts into the turns on the core. This may seem like a lot of mumbo-jumbo but it's worthwhile!

Not only is my waxing method better than trusting to luck that the v.f.o. will prove to be stable, it has a good practical basis. The core boiling appears to anneal the copper wire somewhat and assists temperature stability.

When set, the beeswax holds the turns in place. Bees are very helpful to the radio constructor...and I use a beeswax a lot to hold items in place on printed circuit boards!

Buffer Stage

The Roche v.f.o. has only one buffer stage. In this application, it seems quite enough to give a reasonable amount of drive to the power amplifier board and still retain the stability of the oscillator.

Perhaps the more cautious constructor would add a second stage. This emitter follower buffer has a preset control on the output which acts as the driver control for the amplifier board.

The arrangement of diodes and power inputs at the top of the circuit requires some explanation. And to begin I should mention that the v.f.o. in a transmitter to be used with a separate receiver needs three main requirements.

Naturally, the v.f.o. requires power when transmitting. But ideally it should not be running when receiving the other station to avoid it breaking through on that station's signal.

But switching h.f. oscillators on and off is bad news. This is

because most of the frequency drift occurs just after switch on. One method is to offset the frequency of the oscillator so that it falls outside the passband of the receiver, but this can lead to problems of chirp and frequency jumping.

In the Roche circuit I've used another approach. In the receive mode the v.f.o. receives its power via a preset potentiometer. The preset control is adjusted until the voltage supply to the v.f.o. is such that the oscillations just cease. The oscillator f.e.t. is then still conducting but not oscillating.

Much of the stability depends upon the working temperature of the junctions in the oscillator transistor. So, the v.f.o. will still be on frequency when the oscillations begin again after the full working voltage is restored.

The third requirement is that the oscillator can be switched on during the receive periods. This is required when netting the transmitter to another station.

In this circuit a switch is provided which gives the full voltage during the receive periods. The v.f.o. can then be heard on the receiver so that the transmitter frequency may be adjusted to net with the desired station.

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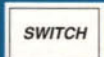
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Single Board

The v.f.o. is built on a single printed circuit board shown in Fig. 6. The layout is such that it allows reasonable spacing between components and tracks to aid stability.

The v.f.o. fits towards the front of a JAB Electronic Components aluminium case Type JA48 (102 x 152 x 51mm). A simple L-shaped aluminium screen separates it from the power amplifier board situated at the rear of the case.

I used 1000pF feed-through capacitors to pass the +TX and +RX supply lines from the changeover relay. (For goodness sake do not use these to pass the signal from the v.f.o. to the amplifier board!) It's not unknown for constructors to do this and wonder where the signal has gone!

With the case I used there's room to use a 6:1 epicyclic slow motion drive for C1. This could then be mounted on a bracket and the drive fixed to the front panel.

However, in practice, using the restricted range of the v.f.o. and a large control knob, I found that a reduction drive was not required. This provides quite a saving in cost.

Board Tested

After checking the wiring of the board the v.f.o. can be tested. You can use a frequency counter or a receiver which covers 1.8 - 1.9MHz.

To start off, connect a 12V supply to the +TX power point for the test. The frequency counter is connected directly to the output of the v.f.o.

If you're using a receiver for testing, connect a short length of wire to the output and listen for the signal on the receiver. At this point it's possible to set the frequency coverage of the v.f.o. using C2.

If the desired range is unobtainable, adjustments can be made to the value of C3. You can also adjust the number of turns on L1 for the required range if need be.

The output of the v.f.o. can be tested using a simple diode r.f. probe and a voltmeter. The output should measure somewhere between 500mV and 1V.

Power Amplifier

The circuit of the power amplifier section of the transmitter is shown in Fig. 2. This follows the design I used in the *PW* Chatterbox 1.8MHz a.m. transceiver (*Practical Wireless* August 1991).

The circuit used in the 'Chatterbox' project was based upon a circuit by Doug Gibson G4RGN. It has proved very reliable to many 1.8MHz a.m. users.

Based on the premise of 'don't fix it if it's not broken' the circuit is used here rather than attempting another amplifier design. A single 2N3866 drives an IRF510 VMOS device. A homewound r.f. choke, L2, damped by a 180Ω resistor forms a wideband load for the driver transistor.

The IRF510 power f.e.t. has another homewound r.f. choke, L3 as the load. It also has an unusual output coupling circuit to offset the internal capacitance of the device.

The diode in the gate of the

IRF510 acts as a d.c. restorer, rectifying the drive signal. If the drive fails, the amplifier turns off and so will not overheat.

The driver transistor and the p.a. device both require heatsinks. A small 'star shaped' heatsink can be used for the 2N3866 and the back of the case is used as the heatsink for the IRF510.

I added a little extra metal at the back of the case for increased heat conduction. And although a small commercial heatsink could be used, a couple of home-made fins work very well.

The low pass filter is essential and follows the standardised data produced by W3NQN. Avoid using cheap ceramic capacitors in the low pass filter. Polystyrene types serve the purpose better.

Changeover Switching

Changeover switching is achieved by using two PNP switching transistors controlled by the key. One of these transistors, Tr5, provides a keyed 12V source for the driver transistor.

An extra outlet for the 12V keyed line is provided to power a side tone oscillator. The other PNP transistor, Tr6, operates a relay with a slight 'hold on' time delay. This allows the relay to remain switched on during normal keying rates.

The relay is mounted off the board. This has been done so that any suitable 12V relay can be used. What's needed is a double pole, changeover relay with a 12V coil.

Many types of 12V relays are available. A suitable small relay is the FBR621 available from JAB Electronic Components. A surge protecting diode is mounted directly on the coils pins of the relay.

The relay has two functions. It changes over the antenna from the receiver input to the transmitter output and provides the +TX and +RX 12V supply lines for the v.f.o.

The 4.7μF electrolytic capacitor, C19, in the base of the relay switching transistor provides the time delay. This of course, can be altered in value to suit individual keying needs.

The amplifier, low pass filter and control circuits are built on a single printed circuit board. The IRF510 is mounted on one side of the board so that it can be

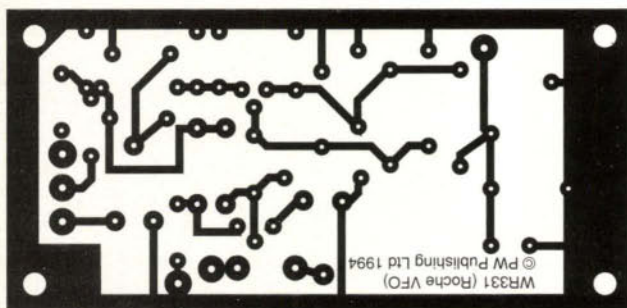


Fig. 6: Printed circuit and associated component overlay for the Roche v.f.o.

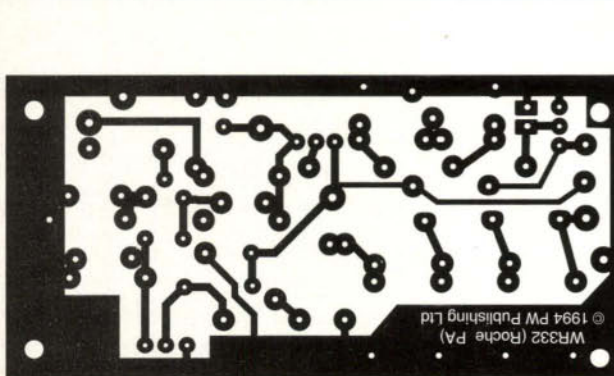
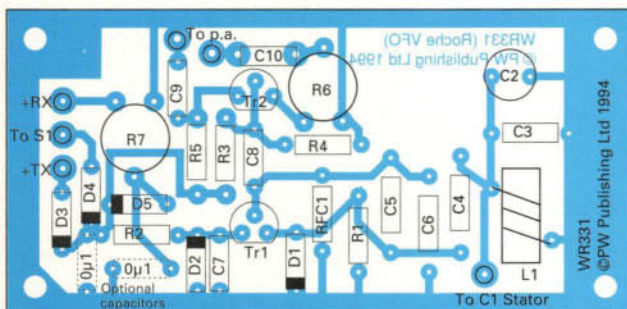
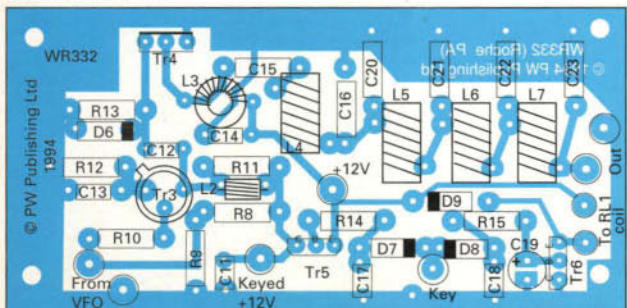


Fig. 7: Printed circuit and component overlay for the power amplifier.



attached by its mounting tab to the back of the case.

A TO220 insulation washer kit is required between the IRF510 and the case with a little heatsink compound smeared on both sides of the washer. But...please be careful and check that there's no electrical connection between the IRF510 and the back of the case!

The Side Tone

I've not neglected the provision of side tone. I know that only clever people can key transmitters without listening to the results of their manipulations!

In some amateur radio set-ups with a separate receiver it's possible to listen to the keying on the receiver. If not, it's desirable to have an additional audio oscillator to provide a side tone.

A suitable sidetone circuit is shown in Fig. 3, with a p.c.b. layout in Fig. 4. This is a version of the Twin-T audio oscillator and produces a much more pleasing sound than a multivibrator or 555 timer chip oscillator.

The output is quite low as it's designed to feed into the audio stages of the receiver. It would also be possible to connect it directly to a crystal earpiece to monitor the keying.

A really fastidious constructor may choose to add a little audio amplifier and speaker to the transmitter. Incidentally, this oscillator is powered by the 12V keyed power line.

A selection of other small extra circuits is shown in Fig. 5. It's always good to have some lights on the front panel - why let Kenwood or Yaesu have all the glory! The 12V +RX and +TX lines can be used to provide l.e.d. indication of the transmit or receive modes.

One simple way to operate a transmitter with a receiver is to leave the receiver running during the transmissions, but turning down or mute the audio signal so that the keying can be heard.

If the 'turned down' approach is used extra protection may be required for the input of the receiver. This can be simply achieved by adding a pair of back to back diodes as shown.

I've often mentioned that a useful aid for building and testing transmitters is a diode probe to check the level of r.f. signal from

the oscillator to the final amplifier. This little circuit placed ahead of a multimeter will provide such a facility. The lead between the probe and the multimeter should be screened to avoid stray r.f. pick-up.

Final Assembly

Final assembly of the project is straightforward. The housing I used, the JA48 case from JAB, holds the boards with plenty of spare room.

On my prototype, the amplifier board and v.f.o. board are divided by a screen made from an off-cut of aluminium sheet. It's bent into an L-shape at the bottom and secured with two screws to the bottom of the case.

The side tone board is mounted at the front of the case. The back of the case has the IRF510 bolted into place for heatsinking.

In the prototype two small aluminium fins were added. These were bent from small pieces of aluminium sheet.

The back contains three phono sockets for 12V input, receiver and antenna. Perhaps the more careful constructor may like to use an alternative type of socket for the 12V supply.

The variable capacitor, C1, with a large tuning knob, and switches for power on and net go on the front panel. The panel also has a 3.5mm jack socket for the key and the option transmit/receive l.e.d.s.

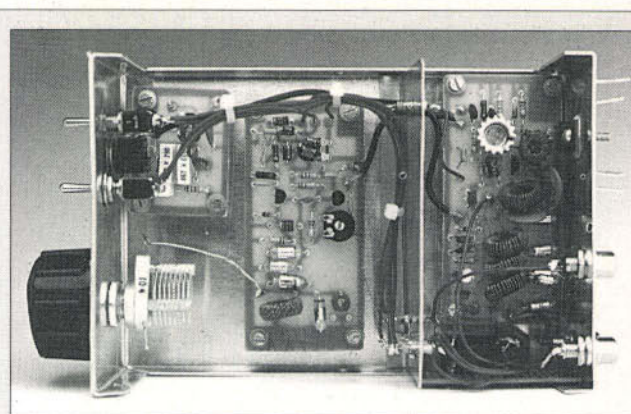
Good Results

The Roche transmitter is capable of good results on the 1.8MHz band. The output is designed for a 50Ω termination so it should be matched into a suitable antenna via an antenna tuner.

The power amplifier is capable of some 10W of r.f. output but the v.f.o. arrangement is such that about 5W is the optimum output. This corresponds with the requirements for QRP award and contest operating and can gain you many contacts on the band.

So, I hope you enjoy building the Roche. And, just in case you're wondering...the name comes from the River Roche which flows through Rochdale where I live!

PW



Shopping List

Resistors

Carbon Film 5% 0.25W

22Ω	1	R10
33Ω	1	R12
100Ω	1	R5
220Ω	1	R2
1kΩ	2	R15, 17
2.2kΩ	1	R14
5.6kΩ	1	R9
10kΩ	3	R3, 4, 13
18kΩ	2	R16, 18
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1kΩ	1	R6
10kΩ	1	R19
220kΩ	1	R7

Semiconductors

1N914	7	D1, 6, 7, 8, 9
1N4001	3	D3, 4, 5
2N3866	1	Tr3
6V2	1	D2 (any 1W Zener diode of 6.2V operating)
BC182	2	Tr2, 7
IRF510	1	Tr4
MPF102	1	Tr1
ZTX753	2	Tr5, 6

Inductors

1mH	1	RFC1
-----	---	------

Home Wound Components

L1	50t 0.4mm (28s.w.g.) on a T50-6 toroid
L2	15t 0.27mm (32s.w.g.) on an FX1115 ferrite bead
L3	15t 0.38mm (28s.w.g.) on a 'Jumbo' Ferrite bead (6302 Balun bead)
L4	32t 0.38mm (28s.w.g.) on a T50-2 toroid
L5/L7	30t 0.45mm (26s.w.g.) on T50-2 toroid
L6	34t 0.45mm (26s.w.g.) on a T50-2 toroid

Miscellaneous

A metal case (JA48), and nuts, bolts and screws to suit, two small pieces of aluminium to make up the heatsink, a TO5 heatsink (for Tr3), two l.e.d.s (optional), one double pole changeover relay, a socket to suit your Morse key lead, a knob for the tuning capacitor C1 (and optional slow motion drive perhaps). All the components may be obtained from JAB Electronic Components, Rear of Queslett Motors, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB, or from Maplin.

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ANTENNA TUNING -THE SIMPLE WAY

My simple antenna tuning unit (a.t.u.) project is aimed at anyone who would like to try either 1.8, 3.5 or even 7MHz but cannot get a long enough piece of wire out. Some form of a.t.u. is probably going to be used with a shorter length of aerial wire and the version suggested here is very simple to build.

If all the items are in the junk box then construction should take no more than one evening. Even if you have to wind the coil there is little else involved.

Parallel Tuned

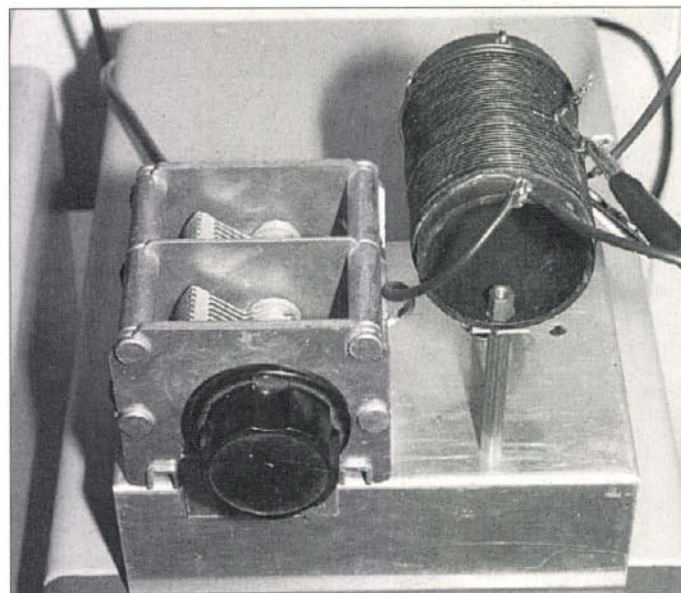
The a.t.u. consists of a parallel tuned circuit with a tapped inductance. Inductive coupling is provided to the antenna input/output on the equipment.

Basically speaking, with this project there's one coil, one capacitor, two crocodile clips and a length of coaxial cable. The a.t.u. circuit is shown in **Fig. 1**. The heading photograph clearly shows that the circuit can be built on any suitable chassis.

An advantage of this type of circuit over the more common Pi type a.t.u. is that any length of wire can be accommodated. This is necessary because different lengths of wire on different frequencies exhibit a wide range of impedances.

The Pi configuration may not be able to match all the possible ranges required. However, the tapped parallel circuit used in my project can match any impedance presented to it, the only limiting factor being the number of taps available.

The inductance values of the coil and the actual capacity of the variable capacitor are not too critical. But the spacing on the plates of the capacitor should be wide enough to allow operation for the level of r.f. power being used.



Low Power

The most commonly available variable capacitors are those used for tuning in domestic valve receivers. These are normally variable between 30 to 350pF and are only suitable for low power, around 10W.

For powers around 100W, much wider spacing is needed on the variable capacitor plates. Fortunately, these can be found at most rallies or club junk sales and a value of around 30 to 200/300pF is required.

The coil is about 35 to 55mm or so in diameter, and about 40 to 50 turns should be enough to tune 1.8MHz. Many inductors of around this size can be found at rallies and even if too large can have turns removed.

If you're winding a coil I suggest you put a few extra turns on, these can be removed easier than they can be added! The wire needs to be around 18 to 20s.w.g. enamelled copper wire.

Coil Tappings

The necessary coil tappings should be made every five turns along the inductor. A crocodile clip on a flying lead is connected to the top, or 'hot end', of the coil and used to short out turns

to allow operation on 3.5 and 7MHz.

A further crocodile clip attached to the end of the long (or short) wire is used to clip the antenna on at the required position. A three turn link is then wound around the ground, or 'cold', end and the coaxial cable feed to the transceiver/transmitter connected to it.

In use, the tapping used for the antenna depends upon the length of the wire and the frequency involved. As a guide, a 20m length (approximately 66ft) of wire is a half wave on 7MHz, high impedance, you should tap at the 'hot' end of coil. On 3.5MHz the same length is a quarter wave, low impedance, and you should tap at the 'cold' end of the coil.

If the length of wire is nearer a half wave, or multiples of (0.5, 1.0, 1.5 wave, etc.), then it taps at the 'hot' end. But if the wire length is a quarter wave or odd multiples of (0.25, 0.75, 1.25 etc.) then it taps at the 'cold' end.

Simple To Operate

After assembly, the a.t.u. is quite simple to operate. To start, you should attach the antenna to the mid point of the coil and rotate the capacitor for a dip in the reading on a s.w.r. meter fitted between the a.t.u. and your station.

If the meter will not dip, use the 'flying' crocodile clip to short out a few turns and try again. At

Ben Nock G4BXD describes a simple antenna tuning unit suitable for use on the lower frequency h.f. bands.

The prototype simple antenna tuning unit as built by G4BXD.

some point, the s.w.r. meter will show signs of dipping.

When the best dip is found, alter the antenna tap either up or down the coil and re-try the dip. If the s.w.r. reading improves, then you're moving the antenna connection the right way up or down the coil. If it worsens, then the opposite direction is needed. Repeat the process until the best match is achieved.

High Voltage

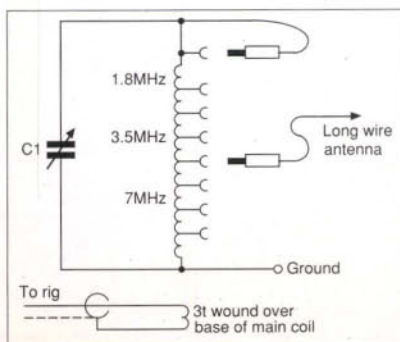
There's quite a high r.f. voltage at the top or 'hot' end of the coils and you must be aware of the possible danger and r.f. burns. So, play safe and switch to receive between altering the taps or you may fry your fingers!

It should be arranged so that the capacitor is nearly fully meshed with all the coil in circuit at 1.8MHz. If you find that the capacitor is open a long way, then remove a couple of the turns on the coil.

On my version of the a.t.u., using 40m (approximately 130ft) of wire, a perfect 1:1 match was obtained with all the coil in circuit and the antenna at a cold end tap. Even trying the a.t.u. with 6m (approximately 20ft) of wire produced a good s.w.r. but obviously nothing like 1:1.

For an end fed wire antenna, ensure some form of earth is used. A connection to a cold water pipe is good for example if handy...but make sure it really is earthed! Happy building and see you on 'Top Band'.

PW



Circuit of G4BXD's simple a.t.u.

Your Library Lends Ideas

Although I've said it before...I'll say it again: Your reference library is probably the most important 'tool'

available to help you in the hobby of amateur radio. The more you extend your library the more information and ideas you'll have to hand.

When I refer to your 'library' I'm not only referring to books. If you're like me for instance, I've no doubt you have collected interesting circuits and put them into a notebook. If you don't use this method...I recommended it!

Books don't have to be new to provide much useful information. I always look through second-hand books at rallies (and bookshops) and never cease to be surprised at what I can find. However, I'm not going to go into detail on the exact contents of each book I mention. I'll just outline what I think of each title so that you'll at least have an idea of what the book is like. The final choice must be yours!

I suggest keen home-brewers look out for the older ARRL Handbooks and the first editions of the ARRL Data Book. These older editions have more 'building block' circuits for discrete (rather

than i.c.) components, although the newer edition still incorporates this information along with a wealth of data on integrated circuits and other essential information.

Pages Of Inspiration

I enjoy leafing through my 'pages of inspiration' and one book at the top of my personal list which I find totally absorbing is the ARRL QRP Classics. It's absolutely packed with ideas and projects, collated from QST and the ARRL Handbook over many years.

Most of the projects have the associated p.c.b. design to hand, and all you need is the time! Incidentally, when I'm on the PW stand at the big shows, QRP Classics is the book which I (highly) recommend to readers who've asked for advice on what book to buy so they can build a few more projects.

Another ARRL book I use - Solid State Design For The Radio Amateur - is not as well known

and appreciated as I feel it should be. This book is as the name suggests, aimed at helping the radio with solid state design work. But, it's much more than that as it also has many projects, building blocks and ideas. Additionally, the authors (Wes Hayward W7ZOI and Doug DeMaw W1FB) guide the reader through the design process. It's certainly a book which helped me become more familiar with semiconductor design and application practice.

Doug DeMaw W1FB, although now virtually 'retired' from activity in amateur radio, has left us a helpful legacy in the form of his many books. Doug has been involved in a great number of publications, some of which I've already mentioned but I've found several to be of particular help. Particularly of help for the home-brew enthusiast (or someone who like to have a first go) are the W1FB's QRP Notebook and the W1FB's Design Notebook. Both these titles have a lot of ideas and projects, and the QRP Notebook

contains all new, previously unpublished circuits complete with their p.c.b. templates.

George & Sprat

The Rev. George Dobbs G3RJV and Sprat, the journal of the G-QRP Club don't really require an introduction from me. But, have you seen the collection of Sprat article reprints in the G-QRP Club Circuit Handbook? They're excellent, great fun to build and can provide you with many ideas.

The G-QRP Circuit Handbook has ideas for all levels of constructional ability. There's even something for the valved-equipment enthusiast! There are 24 projects in the transmitter/receiver and transceiver category alone. Additionally, there's a great number of 'circuit ideas' which provide you with the basic information.

So, there you have it...my personal guide on using your library to best advantage and what books I suggest. G3XFD PW

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KICK TO BASICS

- Transmitting Antennas

Gerald Stancey G3MCK is a keen QRP operator and has a great interest in antennas. In this 'back to basics' article, Gerald draws on a very interesting talk he gave at the Yeovil QRP Convention in 1993.

This article takes a very basic approach to transmitting antennas and it's based on a talk I gave at the 1993 Yeovil QRP Convention. It so happened that the *PW* Editor was in the audience!

In the article, I'm considering antennas as being devices that absorb energy from a transmitter and then radiate it. This may seem to be a self-evident statement, but an appreciation of the obvious can often help in understanding the working and appraising the performance of your own antennas.

Firstly, let's look at the initial part of the statement. Another way of putting it is to say that the antenna acts as a load on the transmitter.

You can consider the load to have two components. There's a useful part which represents the energy that's actually radiated and a useless part which represents the energy that is wasted in losses in the antenna, Fig. 1.

Simple Dipole

Let's illustrate the above statement by considering a simple half wave dipole with a measured feed impedance of 70Ω . If the dipole is made from wire which has a resistance of 5Ω , the radiation resistance is 65Ω and this antenna has an inherent ohmic efficiency of $65/70 = 93\%$.

Another example is to consider a quarter wave vertical antenna over a reasonable earth. This antenna will have a radiation resistance of about 37Ω . But in series with this is the resistance of the antenna, say 1Ω , and the resistance of the ground, say 20Ω . In this case the inherent ohmic efficiency of the

antenna is $37/58 = 64\%$.

In both examples you can clearly see that not all the energy which is fed to the antenna is radiated. In addition to this, further ground losses will occur which will reduce the amount of energy radiated by a real antenna even more.

Too Much Power

Most amateurs use too much power most of the time. And, at least for QRO operators, quite substantial reductions in antenna efficiency can be tolerated without seriously affecting the ability to maintain a QSO.

Another way to look at things is that if you were putting 50W of r.f. into an antenna that is 100% efficient you would not feel deprived! So, why should you worry too much if you are putting 100W of r.f. into an antenna that has an ohmic efficiency of 50%?

It's also worth remembering the minute amount of power that is needed at the receiver input to produce acceptable signals in the loudspeaker.

About one picowatt (0.000, 000, 000, 001W) will give an S7 signal. So, you don't need to radiate much power to make a good impression at the station who is receiving you, provided it goes in the right direction!

Real Systems

In real antenna systems there are additional losses due to feeders and antenna tuning units (a.t.u.s). However, the basic argument remains the same.

The antenna absorbs all the power which is fed to it, some is radiated, and the rest is wasted in ohmic losses in the antenna system. From this it can be seen that an ideal

antenna, irrespective of its size, will radiate all the power which is fed to it.

In other words you could make a 1.8MHz dipole 6m long! The snag is that in the real world the ohmic losses in the antenna, feeders and matching system will drastically reduce its efficiency. However, in practice quite substantial reductions in size can be made before losses become unacceptable.

I haven't yet mentioned the need for an antenna to be resonant. And in fact, the antenna does not need to be resonant for it to absorb power.

All that's needed is an appropriate matching system between the transmitter and the antenna. This point, which often causes difficulty, can easily be understood by simply thinking about antennas, in terms of power transfer.

Minimise Losses

In general it's correct to say that it is desirable to minimise the ohmic losses

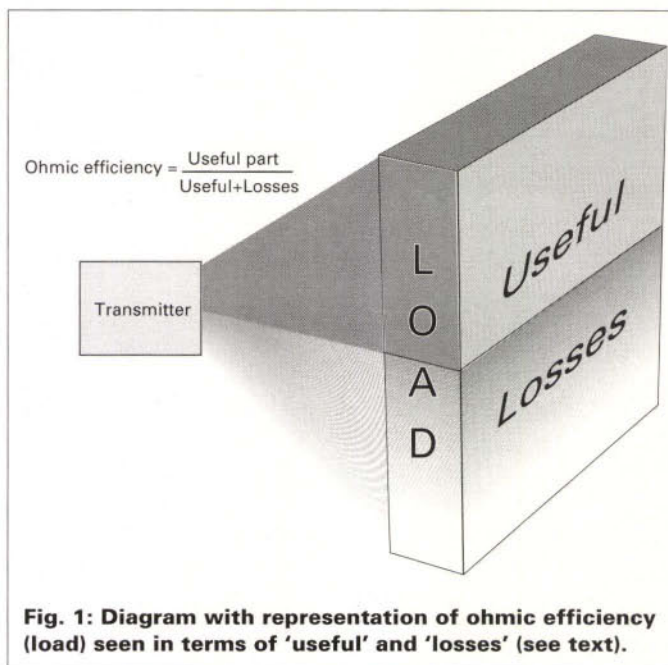


Fig. 1: Diagram with representation of ohmic efficiency (load) seen in terms of 'useful' and 'losses' (see text).

in antennas. However, this is not the whole story!

You also have to consider where the r.f. radiated goes to. And for this you have to study the polar diagrams of the antenna in question, **Fig. 2**.

Radiation patterns given in standard handbooks usually assume ideal ground and need modifying to account for ground losses. However, without allowing for ground losses they give a very good indication as to where the major radiation lobes go.

It's essential to study the horizontal patterns as well as the vertical patterns. This is necessary because the nulls which occur between the horizontal lobes of harmonically operated antennas, for example the G5RV on 14MHz, can be very deep.

You may well find that the comparison between two antennas in a particular direction looks like that shown in **Table 1**. From **Table 1**, it can clearly be seen that Antenna 1 would be the better choice despite the fact that it has the worst ohmic efficiency.

Many Considerations

When choosing antennas there are many other considerations to take into account. They include those such as: in which direction do you wish to work?, what distance do you want to work?, and which bands do you wish to operate?

Other factors to be considered are: how important is fast band changing?, how much time have you to put up antennas?, do you need to save time by buying a commercial antenna?, and does the appearance of your antenna

matter, etc.

No single antenna can meet all the requirements I've outlined. This means you will have to prioritise and compromise.

For example, is it really essential that you cover all nine h.f. bands?, how important is rapid band changing, etc? Actually, there's no single answer to these questions. The correct solution is the one that best suits your requirements.

Sense Of Perspective

Finally, I suggest you keep a sense of perspective! Any piece of metal which is fed r.f. will, given half a chance, radiate.

If you treat your chosen antenna well

the results can be very gratifying. And anything that allows you to get on a band which you could not normally work is by definition a good antenna.

Personally, I don't think there's any such thing as a **bad antenna**. Some are better than others (see Antenna 2 in **Table 1**), but there are no 'magic boxes' or formulae that will beat the basic laws of nature.

In general the highest ohmic efficiencies will be achieved with full-sized mono-band antennas. But you'll also need to ensure that their polar diagrams meet your requirements.

The one big 'unknown factor' is your site. This is because both the nature of the ground and the geography will play an enormous role in determining the effectiveness of your antennas systems.

A particular antenna which produces excellent results for one amateur may be a dead loss for

another. The only way to find out whether an antenna works well for you is to try it yourself!

However, don't forget that your experiments will be more successful if they are conducted with an understanding of the basic laws of nature.

PW

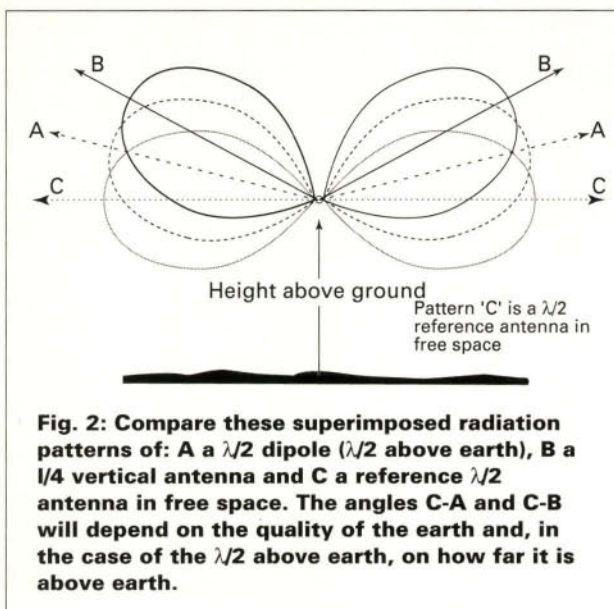


Table 1

	Antenna 1	Antenna 2
Inherent efficiency loss	3dB	1dB
Polar diagram difference	-	7dB
Net loss	3dB	8dB

References

- 1: *Practical Wireless* July 1993, P. Dodd G3LDO, Pages 46-47
- 2: *Wire Antennas*, W. I. Orr W6SAI, Page 37

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BOOKSHELF BASICS

Rob Mannion G3XFD takes a look at some books which he enjoyed and thinks could be very useful on your bookshelf.



RADIO COMMUNICATION HANDBOOK 6TH EDITION

Editor Dick Biddulph G8DPS
Radio Society of Great Britain

It seems a long time since I last bought a new edition of the **RSGB Handbook** and I think the RSGB have timed the new 6th Edition (only available in paperback form) well. Actually, this new edition appears to be an extensively up-dated (almost entirely re-written) book, packed with diagrams and photographs. However, although the diagrams are very clear, many of the photographs seem to be rather darker

than they should be. Apart from this though, the RSGB have produced an excellent book. The 6th Edition is packed with new ideas, projects and the latest amateur radio techniques. In fact, this book is a complete handbook/reference work and project book rolled into one. In my opinion the single most useful section has to be the comprehensive 'Building Blocks' chapter. This section of the book acknowledges that many enthusiasts like to 'lift' ideas as complete circuit 'building blocks' or ideas for further development to use for their own purposes. It's an excellent chapter. The final innovation is that the necessary p.c.b. templates for the published projects are provided at the very end of the book...making it much easier to photocopy them when you're making your own p.c.b. An excellent read, thoroughly recommended and let's hope we don't have to wait so long for the 7th Edition! 750 pages. Available from the **PW Book Service** for £20 plus £1 P&P (UK), £1.75 P&P (overseas).

THE RSGB AMATEUR RADIO CALLBOOK & INFORMATION DIRECTORY

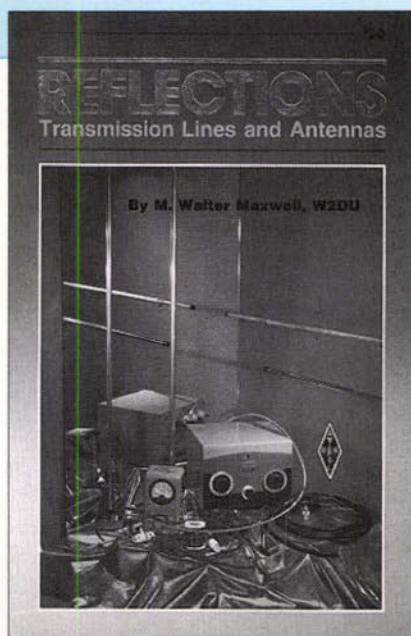
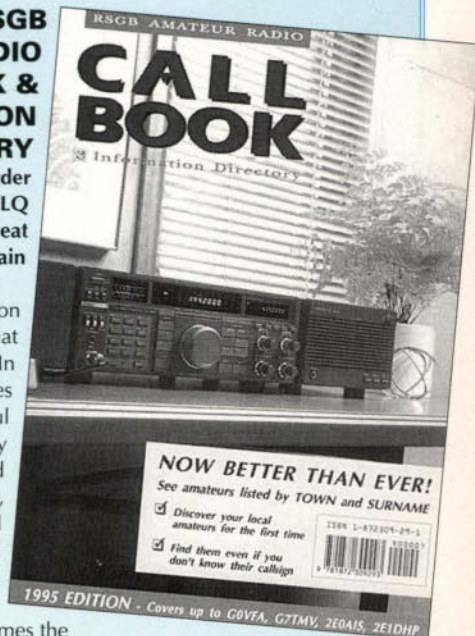
Edited by Brett Ryder
G4FLQ
Radio Society of Great Britain

This annual publication lives up to its name in that it's not just a callbook. In fact, the first 124 pages provide a very useful information directory with details of specialised clubs, country lists, repeater details, band plans and a host of reference material for both members and non-members. Then comes the

callbook itself which is laid out in its established format and fills 257 pages (including Novice callsigns and those from the Irish Republic). Then, towards the rear of the book, the RSGB have incorporated another 110 pages with some extremely useful innovations including: Surnames and initials of listed radio amateurs followed by callsigns (very useful if you know the name but not the callsign) and the same under postcode areas. However,

I found several anomalies including the fact that of the four 'Mannions' listed...I am three of them! (holder of my own callsign G3XFD, school club callsign G0RSC and G3SWM, the *Short Wave Magazine* callsign!). Despite this, I think the new callbook must be one of the most useful publications available for the radio amateur. Well done RSGB!

508 pages. Available from the **PW Book Service** for £10 plus £1 P&P (UK), £1.75 P&P (overseas).



REFLECTIONS - TRANSMISSION LINES AND ANTENNAS

Walter Maxwell W2DU
American Radio Relay League

Walter Maxwell's publication is a textbook with a difference - it's a chatty and informative discourse on how the author approaches the fascinating subject of transmission line and antennas. As such, it's very readable and the author takes a great deal of trouble to involve the reader, the result is that you almost feel that he's there with you! The book has intriguing chapters entitled: "Too low an s.w.r. can kill you, Countdown for a journey from mythology to reality" and so on. The chapters are then dealt with in section with sub-headings such as: open wire versus coaxial feed-lines, engineering an antenna system, basic reflection mechanics. In all, the 24 chapters in this conveniently sized hardback provide a very useful and user-friendly book. For the dedicated antenna experimenter and enthusiast the W2DU book is certainly suggested for the bookshelf and it's an unusual one for being such an easy-to-read, informative and friendly reference source. 323 pages. Available from the **PW Book Service** at the **Special Offer Price** of £11.50 plus £1 P&P (UK), £1.75 P&P (overseas) instead of the normal price of £14.50.

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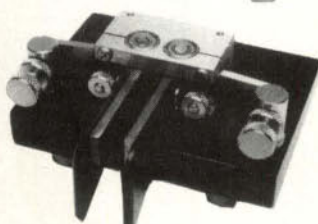
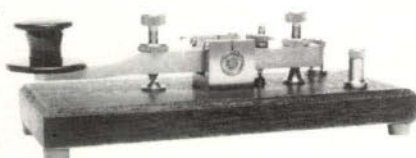
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Specifications

- The Mysteries Explained

Ian Poole G3YWX explains the mysteries behind the Continuous Tone Coded Squelch System used to access repeaters.

Continuous Tone Coded Squelch System or CTCSS is found on most v.h.f. and u.h.f.

rigs using f.m. these days. Many sets come with it as standard, whereas on others it's still an optional extra.

Used mainly in connection with repeaters, the use of CTCSS is by no means universal. However, in years to come its use is likely to become far more widespread.

System Enabling Squelch

Basically, CTCSS is a system for bypassing the squelch or audio on a receiver only when a particular tone is present. Using a standard squelch system, the audio is enabled only when a carrier is present.

By using CTCSS, only wanted signals will open the squelch. However, unlike the well known repeater tone burst the CTCSS tone needs to be present all the time.

There are a number of different CTCSS tones which can be used. Some commercial rigs have a selection of, as many as 37, ranging in frequency from about 60Hz up to around 250Hz.

Table 1: CTCSS Tones

Tone Area	CTCSS Tone (Hz)
A	67.1
B	71.9
C	77.0
D	82.5
E	88.5
F	94.8
G	103.5
H	110.9
J	118.8

The tones are all below the standard communications audio bandwidth. As a result it's possible to ensure that they do not appear in the audio from the loudspeaker.

To open the squelch, a tone on exactly the right frequency must be used. If the wrong tone is used then the squelch will not be opened and the signal will not be heard. This means that it's possible to selectively open the squelch on different receivers.

In the UK CTCSS is now being introduced onto repeaters. This has some distinct advantages.

Tone Burst

Up until recently all that was required to access a repeater was a single audio tone burst at the beginning of a transmission. Normally the repeater would listen on its input frequency and only open up the transmitter once it was properly accessed.

The burst system was adopted to prevent an unmodulated carrier being present on the air all the time. It also reduced power consumption - a significant consideration when these units are in rented accommodation and on the air for 24 hours a day.

A tone at the beginning of the first transmission rather than just the carrier was used to prevent noise or other spurious signals from opening the repeater's squelch. The standard frequency for this in the UK is 1750Hz, and many of you will have become used to hearing the customary 'beep' come through the repeater as it opens up.

In the early days of repeaters the system used was

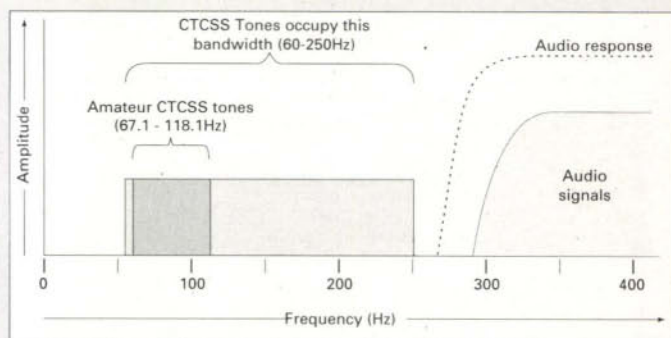


Fig. 1: Response curve for an f.m. demodulator, the closer the 'real' approaches the 'ideal' the lower the distortion.

quite sufficient. However, since then the number of repeaters has risen dramatically.

In many areas of the country it's quite possible to access repeaters on most of the repeater channels, especially on 144MHz. As repeater coverage is so good, it's often possible to be within the coverage area of two repeaters.

The coverage often means that both repeaters can be accessed at the same time. To help overcome this problem, it was proposed that CTCSS would be introduced so that only one station would be accessed at any one time.

Allocated Tones

To prevent two repeaters being accessed at the same time, adjacent repeaters using the same channel must be allocated different tones. To achieve this, nine different tones as shown in **Table 1** have been chosen for amateur use.

The tones are some of the bottom ones available, and they have been allocated letters as shown. The country has been split up into different areas, and each area allocated its own tones. This means that in any given area the same

tones can be used. A CTCSS tone map was published in the November 1994 issue of *PW* in the article 'Repeaters - What They Are And How To Use Them'.

When repeaters are fitted with CTCSS access they transmit the tone letter instead of the usual 'K' as the input transmission drops. This means that it's easy to identify which tone to use if you don't have *PW* to hand! It's worth noting that both the 1750Hz tone burst and CTCSS tone will operate in parallel so either mode of accessing the repeater can be used.

When the different tones are known, it's a simple matter of referring to the handbook for your rig to programme the correct tone for the repeater you want to access. These tones are stored along with the frequency in the memory so it does not have to be programmed in each time. It's only necessary to change the tone codes when you move area, if you go on holiday, etc.

The repeater also transmits a CTCSS tone. This is only present when a transmission is passing through. It means that you can programme your rig to use this to access its squelch, cutting out the periodic callsign transmissions which occur.

PW

Basic QSOs In Italian

Part 3

English	Italian	Pronunciation
Concluding Remarks		
May I thank you once more for this call and wish you a very good morning/afternoon/evening/good weekend.	Ti ringrazio ancora per questo collegamento e ti auguro una buona giornata/buon pomeriggio/buona serata/buon fine settimana.	Tea ringratseo ankora per kwesto koliegamento e ti awgoro wna bwona djornata/bwon pomayyridgow/bwona serata/bwon finay setiamana.
Merry Christmas and a Happy New Year. I send you my best regards. All the best to you and yours. I look forward to working you again. May I wish you 73, 55, 88 and make this my final.	Buon Natale e Felice Anno Nuovo. Ti invio i miei cari saluti. I migliori saluti per te ed i tuoi. Spero ricollegarti ancora. Ti invio i miei settanta-tre, cinquanta-cinque, ottanta-otto, terminando con questo finale.	Bwon Natalay ay Faylitshay Anio Nwovo. Te invewo i meeyee carry salwtee. I millori salwti per te ed ee twoi. Shpero reekoliegartea ancora. Te invewo ee meeyee setanta tray, tshinkwanta-tshinkway, otanta-otto terminando con kwesto finalay.
Back to ... from ... who is waiting for any concluding remarks from you. So best wishes and good DX. Goodbye until next time/until the pleasure of seeing you again.	Il cambio a ... da ... chi é in attesa per conclusioni finali. I migliori auguri e buoni DX. Arrivederci al prossimo incontro/al piacere di risentirti ancora.	Il kambeoo a ... da ... key ay in atayza per conclwzeonee finalee. I milioree awgwree ay bwonee DX. Arrivaydertshee al prosimo incontro/al peeatshayray dee risentitee ancora.
Stating Future Intentions		
This is ... signing off and clear with ... and now standing by for a call on this frequency. ... now monitoring this frequency and waiting for any call. ... now changing frequency to now returning to the calling channel. ... now going QRT.	Questo é ... che termina con ... e resta in attesa di chiamata su questa frequenza. ... ora resta su questa frequenza in attesa si qualsiasi chiamata. ... ora si sposta di frequenza su ora che ritorna sul canale di chiamata. ... ora passa in QRT.	Kwesto ay ... kay termina con ... ay resta in atayza dee keyamata sw kwesta frekwentsa. ... ors resta sw kwesta frekwentsa in atayza dee kwalsiasee keyamata. ... ora see sposta dee frekwentsa sw ora kay ritorna swl kanalay dee keyamata. ... ora passa in Kw-Er-Tea.

Gareth Roberts GW4JXN and Paolo Pellegrineschi I5IJP conclude the 'Basic QSOs In Italian' series.

Common Italian first names of operators - this allows you to copy them down sooner in the QRM if you can recognise them.

Angelo	Eduardo	Mario
Alberto	Enrico	Marco
Andrea	Filippo	Michele
Antonio	Ferdinando	Pietro
Alessio	Fausto	Raimondo
Augusto	Fortunato	Riccardo
Alfredo	Giuseppe	Roberto
Bernardo	Giovanni	Rinaldo
Bruno	Gabriele	Stefano
Cesare	Giuglio	Sergio
Claudio	Ignazio	Tommaso
Carlo	Lorenzo	Ugo
Donato	Leonardo	Vittorio
Emilio	Leone	Vincenzo
Emanuele	Marcello	Valerio

Numbers with Italian pronunciation.

Number	Italian	Pronunciation
1	uno	oonoh
2	due	doay
3	tre	tray
4	quattro	cooahtrah
5	cinque	chinquay
6	sei	say
7	sette	sayttay
8	otto	otto
9	nove	nowvay
10	dieci	deeyatshee
11	undici	wndeetshee
12	dodici	dohdeetschee
13	tredici	dohdeetschee
14	quattordici	coatordeetschee
15	quindici	queendeetschee
16	sedici	saydeetschee
17	diciassette	deetschiasaytay
18	diciotto	deetscheeotto
19	diciannove	deetshianowvay
20	venti	vaintay
21	ventuno	vaintoonoh
22	ventidue	vaintidoay
30	trenta	trenta
31	trenuno	trentoonah
40	quaranta	coaranta
50	cinquanta	chincwanta
60	sessanta	sayssanta
70	settanta	settanta
80	ottanta	ottanta
90	novanta	novanta
100	cento	tshaynto
200	duecento	doaytschaynto
1000	mille	milay
2000	due mila	doaymealah

Here is a list of the most common radio technical words and phrases. No pronunciation is given this time as it is assumed that if you use them you know some basic Italian.

absorption wavemeter	ondametro ad assorbimento (m)
ammeter	amperometro (m)
amplifier	amplificatore (m)
amplitude modulation	modulazione di ampiezza (f)
antenna	antenna (f)
antenna matching	accoppiatore di antenna (m)
antenna tuning unit	accordatore di antenna (m)
aurora	aurora (f)
auroral	aurorale (f)
balun	unità di bilanciamento (f)
calibrator	calibratore (m)
carrier frequency	frequenza portante (f)
coaxial cable	cavo coassiale (m)
coil	bobina
condenser	condensatore (m)
continuous wave	onda continua (f)
cross-modulation	intermodulazione (f)
dial	quadrante (m)
a digital frequency meter	un frequenzimetro (m)
disturbance	disturbo (m)
dummy load	carico fittizio (m)
earth	terra (f)
fading	evanescenza (f)
feeder	alimentatore (m)
final stage	stadio finale (m)
fixed	fisso
frequency modulation	modulazione di frequenza (f)
ground wave	onda terrestre (f)
high pass filter	filtro passa-alto (m)
indoor antenna	antenna interna (f)
insulator	isolatore (m)
ionosphere	ionosfera (f)
jack	presa (f)
lightning protection	protezione da fulmine (f)
line of sight	linea di visibilità (f)
log book	giornale di stazione (m)
lower sideband	banda laterale inferiore (f)
low pass filter	filtro passa-basso (m)
metal case	cassetta metallica (f)
a meter	uno strumento di misura (m)
modulated wave	onda modulata (f)
operator	operatore (m)
oscillation	oscillazione (f)
parasitic oscillations	oscillazioni parassite
plug	spina (f)
power supply	alimentatore di corrente (m)
preset	preregolato
preset potentiometer	dispositivo di pre-regolazione (m)
pulse modulation	modulazione ad impulsi (f)
to radiate	irradiare
the range	portata (f)
readability	comprensibilità (f)
repeater	ripetitore (m)
resistance	resistenza (f)
resistor	resistore (m)
r.f. amplifier	amplificatore r.f. (radio frequenza) (m)
rig	equipaggiamento (m) attrezzatura (f)
rotator	rotatore (m)
satellite	satellite (m)
selectivity	selettività (f)
sensitivity	sensibilità (f)
shielded braiding	calza schermata (f)
sideband	banda laterale (f)
single sideband	banda laterale singola (f)
skip zone	zona di riflessione (f)
sky wave	onda spaziale (f)
solid state	stato solido
sound frequency	frequenza sonora (f)
speech processor	compressore microfonico (m)
standing wave	onda stazionaria (m)
standing wave ratio	rapporto onde stazionarie (m)
switch	interruttore (m)
transceiver	ricestrasmettitore (m)
transistor	transistor (m)
transmitter	trasmettitore (m)
troposphere	troposfera (f)
tuned circuit	circuito accordato (m)
to tune up	accordare
upper sideband	banda laterale superiore (f)
valve	valvola (f)
variable	variabile
vertical antenna	antenna verticale (f)
vertical rod	stilo verticale (m)
voltmeter	voltmetro (m)
wavelength	lunghezza d'onda (f)

Days Of The Week

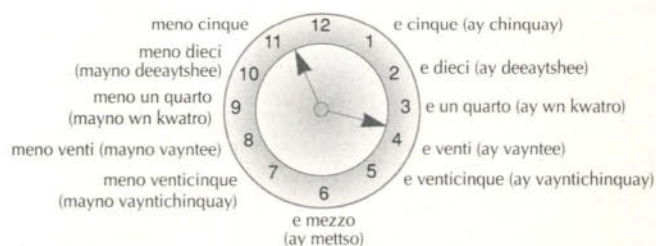
Day	Italian Name	Pronunciation
Sunday	domenica	domaineekah
Monday	lunedì	loomaydee
Tuesday	martedì	marrraydee
Wednesday	mercoledì	mercollaydee
Thursday	giovedì	joveaydee
Friday	venerdì	venerrdee

The Italian alphabet is used for stating Q code and also for stating call signs (nominativi).

Letter	Italian Name	Pronunciation
a	a	a (as in ask)
b	bi	be
c	ci	tshee
d	di	dee
e	e	ay
f	effe	efay
g	gi	gee
h	acca	akka
i	i	e (as in East)
k	cappa	kapa
l	elle	aylay
m	emme	emmae
n	enne	enay
o	o	o (as in pot)
p	p	pay
q	cu	coo
r	erre	eray
s	esse	esay
t	ti	tea
u	u	oo (as in hoot)
v	vi	v
w	doppio vi	dope-eeo v
x	ics	eeks
y	ipsilon	eepsiailon
z	zeta	dzayta

Time

English	Italian	Pronunciation
What time is it?	Che ora è?	Kay oarah ay?
It is one o'clock	é l'uno	Ay loon-oh
It is two o'clock	sono le due	sonoh lay doay
It is 2.05	sono le due e cinque	sonoh lay doay ay chinquay
It is 1.55	sono le due meno cinque	sonoh lay doay mayno chinquay



SPECIAL OFFER

This month's special offer will appeal to all of you who are keen hand-held mobile operators and like to take your radio with you in your car wherever you go. When travelling in your car it's often very difficult to find a suitable place to put your hand-held radio that makes it easy to get access to. Don't worry - we've got the answer!

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To take advantage of this special offer please use the order form on **page 68** of this issue or alternatively call the **Credit Card Hotline** on **(01202) 659930** to place your order.

Offer open until **January 13 1995 (UK)**, **January 27 1995 (overseas)**.

***December 11:** The Verulam Amateur Radio Club will be holding its Verulam Christmas Rally at the Watford Leisure Centre, which is located less than five minutes drive from the Junction of the M1 and M25 motorways. Trading will be from 10am to 4pm. **(01923) 222284**.

1995

January 28: The Lancastrian Radio & Computer Rally is being held at the University of Lancaster. There will be all the usual traders, refreshments, a bar and Bring & Buy. There is excellent access to this rally, five minutes from either Junction 33 or 34 on the M6. Admission is £1. Doors open at 10.30am for the disabled and 11am for everyone else. Further details from **Sue** on **(01524) 64239**.

February 5: The South Essex ARS Radio Rally is being held at The Paddocks, Long Road, Canvey Island, Essex, (The Paddocks is located at the end of the A130). Doors open at 10.30am. Bring & Buy, trade stands and home-made refreshments are available. Talk-in on S22. Admission is £1. Free car parking. **Roger GOLTO** on **(01268) 693786** or **Ken** on **(01268) 755350**.

February 12: The 4th Northern Cross Rally is being held at Rodillian School on the A61 between Leeds and Wakefield

RADIO Diary

**Practical Wireless & Short Wave Magazine in attendance.*

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

The Editorial staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers.

If you have any queries about a particular event, please contact the organisers direct - Editor

(near Jn. M1/M62). Doors open at 11am (10.30am for disabled visitors and Bring & Buy). £1 entry. There will be the usual dealers and groups, a bar and refreshments plus a Morse test on demand with two passport photos. Talk-in on 144 and 430MHz. **Dave Gray** on **(0113) 2827883**.

February 19: The RSGB VHF Convention is being held at Sandown Park Exhibition Centre. Further details can be obtained from **G3MNV** on **(01277) 225563**.

February 25: The 10th Rainham Radio Rally is to be held at the Rainham School for Girls, Derwent

Way, Rainham, Gillingham, Kent ME8 0BX. It is very easy to find from Jn. 4 of the M2 motorway the A278 or from the A2 from Rainham. Doors open at 10.00am, 9.30am for disabled visitors. There will be the usual trade stands, plus a few new ones selling computers. Many special interest groups will be represented, ie. RAYNET, RNARS, Packet, KRGroup and Kent TV Group. There is also a talk-in on S22 by GB4RRR, a Bring & Buy, licensed bar, and snacks and refreshments also available with somewhere to sit and eat. Admission is £1, children under 14 free. Further info. from **Martin G7JBO** on **(01634) 365980** any reasonable time.

***March 11/12:** The London Amateur Radio & Computer Show will be held at Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. Doors open at 10am to 5pm each day. There will be a trade show, lectures, Bring & Buy, on-demand Morse tests, disabled facilities, bars, restaurants, special interest groups and ample free parking. For further information you can contact **Steve White G3ZVW** on **0181-882 5125**.

March 12: Wythall Radio Club will be holding their annual Radio Rally at Wythall Park, Silver Street, Wythall (near Birmingham, on the A435, just two miles from Junction 3 on the M42). Doors open at 10.30am to 4pm. There will be the usual traders in three halls, a marquee, a bar and refreshments and a Bring & Buy stall run by the club. Talk-in on S22. Admission only £1. **Chris G0EYO** on **0121-430 7267**.

March 26: Bournemouth Radio Society's 8th annual sale will be held at Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open at 10am and close at 4.30pm. There will be a talk-in from G1BRS on 2m S22, amateur radio and computer traders, clubs and specialised groups, along with excellent refreshments. Admission is £1 which includes a free raffle. **Malcom G0UCX, QTHR** or **(01202) 747745**.

Top Band Targeting

John Hucklebridge G3ENR, discovers the source of a 'needle bending' 1.8MHz signal he found on his receiver, profiling the station of G3ISG at the same time.



As you can tell from my callsign, I've been in amateur radio quite some time. Over that period I'd heard the stories of enormous 'rock-crushing' signals that threaten to destroy S-meters. Up until that day though, I couldn't say I'd found one.

However, all that changed one day when I was idly tuning through the 1.8MHz band listening for the usual 'normal' signals. Suddenly a very loud signal on the band made me turn down the r.f. and a.f. gains on my receiver. It's a good job I wasn't wearing earphones!

Taking note of the station's callsign, I looked him up in the callbook. I discovered that he was a near neighbour of mine, Stuart Green G3ISG of Corston, near Bath who lives about a mile or so away.

The enormous signal aroused my curiosity as to how such a signal was produced. The answer turned out to be unbelievably simple. It was due mainly to three 15m telegraph poles and a lot of wire and perseverance by Stuart.

Stuart has a routine for chasing the DX on 'Top Band'. Every morning, after getting the

more mundane things like breakfast out of the way, he's in his shack just before daylight.

From experience, Stuart has found that around dawn, and again around dusk, are the best times to work the ZL on single sideband. I've since found of course, that this statement is a generality, as conditions are exactly right only on occasions.

Making his hobby of 1.8MHz DX chasing that little easier, Stuart lives in radio amateur's paradise. He has a huge garden, in an area with flat fields surrounding it. He has just two neighbours who obviously have no objections to the three 15m telegraph poles stood in his garden.

These three tall telephone poles are supports for a horizontally mounted Delta loop antenna. The poles are far enough apart to form the loop from some 300+ metres of 2mm (14s.w.g.) copper wire.

The Delta loop has a main lobes pointing almost towards my location. This accounts for the enormous signal that threatens to destroy the signal strength meter on my receiver!

I think that this 'maximum metal' in the sky idea for antennas obviously works. And more



Ready the sea shanties! Stand by to hoist the antenna into the air. But only seasoned tallship men may apply at this QTH!

especially so if the antenna is in the shape of a antenna loop.

The quad loop antenna has been used to great effect for many years in the h.f. broadcasting world. The Andean station HCJB, with comparatively modest powers, but using a quad loop antenna puts a fantastic signal into receivers on this side of the Atlantic (and the equator).

The recent changes to the licence schedule, allowing British amateurs higher powers in part of the 1.8MHz band will allow many of us to create a bigger signal. But only an antenna with a good effective size will give a good received signal.

In spite of the licence changes Stuart doesn't need them. Before high power was permitted, and all on 1.8MHz using an FT-102 and FV102DM, Stuart had worked 55 countries, with 48 confirmed including ZL.

PW

Stuart G3ISG is dwarfed by two of the three 15m telegraph poles that hold up his 'Top band' loop antenna.



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Seated One Day

John Worthington GW3COI turns his hand to ergonomic design

Not enough thought is devoted by most people to ergonomically designed operating positions. Yet poor positioning of the arms and spine can, and often does, lead to various cramps and pains.

Other symptoms not only kill the enjoyment of operating, but lead to the loss of rare DX contacts, defective equipment, domestic strife, dental problems (teeth gritting) and excessive expenditure on potent medicines to mention but a few.

Layout Of Shack

Of course, sometimes the layout of a shack and the throne, or operator's seat, is almost perfect. But the occupant can nullify this by dressing carelessly, fastening his braces incorrectly causing an involuntary stoop, or wearing leather helmets thus causing loss of audio.

However, such absent-mindedness is beyond the scope of the present article, but will be covered in 'Operating - The Mental Approach'!

Basically, you would think that all your average operator really requires is a simple table on which to put their gear and a simple chair.

But my researches have proved time and again that there are many to whom these plain pieces of furniture are denied, either from lack of room, XYL domination or other complicated factors, (among the latter comes woodworm, rust and rising damp!).

Early Days

In my early days, just after the discovery of gunpowder, I had a friend who always operated standing up even though he had room for a chair and more importantly, the chair.

Whenever he had visitors they would all crowd into his shack, standing up of course, and would look like a bunch of pickets.

Ray (I have changed the name to protect the innocent) never talked about his erect regime, but noticeably, his QSOs

were short. Later he suffered from chronic backache and became a lollipop man!

I never discovered why he didn't use a chair but having met his XYL, I think I can now put two and two together - she's a wide band person and probably needs all the spare chairs for herself!

Problem Operating

Then, of course, there is the problem of operating in your living room. You then feel the heat from a living fire, this is actually my own case.

I like to watch TV while operating and also eat my tea and read the paper. Now, to be able to do this, it requires that the rig, if it were on a table and you were sitting on a simple chair, should ideally come between you, the fire and the TV.

However, this would give rise to the problem of 'harness' awareness, XYL wise, plus the fact that if you have a table at normal height, the gear obscures the TV and the whole thing prevents heat from reaching the operator!

So what do I do?..... The solution is the Ingle Nook and as far as I can see, it is the only practical way. It can be a simple shelf, but of course, the deeper the space, the more gear you get into it.

In my case, I get an FT-101B, portable TV, RTTY unit, MM400-1KB, Datong filter, tape

recorder, H/B linear, car battery plus innumerable books, rubbish and even a trumpet.

Readers may wonder the reason for having this instrument handy. I have occasional visits from a friend who years ago sold all his equipment and retired from the radio scene (you've seen these ads where the chap says 'selling up, no splits, etc.).

Well, he managed to get rid of everything except an old horn gramophone. Using this with me on the trumpet, we always have a nostalgic Morse QSO at a range of a few feet.

Various Designs

Now, we come to the chair itself. I have tried various designs and am shortly to change yet again.

Ideally, the adjustable type would be the thing. The operator can then take a snooze if he wishes and there is no doubt that the little exercise of moving a lever or two is good for those whose hobby is so sedentary.

Well, there it is then - if any reader has found this article helpful I shall be very surprised, but I thought it would be a good idea to give you a demonstration of the sort of waffle I have on my local net. I'm not saying what frequency it's on, or else you'll all want to join!

PW



"You then feel the heat from a living fire..."

Antenna Work

I like operating on the 50MHz band. It's an area of the spectrum that has a mix of h.f. and v.h.f. propagation modes.

This band allows local contacts (via the troposphere) and DX contacts (via the ionosphere) to be made. The two antennas I'm about to describe can both be used for local or DX contacts.

An antenna with horizontal polarisation could be used for local operation. But should you have more than two people in a net then things could become difficult. Where do you point the beam?

The answer is to use a vertical antenna with an omni-directional characteristic for local operations. You'll also be able to contact the mobile operators slowly being attracted to the 50MHz band.

To work mobiles you'll also need to use a vertically polarised antenna. In theory, the cross polar discrimination (x.p.d.) is infinite, and you shouldn't hear anything. But in practice, a mismatch in polarisation will lose you around 18-36dB in signal strength, or about three to six S-points!

Long distance (DX) contacts are normally weak-signal modes making a high gain (horizontally polarised) Yagi antenna desirable. However, there are two modes, F2 (I'll ignore this mode just now) and sporadic-E (Sp-E), that can produce very strong signals.

In single-hop Sp-E openings, path attenuation can often be very low, so even a simple antenna can be useful. In fact a highly directive antenna can sometimes be a hindrance.

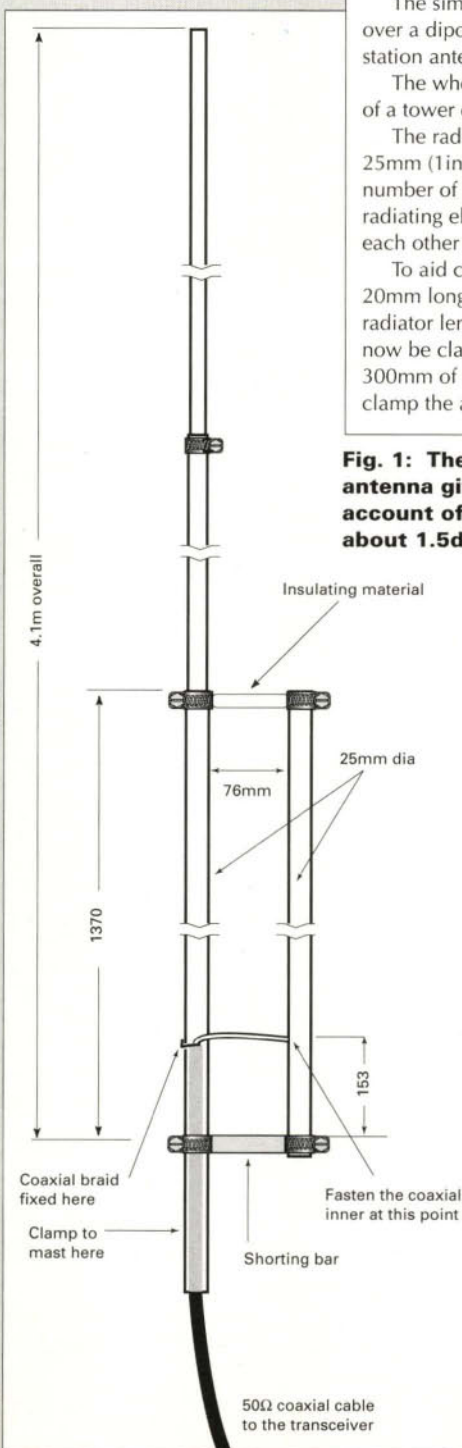
Openings can occur in many directions at once. So, it's useful to have an omni-directional antenna for general searching.

The cross-polarisation effect that I mentioned earlier can also affect DX signals. Sometimes a signal that started out as horizontal polarisation might, at times, arrive in a vertical plane.

One other advantage that I forgot to mention is that vertical antennas can be broken down into fairly small component parts. So, now there's no excuse for not coinciding the annual family

holiday with a DXpedition!

As the feeder really does need to be perpendicular to the dipole for some distance. This makes mounting a vertical dipole rather cumbersome. A neat solution to this is to construct a vertical dipole fed via a matching transformer at the bottom.



The J-Pole Antenna

The arrangement shown in Fig. 1, is called a J-Pole antenna. Ideally the matching stub shouldn't radiate, though in practice it does.

The slight radiation interferes with the main lobe of the antenna, causing the effective radiation angle to increase. Although other matching methods may be better, the J-Pole still provides excellent low angle radiation.

The simple to set up J-pole antenna has a gain of about 1.5dB over a dipole (1.5dBd). It makes a good general purpose base station antenna, not needing radials.

The whole assembly is quite sturdy and can be mounted on top of a tower or existing mast.

The radiating element can be made from one single piece of 25mm (1in) tubing. However you may wish to construct it from a number of telescoping sections. I used three 1.5m lengths for the radiating element. Tubing of 25, 22 and 19mm (all 18s.w.g.) fit into each other easily.

To aid clamping use a hacksaw to make two small cuts about 20mm long into one end of the sections. Then adjust the overall radiator length to 4.1m above the shorting bar. The sections can now be clamped with Jubilee clips. Don't forget to provide about 300mm of tubing below the shorting bar. This is used to help clamp the antenna onto a mast.

Fig. 1: The J-Pole antenna gives a good account of itself with about 1.5dBd gain.

Matching Section

The matching section is made from 25mm tubing. It should be 1370mm long measured from the top of the shorting bar. An insulating spacer, of nylon or similar material fitted between the two elements as shown.

The shorting bar consisted of two Jubilee clips and a small piece of copper water pipe soldered between them. It wasn't very elegant but it worked. As long as the base of the matching section is held rigid and the spacing is maintained it doesn't really matter how you construct the shorting bar.

You could build the entire antenna out of surplus copper water pipe. Then you could use T-piece adapters similar to the antenna described by Dick Pascoe G0BPS in 'Antenna Workshop' in the September '94 issue of PW.

The coaxial cable 50Ω impedance low loss type (such as RG8/RU or similar) is preferable, may be brought down inside the tube. Separate the outer braiding from the insulated inner conductor, and twisted the braid into one 'pig-tail' to allow it to be soldered to a tag.

Seal the end of the coaxial

rkshop

Our 'VHF Report' author, David Butler G4ASR, takes this opportunity to describe two antennas suitable for the 50MHz v.h.f. band.

cable to stop entry of water. The outer braiding of the feeder is passed through a small hole and attached to the tube 153mm above the shorting bar with the use of a small solder tag and stainless steel screw. The inner conductor is connected in a similar fashion as shown in Fig. 1.

If you've followed the given dimensions then the v.s.w.r. should be very low. If not, alter slightly the position of the tap to bring the v.s.w.r. to an acceptable level.

Ground Plane

This $5\lambda/8$ wave vertical ground plane (GP) antenna, is in reality a three quarter wave antenna with the bottom $\lambda/8$ in the form of a coil. The base loading coil allows 50 or 75 Ω feeder to be used without any significant matching problems.

The performance of the GP antenna, has a slight edge over the J-pole antenna. Although a little more engineering work is required it's well worth the effort.

The GP antenna, shown in Fig. 2, can be constructed out of a number of telescoping sections of aluminium tubing. If you decide to do this then the diameters of each section must be chosen so they just fit into each other.

I used two 2m lengths of 18 s.w.g. tubing, one 22mm (7/8in) diameter and the other 19mm (3/4in) diameter. If you want to use it for a DXpedition then a

four section antenna could be built. Sections of 22, 19, 15, 12mm diameter will be ideal.

The antenna is loaded at the bottom with a coil wound on an insulating former 19mm in diameter. I used a small piece that conveniently fitted inside the base section of the vertical. The coil consists of 10 turns of 1.5mm (16s.w.g.) diameter copper wire evenly spaced over 130mm.

The bottom of the coil is attached to the base plate and the top is connected to the vertical radiator. Use solder tags and stainless steel screws for fixing.

The coil is tapped 5 turns from the grounded end. Then it's connected to an SO-239 socket mounted on the base plate.

The radiating element (including the coil former) should be adjusted to a total length of 3.95m. I prefer to use Jubilee clips for clamping the sections together. You could use stainless steels screws however.

Radials

The number of radials used directly effects the feedpoint impedance and the radiation characteristics. Experimentation shows that the minimum number is three radials.

As the number of radials is increased there is less effect on the characteristics. More than six radials gives little improvement.

I chose the middle ground and have gone for four radials. Each radial is about one quarter wavelength long (1.25m) and is made with 10mm diameter tubing. They are mounted onto the base support, as shown in Fig. 3, by stainless steel screws.

Base support is provided by a 'U' shaped piece of aluminium formed from a length of aluminium plate, measuring 460

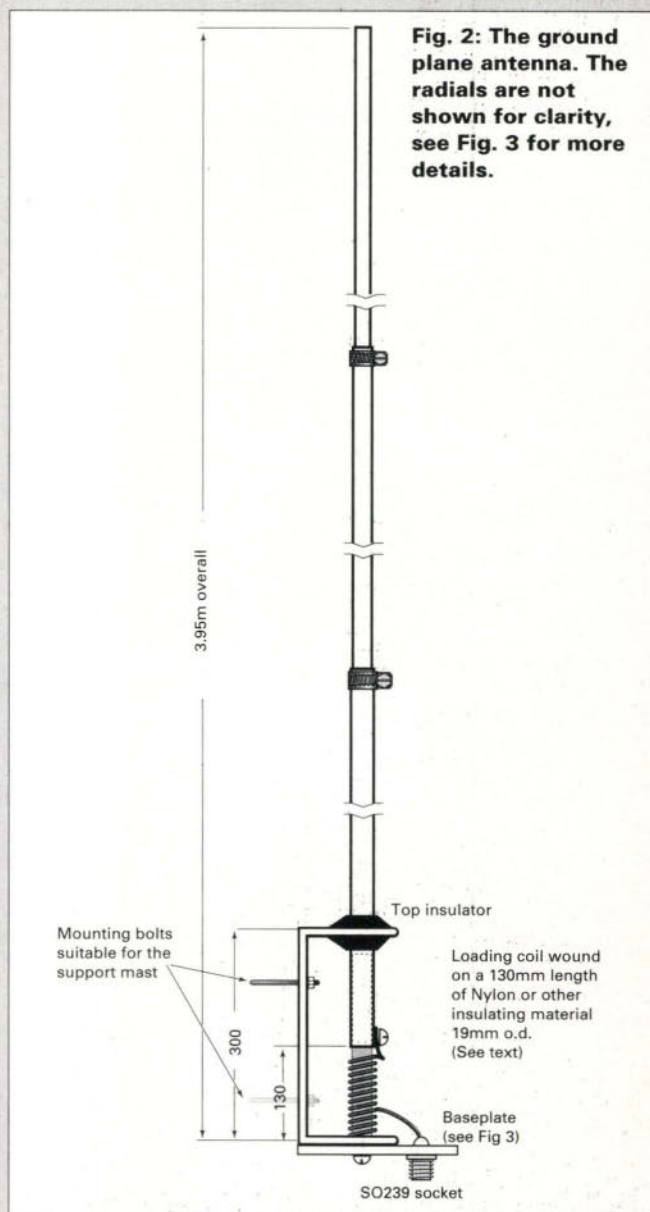
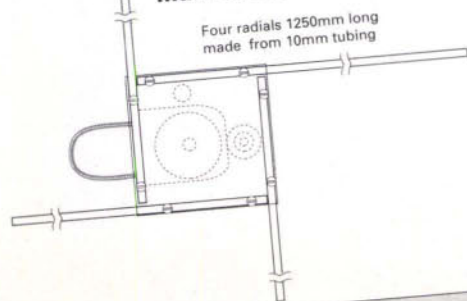


Fig. 2: The ground plane antenna. The radials are not shown for clarity, see Fig. 3 for more details.

Fig. 3: Four radials (viewed from underneath) make up the 'ground plane' for the GP vertical antenna. Four radials give a reasonable performance without too much complexity.



by 80mm. Make the bends as shown 80mm from each end.

An insulator needs to be manufactured to stop the antenna shorting to earth. This could be nylon or a rubber grommet, alternatively you could use approximately 400mm of fibreglass tubing. It's possible to get tubing that is an interference fit over the 25mm tubing.

I was fortunate to obtain a scrap 27MHz CB antenna that provided the base assembly so I didn't have to do any metal bashing. In fact it may be possible to build this 50MHz vertical completely from such an antenna.

Tuning is very simple. Adjust the top section to set the centre frequency of your choice. Then adjust the tap on the loading coil for minimum v.s.w.r.

Final Tip

Here's a final tip. If you use a $5\lambda/8$ mobile antenna for the 144MHz band you may be surprised to know that it will also work on the 50MHz band. At this frequency it will work as a quarter wave.

Hopefully you should find that the v.s.w.r. is quite low, around 1.3:1 or so. There you are, a dual band antenna and you didn't even know you had one! PW

Ron Ham invites you once again to enter the PW 'Vintage wireless shop'. You may not be able to buy anything but you can at least share the many memories sent in by other enthusiasts of valves and polished cabinets!

Valve &



Fig. 1: The Philip's Communications Receiver (PCR).

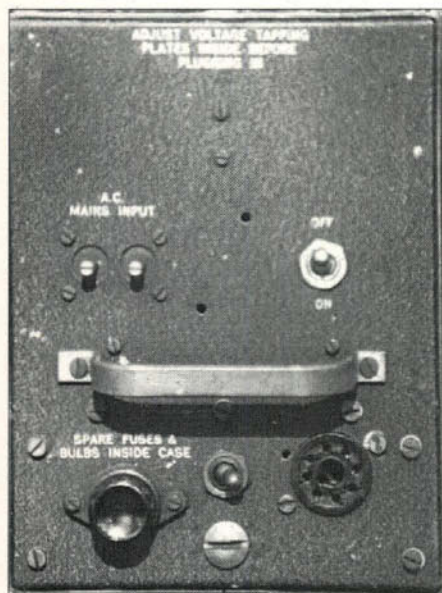


Fig. 2: Power supply unit for the PCR.

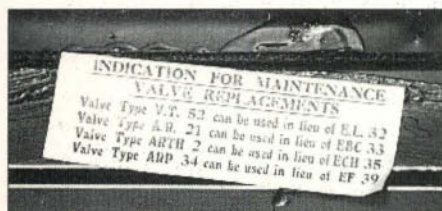


Fig. 3: Small - but not insignificant. This scrap of paper can sometimes be found enclosed with PCR units, providing information on civilian valve equipment.



Fig. 5: Tuning scale on the PCR, showing the locking feature immediately below the tuning knob (see text).

Welcome to 'Valve & Vintage' and firstly, may I wish you all a very Happy Christmas and a prosperous New Year. Secondly, I'd like to thank you for your letters and the kind remarks about 'Valve & Vintage'.

I'll start off with a letter from Australia this time. In Victoria, Rodney Champness has a working Type A MkIII and an unused Type 3 MkII (clandestine sets) in his collection.

Rodney also tells me that a number of 22 sets were modified in Australia. They then became known as the "Yellow Band 22 Wireless Set".

Battles And Broadcasting

With all the destruction that followed the battles from Normandy through to Berlin in the Second World War, the Allied authorities used broadcasting to advantage. They employed it to communicate with and to help the unsettled civilian population on a large scale. And, I understand that the Philips Communications Receiver (PCR) was made, in various forms, for this purpose.

The idea was that a PCR, Fig. 1, could be installed in a truck or in the home. It could also be used in buildings where the public gathered to hear the news or official announcements.

To meet the portability requirement the set was designed to run from a vibrator pack or fed from a 'wet' battery. It could also work from a mains unit, Fig. 2, suitable for various a.c. voltages.

Originally, there was a hefty rubber lead with a large 'snap' connector in the middle which carried the high and low tension supply from the power unit to the set. Although the power pack in Fig. 2 has been modified, I can tell you what I remember about the original panel.

The a.c. input point, upper left, and the pilot lamp, lower left, in the

unit in Fig. 2, are authentic. But the octal valve base on the opposite side is not.

From memory, I think that this was a 'bush' unit like its opposite number at the bottom left of the receiver, Fig. 1. A short lead with its half of the 'snap' connector came out via the bush on each unit.

Please remember that these power units may now be dangerous. This is because the insulation of the mains transformer, wiring or components could have broken down.

Also there is no safety earth connection provided in the mains lead on the PCR. This means that, in the event of a fault occurring, the chassis could become live. If you are not sure about making this safe do get some professional advice.

Military Style

Both chassis are housed in military style metal cases. They are released by the four corner bolts in Fig. 1 and the large slot screw at the bottom centre of Fig. 2. But beware, these may be a tight fit especially if you find one that has been stored for years.

However, you may find a useful label, Fig. 3, giving the valve types in military and civilian terms. This is often stuck inside the back of the receiver case.

Superhet Receiver

The PCR is a six valved superheterodyne receiver using the international octal series of valves known in the trade as the 'Red-Es'. This name applies to such valves as the EF39, ECH35, EBC33, etc., because their initial letter is 'E' and their metallised coating is red!

My theme in 'Valve & Vintage' is 'wireless is wireless' whoever it's made for. I'm reminding you of this because the collectors among you will meet the 'Red E' range of valves in many pre-war and post-war domestic sets.

Screening is an important factor in any set and the PCR lives up to

Vintage

By Ron Ham

this rule. For instance, **Fig. 4** shows its upper chassis and the metal can around the frequency changer valve.

The photograph shows the frequency changer (ECH35), centre left, the screened top cap 'hats' on the r.f. amplifier (EF39), top left and the two audio valves (EBC33 and EL32) on the lower right. The latter two screening cans protect against 'hum' being picked up by the top cap grids.

There are coils inside the oblong box to the left of the three-gang tuning capacitor in **Fig. 4**. There's also of course the three i.f. transformers, bottom row, which are screened by their own metal containers.

The Controls

All the controls on the PCR are to the right of the loud-speaker, **Fig. 1**. Starting on the left, there's the volume control, tone, tuning and wave-change switch ending with the antenna trimmer.

The antenna is connected to the large terminals by the handle on the right. The depth of audio tone and the selected wave-band, left and right of the tuner **Fig. 5**, is indicated by a pointer at each end of the dial glass.

The tuning scale for the long and medium waves, inner and centre respectively, is calibrated in metres. The outer shortwave band is described in MHz.

The latter covers from 6 to 18MHz. The 49, 41, 31, 25 and 19 metre broadcast bands are marked on the scale each with a short arc.

The cursor on the PCR's easy to read and well illuminated dial, centre **Fig. 5**, has a 180° sweep. This is controlled by the large, lockable, knob in the middle.

The Valves

The PCR's, valves, **Fig. 6**, are three EF39 pentodes (r.f. and i.f. amplifiers), one ECH35 triode-hexode (mixer/oscillator), one EBC33 double diode triode (detector and audio driver) and an

EL32 audio output pentode.

The audio from the EL32 is fed to a special speaker transformer, centre right **Fig. 4**. This has windings for a 100Ω telephone line.

Incidentally, for decades Philips always enclosed their loud speakers in a white cloth dust cover, top right **Fig. 4**. The speaker securing bolts are passed through the cloth which by now may have rotted into the threads.

The securing bolt threads might be tight to undo. You may have to search the fabric shops for a suitable material to replace the cover.

All the valves, except the ECH35 (which has a 300mA heater current) require 6.3V at 0.2A, and around 200V high tension. Don't forget to always check the valve types for working voltages with a manual, especially if you are using one of a different make.

Service Points

One or two servicing points now. Firstly, make sure that both ends of the tuning capacitor spindle, left **Fig. 7**, the dial drive mechanism, bottom left **Fig. 8** and the wavechange switch shaft, centre **Fig. 8**, are lubricated.

The PCR dial is illuminated by two bulbs. These are behind the glass and dummy holders are provided for spares to the right of the tuning capacitor, **Fig. 4**.

I removed the screening plates that cover the coils and trimmers, bottom right **Fig. 7** and centre **Fig. 8**, to let you see most of the coil pack and switching arrangement.

Should it be necessary to alter the alignment of the PCR, make sure that the covers are refitted. Ensure also that the trimmers, centre and centre right **Fig. 8**, move freely and are adjusted with a strong (insulated) tool.

At this age it's almost sure that the tubular capacitors, mounted in pairs, around the top and right side of **Fig. 8**, will need replacing. The upper one on the right carries a 'ZA' (Army) part number and the lower one is stamped with the

Fig. 4: Top chassis view for the PCR unit discussed by Ron Ham. The white cloth used to protect the speaker was a feature of Philips receivers for many decades.

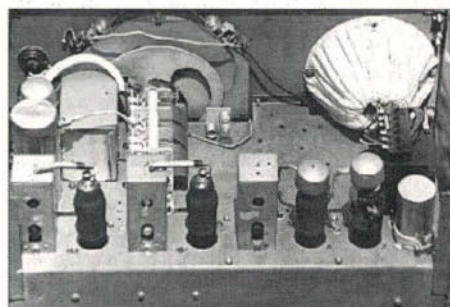


Fig. 6: Valves used on the PCR unit (see text).

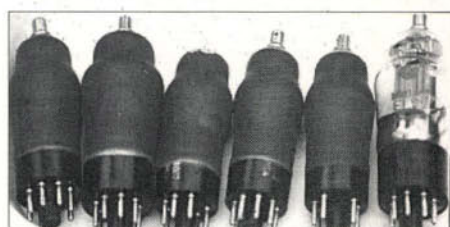


Fig. 7: Main tuning capacitor used on the PCR unit, with screened coil compartment visible on the right (see text).

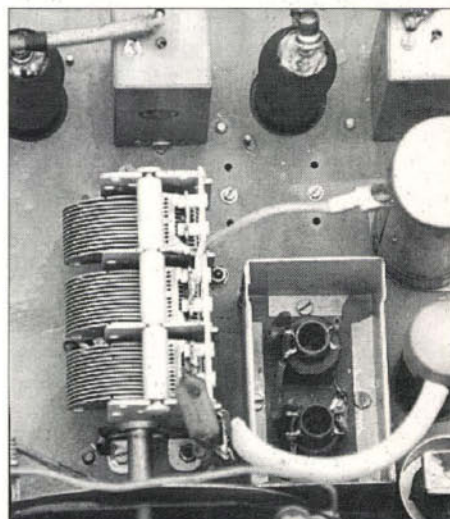
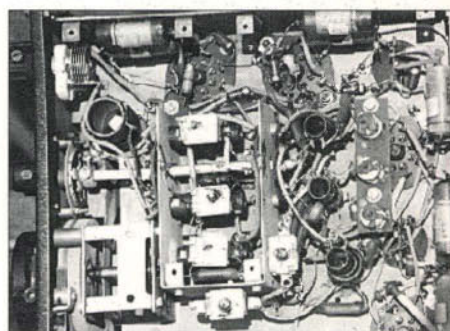


Fig. 8: Under chassis view of the PCR unit, showing screened band switching, associated coils and aerial trimmer (top left). See text for advice on replacing 'canned' capacitors.



makers date '8 44' (August 1944). Such information is valuable to collectors.

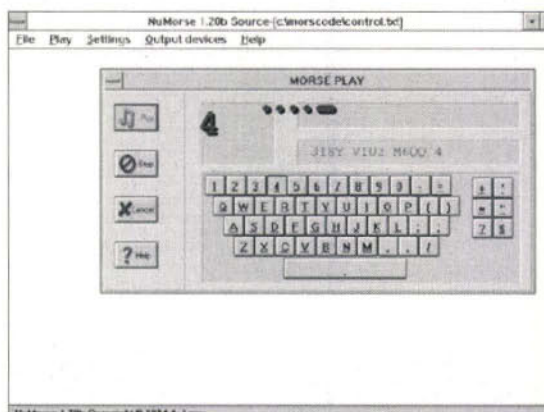
That's it for this time. Happy Christmas and a prosperous New

Year everyone! And, don't forget to keep writing to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 4HE.

The Computer in Your Shack

This month Mike Richards G4WNC has news on a new version of the NuMorse program as well as updates on CompuServe and Internet.

Fig. 1: NuMorse's screen representation of a keyboard showing the last few received characters.



The latest shareware program to arrive on my desk is version 1.20b of the Morse tutor NuMorse by **Tony Lacy G4AUD** of Wolverhampton. This excellent Windows based tutor is full of user adjustable features which makes it suitable for all.

One of the most impressive features is the Windows interface itself. As you can see from the screen dump (Fig. 1), you are presented with a screen representation of a keyboard with a display showing the last few received characters.

In its standard configuration the current character is played through the sound device and the Morse character is shown on the screen. As with most of the parameters, the range of information displayed can be set by the operator through the OPTIONS menu.

The source text for NuMorse can be defined by the user and can be anything you like. So, to make the program easy to use, it comes with a well thought out selection of texts which will suit the needs of most amateurs.

There are essentially two key learning modes in NuMorse, Continuous and Drill. The Continuous mode is pretty much self explanatory and produces a stream of characters at a constant speed.

Perhaps the more powerful learning system is provided by the Drill mode. In this mode the program works interactively with the operator to drive up the receive speed.

Once the Drill mode is activated you use the keyboard to indicate the appropriate received character. NuMorse then monitors your performance and increases the speed as you get better. I found this to be particularly useful for refresher training to get you quickly back up to a previously attained speed.

Just to complete this sophisticated learning program, there is a very powerful analysis log. This keeps track of your responses so you can quickly see the areas that need attention.

In a recent note, Tony reports that he's currently working on version 1.30. In addition to a few minor bug fixes, the following additional features will be included: Windows style toolbar, Speech output for the visually impaired, A flashing semaphore system for those with hearing problems, On-screen clock-timer and QSO & FCC test generation.

If you would like to register for version 1.30 just send a cheque or postal order for £14.00 to **A. Lacy, 58 Bilbrook Road, Codsall, Wolverhampton WV8 1ER**. To receive version 1.20b you can either send me a formatted 3.5in disk, self addressed label and 50p or you can download the file from CompuServe's HAMNET forum. My thanks to Tony for this fine program.

Difficulty Decoding

Bob Stainton G0ELH reports that he has been having difficulty decoding Morse transmissions using computer programs. Up until recently he had been using HAMCOMM 2.2, but has now upgraded to version 3.

The problem is not new and is a difficult one for a computer to crack. If you think about how a Morse decoding program works it has to look at an audio input signal and try to find a pattern that aligns with the stored Morse characters. This is reasonably simple when dealing with good quality hand or machine generated code!

However, you have no doubt come across the operator that sends Morse with what's known as a 'swing'. This is a distortion of the Morse timings which in some cases can be severe. It's not really surprising that computer based decoders have great difficulty following this heavily distorted code.

The only way around the problem is for the program to adapt itself to the stylised Morse and effectively amend its stored reference. This is further complicated when dealing with amateur transmissions as there is a

fairly rapid changeover between operators. As you can see all these difficulties combine to make computer decoding of poor quality Morse very difficult indeed.

CompuServe Update

If you took-up last month's offer to try CompuServe you might have been disappointed if you used a basic communications package. The secret to easy access to this network is to use their WinCIM (Windows), DosCIM (DOS) or MacCIM (MAC) communications packages.

The suggested package provides an excellent graphical interface to their services and make operation simplicity itself. This can be further improved by downloading the CompuServe Navigator.

Navigator is a Windows based system known as an off-line reader. This lets you plan out all the things you want to do before you dial-up the service. Having used this for a few weeks now, I can see it's by far the best way to access the CompuServe network.

Internet Hype

You can't pick-up a computer magazine these days without being bombarded with hype on the Internet. As you can see from the foot of the column, I've now set myself up with an Internet address and am busy finding my way around.

Over the next few months I'll be giving a few tips on where to find radio related information. I've already had loads of E-Mail through both CompuServe and the Internet.

Many thanks to all those who've written - I'll be taking up your points over the next few months.

Special Offers

The following special offers are available to 'Bits & Bytes' readers. Although I try to turn the orders round in a day or two, you should allow up to two weeks for delivery, especially over the festive season.

- 1 JVFX 7.0 - FAX and SSTV transmission and reception for IBM compatible computers.
- 2 HAMCOMM 3.0 - RTTY and c.w. transceive facilities for IBM compatibles.
- 3 FactPack 1 Interference - Help for solving interference problems.

To receive any of these offers just send a self addressed sticky label plus 50p per item. If you're ordering JVFX or HAMCOMM you will also need to send a blank formatted 720k 3.5in disk for each program or just one 1.44M disk. If you want NuMorse you need to send a separate 3.5in disk.

Just to round off I'd like to thank you for your contributions to the column and wish you all a very happy and peaceful Christmas and New Year. All letters to 'Bits & Bytes' - Mike Richards, PO Box 1863, Ringwood, Hants BH24 3XD. CompuServe 100411,344 Internet Mike@decode.demon.co.uk

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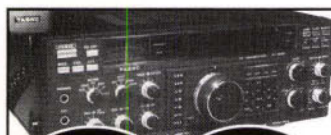
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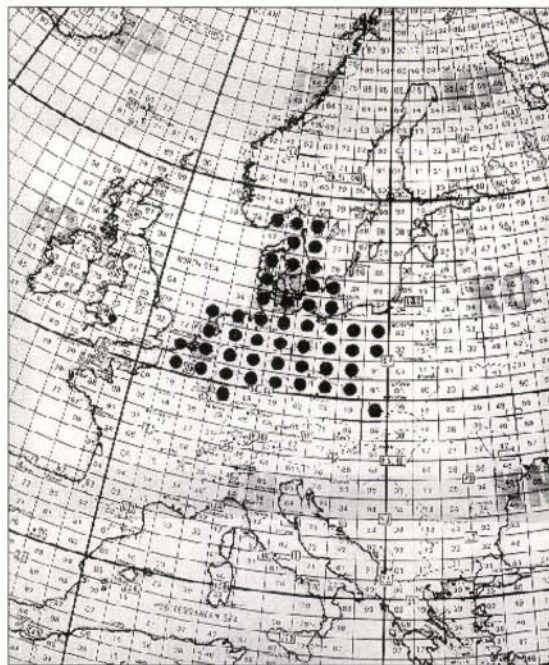
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VISA

In his regular report on v.h.f. operations David Butler G4ASR tells us that four days in October saw possibly some of the finest tropo DX worked on the bands this year.

Fig. 1: Locator squares worked from the QTH of G4ASR during the tropo opening in October 1994.



During the four day period, between October 12-15, I made 301 DX contacts on the 144MHz band. And by DX I mean stations located more than 800km away.

The map, Fig. 1, shows the extent of the opening from my QTH in IO81. Mind you, I was running a pair of 3CX400s and four 17-element Yagis which helped a little!

At the beginning of the event, from October 12, propagation was mainly into eastern Germany and Poland. On October 13 and 14 it moved north enabling QSOs to be made into northern Germany and Scandinavia. Contacts were made with stations in LA, OZ and SM at this time.

Normally the best DX occurs during the last day of the event. And so it was this time. The longest distances worked on October 15 were into central Poland and the Czech Republic.

Some of the DX included SP2JYR (JO92) at 1465km, SP2MKO/A (JO93) at 1440km and OK2BLE (JN99) at 1530km. Incidentally, I also worked this station during an opening on September 30.

By October 16 the enhanced propagation had virtually disappeared from the UK. Stations in eastern England were still able to work into the Czech Republic but conditions were changing rapidly.

Vårgårda Yagis

Lee Adams G4RKV (JO01) runs an Icom IC-275E, 400W and two 9-element Vårgårda Yagis on the 144MHz band. With this set-up it's of course expected that excellent results would be achieved.

By October 14 Lee had made 290 contacts, nearly 200 of them into Germany. He also reports about the good tropo conditions on September 29 and 30.

Most of Lee's activity was into Germany but stations in Switzerland and the Czech Republic were also worked. Some of the more interesting DX included: HB9DFG and HB9QQ (JN47) and OE2SCM

(JN67) at 942km. Best DX of the event were the stations of OK1UOZ/P and OK1VDJ/P (JN79) at 1042km.

Paul Bradbeer G7GUC (JO02) reckons that working into Poland with QRO and a large antenna system is no big deal. (He's probably quite right but I bet he'd like to try it!).

Paul uses an Icom IC-275H into a 5-element ZL-special antenna located in the loft. The period October 13 and 14 was particularly rewarding for G7GUC as two new countries, LX2DX and SP3SFN, were worked on the 144MHz band.

Paul also contacted many stations in DL, OZ and SM. His advice to others who can't put up big antennas is just to persevere. It all comes to those that wait!

Good In North

Conditions were also good in the north of England. **Nick Peckett G4KUX** (IO94) located in County Durham worked many Polish stations on the 144MHz band. His best DX was with SP5XMU (KO02) at 1470km.

The club station RK2FWA (KO04), formerly UZ2FWA, was also contacted by G4KUX on s.s.b. (Although it sounds a long way away they were only at a distance of 1383km).

Stations in eastern England also worked RK2FWA around 1900UTC on October 14. The station in Kaliningrad is regularly worked from the UK via aurora or meteor scatter. It runs at least 500W into eight 15-element Yagis.

Even further to the north and over the Border, **Gavin Stirling GM7LVJ** (IO85) in Edinburgh mentions working stations in ON, PA and DL. On October 13 he heard OK1KPU/P (JO60) on s.s.b. peaking 41.

Gavin called OK1KPU/P on c.w. and the Czech station came back. Unfortunately he was sending too fast and coupled with hash from a local thermostat the contact was not completed. Oh well,

there's always the autumnal tropo next October!

Channel Islands

Switching now to the other end of the British Isles, to the Channel Islands, **Geoff Brown G4JICD** (IN89) has sent in a report of activity on the u.h.f. bands.

On October 13 Geoff started to work into Germany on the 430 and 1296MHz bands. Signals were enormous on both bands although it was noted that the quantity of stations available to work was much less than on the 144MHz band. (This is a pity because the u.h.f. bands are normally open for tropo DX much more than on lower frequencies).

Contacts made on the 430MHz band included DC2XG (JO53) and DL3YEE (JO42). During the evening of October 13 conditions were excellent on the 1296MHz band. Running only 40W output Geoff made QSOs with OZ2OE (JO45) and Swedish stations in locators JO57, JO58, JO65, JO67 and JO76.

Microwave Bands

The tropo enhancement also effected the microwave bands. The best day for this was October 13 although good DX contacts could be made throughout the period.

The most popular of the s.h.f. frequencies is the 10GHz band and many QSOs were made on this band into central Europe and Scandinavia. **Roger Blackwell G4PMK** (IO93)

made contacts with DB1DI/P (JO31), DL5KVD (JO64) and SM6ESG (JO67) at 935km. His best DX on the 10GHz band was SM7ECM (JO65) over a distance of 935km.

Another operator on the 10GHz band is **Peter Day G3PHO** (IO93). He was alerted to the good conditions by reception of Dutch and German TV on u.h.f. frequencies.

Peter normally operates portable but on this occasion he decided to set up the gear in the bedroom! He used a transverter running 250mW into a 600mm dish mounted on a tripod. (Peter's XYL apparently made a few comments!).

Despite having to beam through double-glazed windows and part of a stone wall, Peter found signals on the 10GHz band were amazingly strong.

During the evening of October 13 Peter completed contacts s.s.b. with PA3AGS (428km), PA3FPS (430km), PA0EZ (469km) and PA0BAT (558km). German stations worked included DB1BX (584km) and DB1DI/P (618km). The station of DL4EAU/P (838km) was heard by G3PHO but unfortunately not worked.

Peter comments about the very strong received signals. The station of PA0EZ (JO22) pinned his IC-202's S-meter to the end stop even when the 600mm dish was moved over a wide arc. Another Dutch station PA3FPS (JO22), running 2W output, was still S9 when he was beaming east!

Even better microwave

DX was worked from the Bristol area. Both **Roy Emery G3FYX** and **Ted Halliday G3JMY** worked SM6ESG. This is probably a new UK record for the 10GHz band at 1137km. (Narrow-band activity (c.w./s.s.b.) on the 10GHz band is very much on the increase).

Tropo 'lifts' on microwaves are more frequent than is generally realised. And, even when it's raining, good DX contacts can be made via rain scatter.

If you're interested in joining the activity I suggest you subscribe to the *RSGB Microwave Newsletter*. It's published monthly and contains a wealth of technical articles and operating news. The RSGB can accept payment by credit card if you telephone (01956) 707373.

Auroral Openings

Although I haven't recently made mention of auroral openings they've still been continuing. The last events I reported occurred on June 3, 12 and 26. Since then I've received reports of events on July 14 and 15, August 14 and 15 and September 6, 7 and 9.

In the October auroral conditions took place on 10 occasions. These were October 3-5, 7, 22-24, 29-31. The best opening during this period occurred on October 29.

From my QTH the event on Saturday October 29 lasted from 1350-1555UTC. During that time I made 25 c.w. QSOs on the 144MHz band. A total of 21 locator squares were contacted in 9 countries.

With the exception of one station, SP2HV (J094) at 1462km, who I worked at 1431UTC all other stations further than 1000km away were worked between 1539-1548UTC. These included DL1ANP (J051) 1008km, DL3JWD (J060) 1077km, DL4DTU/P (J060) 1161km and OK1SC (J070) at 1290km.

The best DX was OK1PLB (JN99) at 1617km who I worked at 1539UTC. The beam-heading from my QTH was 30° for stations in G and GM, 50° for northern DL and SP and 55° for stations in central Germany. To contact stations in OK I had to beam at 60°.

Note that the headings I've quoted are considerably further to the north than the great circle heading. In the case of the contact with OK1PLB (for example) the offset was some 32°.

The 50MHz Band

Conditions on the 50MHz band are directly related to the solar geomagnetic activity. During the autumn period, October-November, it normally gives rise to auroral activity. However, on some occasions an enhancement of the E-layer takes places and Sp-E (for want of a description) can occur.

During the evening of October 19, a large solar proton flare erupted. The shock front from the associated coronal mass ejection hit the Earth on October 22. This was probably the reason why E-layer conditions were particularly good on Sunday October 23.

The opening started around 1730UTC and was still in progress at 2300. At the beginning of the event contacts were being made from central England with stations in GM, OH, OZ, SM and northern DL.

From 1900UTC propagation had moved to the east allowing contacts to be made into eastern DL and SP. Throughout the evening the propagation slowly moved to the south.

At 2000UTC contacts were being made with stations in OE and OK. An hour later it was into S5 and 9A and by 2200 contacts were being made into Italy and the Portuguese beacon CT0VWV was heard at 2250.

Incidentally, it's worth noting that the clockwise rotation in the propagation path is very common. The effect is noticed on all v.h.f. (and h.f.) bands when the E-layer is enhanced.

Expedition Honoured

During the recent expedition to Jordan (JY7SIX) the UK Six Metre Group (UKSMG) were honoured to be visited by His Royal Highness Prince Raad Ibn Zeid JY2RZ. The photograph, **Fig. 2**, shows the presentation by Geoff Brown GJ4ICD, Chairman of the UKSMG, of a 50MHz beacon.

The beacon was built and donated by Lawrence Woolf GJ3RAX and GJ4ICD. Also presented was a Diamond 50MHz vertical antenna donated by Waters and Stanton.

The beacon will be installed at the club station of the Royal Jordanian Amateur Radio Society Club. It will use the call sign JY6ZZ on 50.075MHz.

If you're an active operator on the 50MHz band I would suggest that you join the UKSMG. The aim of the

group through the medium of its 48-page quarterly journal, *Six News*, is to provide the best information available about the band.

Six News includes DX news and reports, QSL addresses, beacon information, equipment reviews, propagation and technical articles. The group also hold activity contests and maintain various award schemes.

The UKSMG has over 800 members in more than 50 countries around the world. Yearly subscriptions for UK membership is only £7. To join, make your cheques payable to: **UK Six Metre Group** and send it to: **Chris Gare G3WOS, Old White Lodge, 183 Sycamore Road, Farnborough, Hampshire GU14 6RF.**

Letter From Ireland

I've received a letter from Ireland as (after reading a recent 'VHF Report' column) **Tony Allen EI4DIB** was moved to write to me. He was prompted by my statement: "I hope that you now realise that v.h.f. signals DO extend beyond the horizon".

Tony claims that when he was tuning around the top end of the 144MHz band he heard VO10R calling CQ on 145.965MHz. The station in Newfoundland was using f.m. and trying to access the Fuji Oscar-20 satellite. (The uplink frequency for FO-20 is 145.950-145.970MHz and sometimes, I believe, operates on f.m.).

Tony was interested to see if VO10R could provide any explanation as to why the impossible had occurred. He therefore sent him a QSL card and was pleased to have recently received a reply.

Bill Fry VO10R confirmed that he was in fact transmitting on frequencies between 145.950MHz and 145.970MHz. He was using f.m. trying to access FO-20.

Bill reports (quite correctly) that Aurora, m.s. or Sp-E can be ruled out. The distance, over 3500km, being too far for these modes. (My propagation log indicates that no enhancement in tropo conditions occurred on this day). Furthermore no DX was noted on the 50MHz band, ruling out any E-layer propagation.

Bill surmised that what Tony heard could have been reflections from a high altitude aeroplane. However, I reckon it would have to be well above the E-layer, higher than 110km, to give the right geometry.



Fig. 2: (L-R) Mohammed Balbisi JY4MB, HRH Prince Raad Ibn Zeid JY2RZ and Geoff Brown GJ4ICD during the presentation of the 50MHz beacon to the Royal Jordanian Amateur Radio Society from the UKSMG.

(Photo courtesy of GJ4ICD).

According to my records only two satellites, AO-10 and AO-13, have downlinks which cover 145.965MHz. It may have been possible that a 145MHz uplink translated to a 435MHz downlink was picked up by another satellite. This could have received the 435MHz signal and re-transmitted it on 145.965MHz.

I was however, unable to find any suitable combination of satellites when I made a cursory inspection of the frequency plans. Just for the record, the reported event occurred at 2325UTC on Friday May 13 1994. The locators of EI4DIB and VO10R are IO63 and GN29 respectively. I wonder if any readers can calculate what satellite or satellites could have been in range at this time?

Deadline Time

It looks like I've run out of space again and it's deadline time! But, in next month's column I've got details of increasing f.m. activity on the 50MHz band and further information about ionospheric scatter on the 144MHz band.

Also in next month's 'VHF Report' there will be tips about how to spot radio auroras and also the reasons why you didn't hear VE30NT in the recent ARRL moonbounce contest! All this and details of all the v.h.f. openings you might have missed!

So, it only leaves me to wish you a very Happy Christmas and hope that 1995 is yet another year full of DX. Please send your reports to me at **Yew Tree Cottage, Lower Maescroed, Herefordshire HR2 0HP** or via packet radio @ GB7MAD or the DX Cluster system. Alternatively you can telephone me on (01873) 87679.

E N D

Report

S BANDS HF

Paul Essery GW3KFE provides some useful 'ergonomic' tips before launching off into his monthly activity reports on the h.f. bands.

Welcome to the world of h.f. where I'm starting off with the 'hint for the month'...look carefully at your station layout.

Is the equipment so placed that it falls nicely under the left hand, and the key under the right hand? (if you're right handed!).

Is the operating surface at the right height? Is the chair of such height so that fatigue is reduced to a minimum? Could it be improved?

In my other interest, REMAP (Engineering for the disabled) I have come across at least one case where the client had to use an 'awkward' stance in his (non-radio) hobby. The client ended up in the hands of the physiotherapists at the local hospital. After altering his workshop suitably, his problem hasn't returned.

Finally, don't forget to check lighting and ventilation. All these points will help you to make the very best of your operating skills.

Band Conditions

Let's now look at band conditions. I've been QRT temporarily, but the solar data on the GB2RS news each Sunday indicates the usual mixture of good and poor.

Remember, in simple terms you look for high sunspot numbers or solar flux. These, along with low A or K will mean good conditions.

Your Letters

From your letters, everyone agrees that the bands have been extremely patchy. No-one mentions any contacts on 28MHz. Doubtless though, with the big tropo lift on v.h.f. earlier in October, there would have been a few contacts possible into Europe, or even maybe north-south DX.

Only Don G3NOF down in Yeovil got any joy on 24MHz. Don mentions A71AN, FY5GF, TT8/F5IXR, 9J2SZ, and 8Q7EB, all (take note) on

essentially north-south paths using his beam antennas and s.s.b.

At 21MHz things weren't a lot better for G3NOF. For example, North America might as well have not existed as far as the 21MHz logs go. Don mentions D2EGH, V51GB, VP8BKT (Falklands), 3X0DEX, 9G1BJ, and 9J2SZ, all on sideband.

John G3BDQ in Hastings spoke to 4L7AT and 3DA/SP2JYX. He then turned to c.w. and keyed to T5AR in Somalia.

Ted G2HKU, over on the Isle of Sheppey, used c.w. for his only contact hereabouts. He worked 4Z4SZ, using 70W output to his HF6 antenna.

Coming down again, to 18MHz, things seem to have been a bit more useful; for example, G2HKU snaffled a couple of USA stations, between VQ9QM, EK7GF, 1B/KU0J, 3B8CF, A71CW, TL8NG, 9J2SZ and PT7WX. Again, notice, north-south propagation mainly.

Also on 18MHz Don at G3NOF found SV2ASP/A for Mount Athos. Then managed VP8GAV(Antarctica), VQ9HJ, a bit warmer, V21FC, V44KAA, and 8Q7EB.

In Hastings, G3BDQ reckons he found some really good openings to North America on 18MHz. He mentions sideband with JW0C, A45ZZ, 9J2WA, various Ws, and 5U7C on the key.

That brings us to 14MHz. 'Twenty' is traditionally 'where it all happens' and Don G3NOF found sideband contacts with DU9RG, TR8/ON5GA, XX9MD, VS6GZ, 3D8A/SP2JYX, and 9X5HG.

Down in East Sussex G3BDQ stuck to the key on this band, and his reward was VU2TS and TA4/KU0J. Over on the Isle of Sheppey, G2HKU used his G5RV and 70W on the key, for SV9/DJ5IL, C53HG, 1B/DK8FD, VE7SR, WJ60, W6CYX, VE9ST, TA1A, and 5B4DL7U00.

Looking next at 10MHz, G2HKU used his Omni-V and the G5RV to raise LU6EF,



Paul Essery GW3KFE's hint of the month - "Look carefully at your station layout".

4K0/RV6HKB, and VK3MR. The key was also favoured on this band by G3BDQ when he worked JN1HOW.

Good DX

Another good place for the DX is 7MHz. And Don G3NOF doesn't normally mention the lower bands, but this month he did knock off the Dutch Liberation memorial stations PA6LIB/1 to 9.

For his 7MHz report G2HKU pulled 70W from his Omni-V into the G5RV on this band too for N9CHU, FG5ED, NB2V, TA2DS, ER1AM andIK/DK7UY/1P0Y (Just imagine a 'proper operator' sending that lot at the start and finish of each over of a ragchew!!). As for G3BDQ, he skipped the band altogether.

A step down again to 3.5MHz. Firstly there was G3BDQ, who used sideband exclusively. His 'plums' were HZ1AB, 9K2MU, and 5B4XA.

As for G2HKU's 3.5MHz activity, Ted stuck to the IC-721S. He used its 5W to work GM0IGJ, the contact being low-power in both directions.

Finally, 1.8MHz; Ted at G2HKU kept his skeds with ON7BW, though with difficulty. He also hooked YU7BW on the key with the G5RV and Omni-V.

Ted notes what a help his receiving loop is with the ON7BW skeds on 1.8MHz. Signals are a bit down on it, but the noise is far more so!

As for G3BDQ, John says he has booked in, on c.w. UA3ZOV, K1ZM, VE1ZZ, RZ6HW, RA3AUE, RV6BP,

EA6ZY who is of course one-time G3ZY, S51WA and from the Urals, RX9ST.

In addition, John notes that the group of Gs having regular skeds with ZL are learning a mighty amount about antipodean propagation. On the morning on which he reported ZL2SQ on sideband was a very scratchy job with a relayed report.

Useful Addresses

Some useful addresses now: QSL VE9ST via VE1ANJ; IK/DK7UY/1P0Y via I1RBJ; T99W via DL1QQ; TL8NG via WA1ECA; 9J2SZ via SP8DIP.

Any QSLs for C53HG go via W3HCW; HS10VH via PO Box 195, Bangkok 10400; HS1GOS via HS1FMD; and 7X2BK via I0WDX. Thanks to G2HKU for QSL information.

Activity From Seborga

Finally, the various mentions of activity from Seborga resulted in a letter from I2MQP the General Secretary of ARI and published in DXNS. Maria I2MQP cautions against getting too excited at the thought of this as a new DXCC 'counter'.

That's all for now. Letters - the more the merrier please - by the middle of the month to Box 4 Newtown, Powys SY16 1ZZ.

E N D

This month Peter Shore has news of a new model from Roberts Radio and details of where you can find your favourite broadcast stations for the coming month.



The Siemens RK759 equivalent to the new Roberts Radio model no. R617.

at 2000 on 7.412, 9.95 and 11.62MHz.

American Broadcasters

Kentucky-based WJCR has converted three 50kW medium wave transmitters to short wave and two were operational by the beginning of November. Try listening on 7.49MHz for a 24 hour-a-day English service and 13.595MHz for Chinese and English.

A more powerful US short wave broadcaster is WEWN based down south in Birmingham, Alabama. It uses a 500kW short wave transmitter and has English beamed to Europe at 0000-0200 on 5.825MHz; 0930-1300 on 7.465 and 1600-2000 on 15.695.

Nordic Nations

Radio Finland has introduced a weekly *Media Roundup* which is carried in the English service every Thursday and could be a rival to Radio Netherlands' *Media Network* aired each Thursday. The *Media Roundup* programme reports on press, radio and TV in Finland, but I wonder how long it will be before it starts to include stories from other Nordic nations and the former Soviet republics across the Baltic.

English is heard from Helsinki at 0530-0600 and 0745-0800 on 11.755, 9.635, 6.12; 1930-2000 on 11.755, 9.73, 6.12; and at 2230-2300 on 963 and 558kHz.

Radio Netherlands carries English, and beams specifically to Europe at 1130

to 1325 on 6.045MHz from Flevo. The station plans to rent time on a Deutsche Welle transmitter at Nauen in the former East Germany, but no date has been set for the start of relays from there.

It will, however, beam to Europe at 1130 on 7.14MHz - check that out. There is also a relay from Kaliningrad at 2130 to 2325 on 1.386MHz. This frequency has been a mainstay of Radio Moscow for many years, carrying broadcasts in English and other languages to north-west Europe.

Ecuador Features

Finally a look at some of the features to be heard on HCJB Quito, Ecuador during December.

On Wednesdays *Ham Radio Today* is broadcast and items include: December 7: Grey line effects, herringbone antenna and a profile of Samuel B Morse; on 14th: Selectivity and intermode, sweet spot DXing and Lazy-H antenna; on 21st: Sudden ionospheric disturbances, the birth of broadcasting and the Marconi antenna.

On Tuesday there is *Blues, Rags and All That Jazz* hosted by Bill Rapley who brings you the best in traditional jazz. Aired at 1830 to Europe. Frequencies are 9.60 and 11.835 from 0700 to 0830 and 15.35 between 1700 and 2000UTC.

That's all for this month, but keep twiddling the dial and let me know of any interesting catches!

E N D

The Roberts Radio company has altered the name of one of its short wave sets. The R808, a portable digitally-tuned set, becomes the R809.

There is also a brand new Roberts Radio receiver, the R617. This is a truly compact set, measuring 148 x 89 x 30mm deep and weighing 390 grams, including the three AA batteries needed to power the radio.

The R617 offers continuous coverage on the a.m. bands from 150kHz to 30MHz, and there is f.m. with stereo through headphones. Performance across the short wave bands is good, selectivity is reasonable and sensitivity is fair.

Retailing at £129.99 in the UK, the R617 comes complete with an a.c. adaptor and a roll-up short wave antenna. Readers elsewhere in the world can look out for this model under the Siemens name (RK 759) and Sangean (ATS 606).

Radio Moscow News

John Court writing from Birmingham says "Thank goodness for exciting short wave. In my opinion ILR and BBC stations are boring". He goes on to mention the 60th anniversary of Radio Moscow which took place on October 29.

John says that he has remembered lots of the achievements which he has heard broadcast on the station. He pays particular tribute to Joe Adamov's *Mailbag* programme.

If you, like John, are a regular listener to Radio Moscow, then you will have noticed that since late October the station has been called the Voice of Russia World Service.

Some suggestions for the English language service from the Voice of Russia World Service are: 1100-1200 on 21.60, 17.86, 17.755, 15.495, 15.19, 12.015, 11.98, 11.675, 9.80, 9.68, 9.55, 9.47, 7.205MHz; 2000-2100 on 13.67, 12.015, 9.89, 9.875, 9.80, 9.55, 9.53, 7.275, 7.215, 7.21, 7.205, 7.195, 6.11, 6.085, 6.055, 5.995, 5.92,

4.86MHz.

John also reports excellent reception of Radio Sudan in Omdurman. He tuned in at 0258UTC on 7.20MHz and heard a full identification in Arabic.

Broadcast Station News

Radio Intercontinental is a new station that appears to come from Armenia. It broadcasts between 0630 and 0715 on 15.40MHz, with German, English and Armenian. Reports, please, if you have heard this station, to Broadcast Round-Up via the PW Editorial Office in Broadstone.

Further north, Radiostantsiya Belarus has a weekly broadcast in English. It can be heard at 1945 on Tuesdays on 7.405, 7.21, 7.105 and 5.94MHz.

Serbian Radio has moved some of its transmissions. It is now on the air at 0100-0130 on 11.87 and 9.58MHz; 0700-0730 on 9.595 to Australia; at 0730-0800 on 7.215 to Europe; 1630-1700 on 7.215 and at 2100-2130 on 9.595 (announced as 9.58MHz).

Radio Tirana in Albania broadcasts English to Europe at 1700-1715 on 9.76 and 7.155MHz, and at 1900-1930 on 9.73, 7.23 and 1.395MHz. There are also two North American transmissions at 0130-0145 and 0230-0300 on 11.84 and 9.58MHz.

The Voice of Turkey carries English to Europe at 2100-2200 on 9.40MHz and at 2300-0000 on 11.71, 9.445 and 7.185MHz. Radio Korea in Seoul has a new 250kW transmitter at its Kimjae site, and is on the air between 0215 and 0400, 0800 and 1500 and 1600 to 2345 on 7.275MHz.

All India Radio's General Overseas Service is on the air to the UK and Europe at 1745 to 1945 on 11.62, 9.95 and 7.412MHz, and again at 2045 to 2230 on the same frequencies. There is a transmission to East Africa, also at 1745, on 11.935 and 15.075MHz, and to West and North Africa on 9.65 and 13.75MHz. Hindi to Europe is

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Dayton '95 HamVention Holiday

"Gobsmacked" was the answer given by Arthur GONDI and Anne Izzard GONDJ when they learned they'd won TWO major prizes in last year's giant HamVention Prize Draw!



Arthur and Anne Izzard from Birmingham were one of the several husband and wife teams who joined the 1993 HamVention Holiday. However, although they expected to enjoy themselves they didn't think they'd more than cover the cost of their holiday with the prizes won from the giant draw (There's over \$20 000 worth of prizes to be won every year!).

Although Arthur and Anne are both radio amateurs, your partner doesn't have to enjoy the hobby to get the most out of the *PW* HamVention trip. There's so much to see, so much shopping available and great company to be had on the holiday of a lifetime and it only costs £650 per person (based on sharing a twin-bedded room)!

You can join Rob Mannion G3XFD and the *PW* party when our 1995 holiday to the largest amateur radio show in the world starts on Tuesday April 25 at Gatwick when we fly out to Cincinnati. After transfer by coach to Dayton we'll be staying at the Englewood Holiday Inn for six nights. There's lots of places nearby to eat out, the Hotel has a good swimming pool and we're close to the HamVention itself.

We've arranged a visit to the world famous United States Air Force Museum and there's also an optional shopping trip to see Cincinnati and the famous 'Skywalks'.

The £650 includes return flight, meals on the flight, transfers to and from Cincinnati Airport, six nights at the Holiday Inn, entry fee to the HamVention, excursion to Air Force Museum, all local taxes, US Airport taxes and the new UK Airport tax of £10. (We'll be pleased to arrange sharing of twin-bedded room if you're travelling alone).

Please contact Andy Garside at Gullivers Groups & Incentives, Fiddington Manor, Tewksbury, Gloucestershire GL20 7BJ for further details of the *Practical Wireless* 1995 Dayton HamVention Holiday.

For further details of the *PW* 1995 HamVention Holiday please contact our professional tour organiser Andy Garside. Alternatively, you can call Rob Mannion G3XFD on (01202) 659910 (between 1 and 2pm please) to discuss the holiday.

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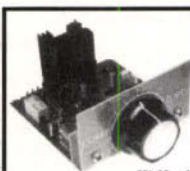


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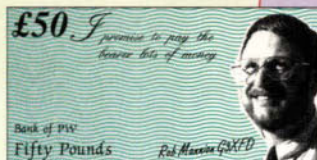
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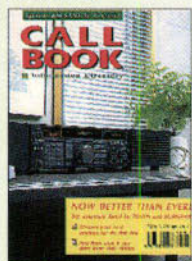
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INTERFERENCE HANDBOOK (USA)

William R. Nelson WA6FGG
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ANTENNA EXPERIMENTER'S GUIDE

Peter Dodd G3LDO
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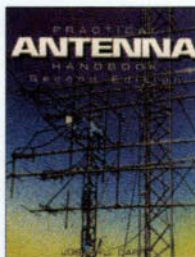
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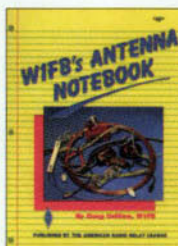
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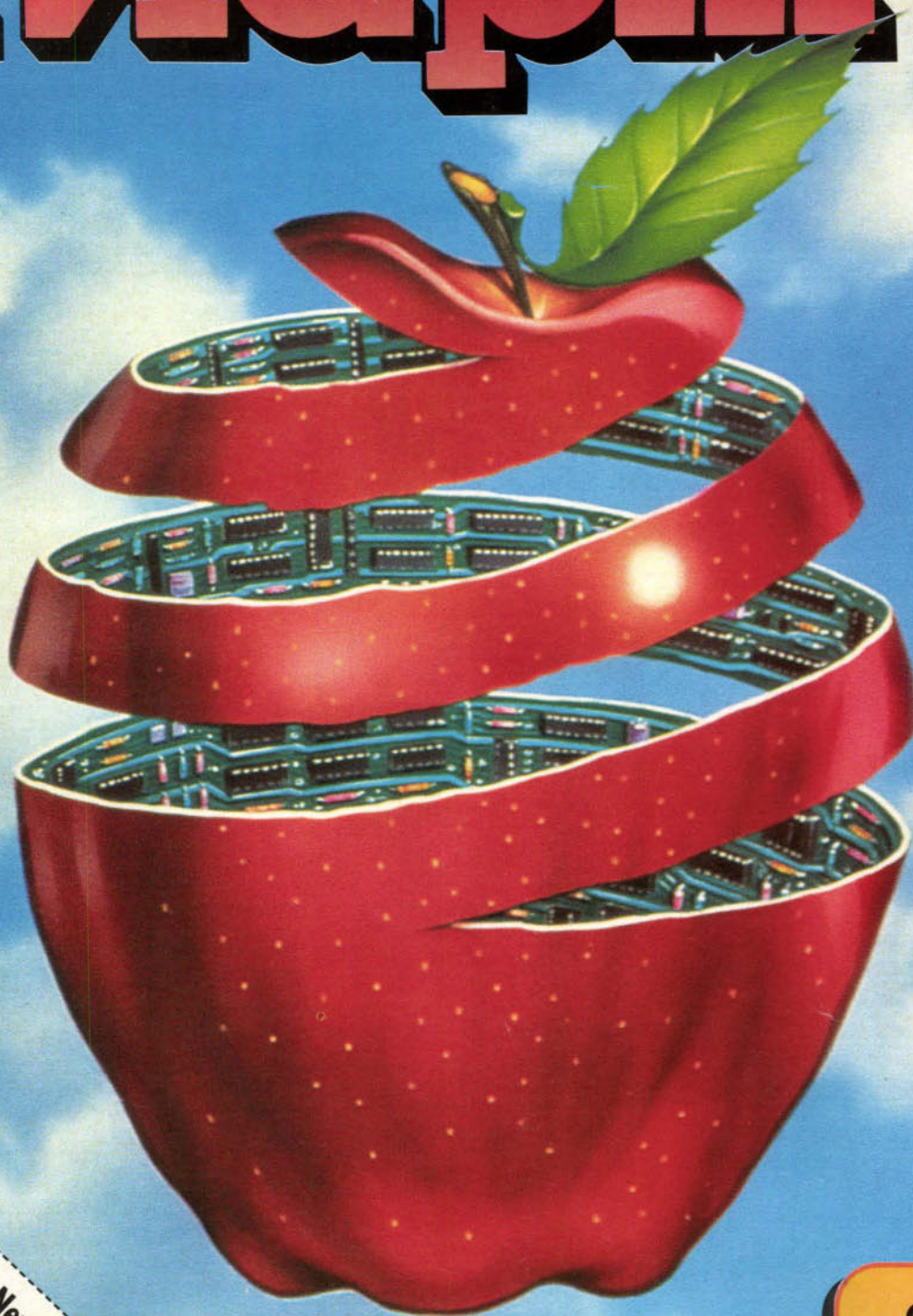
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