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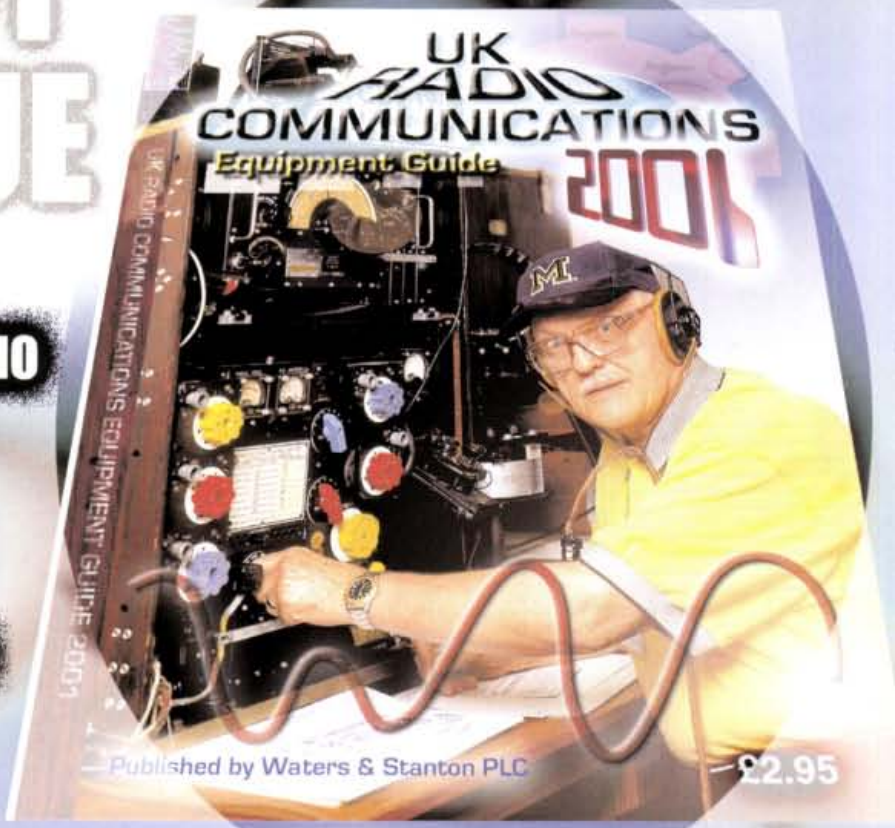

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Cover Subject.

The Yaesu FT-707 is truly a forgotten classic, as **Rob Mannion G3XFD** discovered when he had the opportunity to test one out recently. Rob says look out for this pioneering transceiver on the second-hand market.

Photograph by: **Tex Swann G1TEX**

Design by: **John Kitching**

December features

page 22

page 8

page 18

page 31

page 22

page 26

December regulars

page 44

page 46

page 36

page 10

page 42

page 62

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Our Rob is seldom lost for words, but he was speechless at your reaction to 'It's A Classic'

rob mannion's keylines

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

The letter from **B. C. N. Ward** in Manchester (see 'Radio Waves') highlights several problems. The majority of the letter of complaint deals with annoying mistakes in *PW*, and these are a source of great anguish to myself and other members of the Editorial team (A separate letter answering the technical questions is being prepared for the letter writer and an Errors and Updates will appear in *PW*).

Unlike some of the magazines I buy. As Editor I will not tolerate the ignoring of errors (Some periodicals have a policy of never publishing 'Errors & Updates'. And although the policy will cause embarrassment to myself and the team - we won't hide ours under the carpet so to speak.

We'll continue to attempt to produce an 'error free' *PW* but I can never promise a totally 'perfect' magazine. We'll do our best but when you consider that technical books (in production for over a year in some cases) are often full of errata, etc., we've got an up-hill task.

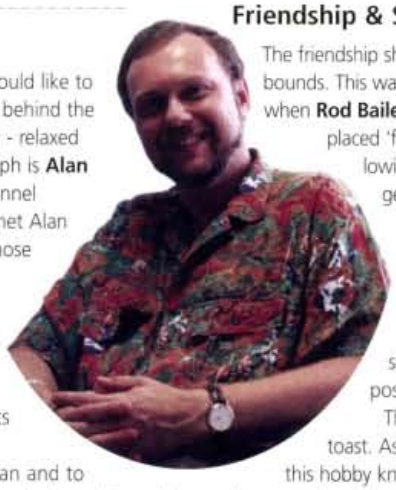
Among other comments the letter writer mentions the 'Over The Top' use of photographs featuring me last month. I have to agree - with benefit of hindsight **it was OTT** but you can help by providing photographs please!

To help *PW* reflect more of the personalities in our hobby how about getting those cameras into action? A photograph of your club will be very useful to accompany the new 'Club News' section in the magazine. We really do need plenty of photographs and please ensure you're looking in the general direction of the camera and provide evidence you enjoy the hobby (even a hint of a smile helps cheer the photograph up!).

Finally, to show just how seriously I take my job here at *PW* I've offered to personally re-pay B. C. N. Ward's subscription. In this way this reader will not feel a 'subscription prisoner' until next June, and will continue to receive *PW* and hopefully note our attempts at producing the best magazine possible.

Another Face!

As we've done in the past, I would like to launch another series of 'faces behind the scenes' to readers. The friendly - relaxed looking - chap in the photograph is **Alan Burgess** our Accounts & Personnel Manager. Many readers have met Alan at the Longleat Rally and for those of you who have a letter published -he's the person to thank for the voucher you receive. Regular authors have to keep on his right side too as he looks after their payments (as indeed do we!).



Alan is a dedicated Thespian and to date his most famous role was playing a 'Stone' in an amateur production. We've heard that he 'upstaged' the leading actors by his interpretation of a large boulder (despite the fact he's so slim!).

More importantly, with his extensive experience in the Motor Trade it was thanks to Alan's help that I was able to get the full Volkswagen Warranty reinstated to my VW 'Sharan'. With the unreliability and problems I've had with my new car I owe Alan a great deal indeed. I now travel to club visits (I've never been invited to a 'Junket' - and look forward to attending one!) a little less apprehensively. Thanks Alan! You may consider yourself a PW Publishing 'back room boy' perhaps but without you we'd all be worse off.

It's A Classic Takes Off!

The *PW* team have been taken by surprise at the response from readers to 'It's A Classic'. There certainly seems to be some real Trio TS-830 fans out there. We've even received letters from non-*PW* readers who have been sent copies of the article published in the November issue.

> "To help *PW* reflect more of the personalities in our hobby how about getting those cameras into action?"

Because of the interest we would like to hear from readers who own, or have owned other 'classic' rigs. Let us know what you'd like to see featured in the series.

At the moment I'm planning to look at transceivers such as the Yaesu FT-75 (a true pioneer mobile rig), the FT-7, the Trio TS-120 and would like to have some more suggestions. For the rarer rigs we'd like to have them on loan from readers, incorporate their comments into the reviews and pay them into the bargain. We look forward to hearing from you soon.

Friendship & Shrimps

The friendship shown by *PW* readers knows no bounds. This was illustrated in a tangible form when **Rod Bailey G3FBY** noted my deliberately placed 'fishing for shrimps' comment following the 'Morecambe Bay Submerged Mobile' letter in October *PW*.

Rod came to chat to me at the Leicester Show and promised to get some shrimps for me. On his next visit to Morecambe he kindly bought some shrimps which arrived by post in Dorset the next day.

They were a real treat - delicious on toast. As I said before - the friendship in this hobby knows no bounds - thanks Rod it's a pleasure to know people like you and the many other friendly readers we get to meet throughout the year.

practical wireless services

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

Subscriptions

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

Components For *PW* Projects

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

Photocopies & Back Issues

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

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

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

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Technical Help

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

amateur radio waves

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

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

Thank You Bury RS!

● Dear Sir

My name is Gareth Brodiak, I got interested in Amateur Radio about six years ago when I was at school. My grandad (he's G8XPL) introduced me to the hobby. I am now 20 years old and currently unable to work due to an unknown illness which affects the whole of my left arm, this has been affected for about two and as half years now and now I have a lot of spare time, so I like to listen to the h.f. bands mainly.

I have a Lowe HF-150 receiver and thoroughly enjoy listening. I'm taking the RAE this year 'again' and will hopefully pass. I say 'again' because for the past two years when I have taken the course, I have had to go into hospital.

Anyway I find everyone in the hobby very helpful and willing to help, and are all keen to get you licensed. I have also met many friends through the hobby and hope to met many more. When I left school I always wanted to be a chef, ago until my illness started just over two and a half years ago.

Having an interest in Amateur Radio now, I would of liked a career in communications if I got better. Anyway thanks for reading my letter and a big thank you to everyone at the club I attend which is the Bury Radio Society.

Gareth Brodiak
RS177720 + G21002
Bury
Lancashire

Editor's comment: Good luck Gareth - with a good club behind you you're halfway there! Please keep us informed of your progress.

November Issue & Albrecht Rig

● Dear Sir

(Hi Rob!) I've just got the November 2000 issue of *PW*. Firstly I did actually spot your famous 'fizzog' at the Leicester (Donington) rally and I half-heartedly raised a hand to say hello, but you roared past me in a haze of 'battery buggy' electric motor ozone. It was nice to see you, anyway..even briefly!

I thought I'd write with some comments regarding your review of the Albrecht 28MHz set. First of all thanks for pointing out that we still can't legally own or re-tune 27MHz multi-mode sets to 28-29MHz. **Is it possible that such representation might be taken more seriously if it came from the RSGB**, presumably recognised as the representative body for Amateur Radio? Maybe so, but I wouldn't really know who to write to in the first instance.

Anyway, I had a look at one of the Albrecht rigs at the Great Lumley rally recently and the stall holder, from Birtley Truck Stop, very kindly let me look through the manual. It might be a bit unfair to say that it is just a retuned CB transceiver because it has two features that I would not expect to see in a purely CB multi-mode, the first being the ability to work split RX/TX, and the second being a 1750Hz toneburst.

I'd say that the set must have been given a minimum of a new control microprocessor in order to provide these features, but in any case single band 28MHz sets have only been outlawed in Britain, not in mainland Europe, so I dare say the amateur version has been available there all along.

I agree that the r.f. sections, etc., are likely to be component for component identical to the CB equivalent, although I have not seen the CB version. One missing feature which might not seem important at first is the lack of CTCSS tone encode - after all, we use 1750Hz tone access in Europe don't we? Well, yes, for the most part. But as you've probably discovered, there are times when conditions improve to the point where repeaters in the USA come raining in, and many of those require CTCSS tones for access. Also, on page 10 of the November *PW* you have a nice article about the first 10m repeater on the air in Britain, which uses....guess what - a 77Hz CTCSS tone for access! Apart from that, though, it seems like a nice little set. Regards.

Graham M0ADR.
Wallsend
Tyne & Wear

Editor's comments: Flag me down next time Graham - remember I'm at shows to talk to you! I hope also that the RSGB will take up the 27MHz multi-mode to 28MHz cause as I've tried for years with no success. Don't forget that although I have an opinion that can be expressed freely in *PW* (and which is often listened to) I cannot pretend to represent Radio Amateurs in the UK. That's the job of the national society.

Too Many Mistakes

● Dear Sir

You may recall I wrote to you earlier this year concerning an article by **Rev. George Dobbs G3RJV** which I considered to be a complete 'cock up'. In subsequent correspondence I promised that I would, after all, renew my subscription because you had taken the trouble to respond. To my regret, I kept that promise and continue to find your magazine a source of major irritation and frustration.

In all my years of reading specialist magazines, including many devoted to cycle-sport and photography, I have never encountered one that had a regular half page feature entitled 'Errors & Updates' required to correct the errors and omissions in the previous issue. Neither have I encountered a magazine which contained so many reports and photographs of the Editor 'junketing' with his readers in various parts of the British Isles. There are **five photos** of the Editor in the latest issue, excluding the one with sunglasses in the advert for Nevada. One, associated with the editorial, would be acceptable, but **FIVE** is overkill.

As a short wave listener I really only buy *PW* for the 'practical' articles, and again I have a number of questions arising from apparent discrepancies. So as far as this reader is concerned, *Practical Wireless* is a bitter disappointment and something of a sad and pathetic joke. I can no longer take it seriously, but amuse myself with marking up the obvious mistakes, omissions and discrepancies I find as I 'proof read' the latest edition. As I renewed my subscription for another year, we are stuck with each other until next June.

After reading your letters page for the last year, and the praise you receive, I can only conclude that the average Radio Amateur is very uncritical and easy to satisfy. Maybe they have never seen other magazines and do not know any better?

Joke: Question: If an 'Anorak' is a sad and lonely individual who hangs about cold railway stations collecting engine numbers, what is a Cardigan?

Answer: A 'Cardigan' is a sad and lonely individual who sits by a radio set screaming 'CQ, CQ, CQ' into a microphone, in order to collect callsigns.

B. C. N. Ward (a very disillusioned reader)
Manchester

Editor's comment: The above is extracted from a longer letter - edited only to reduce length. In answering I must say that we really do try hard to eliminate mistakes. However, regarding the 'over exposure' of photographs featuring G3XFD - I have to agree - it was 'Over the top' and (in hindsight) very embarrassing (my apologies). Please see 'Keylines' for further comments and how you can help make G3XFD appear in *PW* less often!

Extracting Microwaves

● Dear Sir

On reading the Editor's 'Radio Basics' column in the November issue of *PW*, about using an old microwave extractor fan to get rid of soldering fumes, reminded me of a similar idea that I had used some time ago, and (incidentally) is still in use.

I had wanted to use my hand-held 144MHz rig in the shack, connected to an outside antenna and the shack's 12V power supply. Because it was being used for extended periods, I found that the back of the rig got very hot indeed, so I devised a cheap and simple method of being able to use the

hand-held, and at the same time keeping it cool.

At a previous rally I had obtained a number of ex-equipment, 12V fans of various sizes, and so decided to utilise one of these to solve the heating problem.

I cut a piece of 'five ply' plywood of sufficient size to use as a baseboard to support the rig without it toppling over. Next I stuck a spare dry cell case (in an upright position) to it with epoxy adhesive.

Behind the cell case I glued a further block of wood on which to mount one of the small 12V fans. A small on-off switch mounted on a bracket cut from a piece of aluminium sheet (used to switch both the rig and the fan on at the same time) four rubber, feet and hey-presto, a simple cooling system for my hand-held.

This could easily be modified to suit different hand-held transceivers, my original one was an Alinco DJ-G5. It has subsequently been used for a Kenpro KT-44, and is now in use for a Standard C156.
I hope this idea may be of similar use to others who also have a 'heating problem'.
Ian Graham M0BZP
Ulverston
Cumbria

Editor's comment: Good idea Ian! Tex Swann G1TEX gave me a tiny 'CPU Cooling' in fan unit which now provides extra cooling for my Alinco DX-70 which (being black) gets very warm behind the windscreen in my car when I'm operating portable. They're very effective indeed.

Help & Support

● Dear Sir

I would just like to let you know of the fantastic help and support I have had from one of the local Radio Amateurs. I was chatting on 144MHz one evening and just mentioned that I would like to have a go at Morse code as I was spending most of my time in shack at home due to health problems.

Roger Moore M0AUI came back to me and said he would be happy to teach me if I was serious about it. I said I was, and with his help we got going.

Well, the amount of time and effort he put in to this was great we had Morse practice every day of the week and sometime twice a day and each session lasted about two hours. The nice thing was when I hit that inevitable 'brick wall' and felt like giving up Roger just kept on going and kept on giving support which got me past that hurdle and I went from strength to strength. I passed the 5w.p.m. in 25 days of starting and was told that I was ready for 12w.p.m. (although I did have a good start as I knew the alphabet but nothing else). I thought it would be nice to let readers know how wonderful it is to have continuing support from the world of Amateur Radio. Many thanks
Graham Barlow M5AKU
Poole
Dorset

Welsh Wireless

● Dear Sir

Greetings from two members of the 'Senior' class, around here in 'Wild Wales'! who also had bother of getting a 'sitting place' for the Novice RAE. The Carmarthen College of Technology & Arts at Llanelli (who were very unhelpful) wanted to charge us £41 each to sit the paper there, on top of the City & Guilds fee for a course they did not run , or had, nor ever will!

You may well imagine how cross our Honorary Instructor got! He even wrote to the Director of the City & Guilds of London Institute and got a reassuring reply. All this 'cost' us three months but we both passed at Llandovery College, which had got itself Registered as an Exam Centre by then. And of course we endorse **Colin Topping GM6HGW**'s appeal to the C&GLI (November *PW*).
Eileen 2W1BPS &
Pete 2W1DIK
Carmarthenshire
Wales

Koyo Radio

● Dear Sir

Would it be possible to ask you readers for information about a Koyo short wave radio, in fact it is a multi-band but it is only the short wave bands I am interested in.

My wife Jennifer and I visited a car boot sale in Cardiff a few weeks ago and on one of the tables stood this old Koyo radio it has a wooden handle and looked rather worse for wear, so I asked how much, I thought my ears were playing tricks with me when the reply came back - £3.50! Being a radio enthusiast I paid in the wink of an eye and was away from the table like a rabbit with pepper on my tail in case a mistake had been made! I got the radio home, wired a plug on and switched on ... it crackled into life and sounded beautiful. I've searched all my radio books and cannot find a Koyo radio anywhere.

I would like to mention that this radio **is not a valve set** but must be a very early transistor maybe one the first transistor radios made.

Thanks *PW* team for a great publication! I have a copy of *PW* on regular order at our local newsagent. So I've no problem getting my hands on my copy and look forward to it every month.
Dave Mead MW1EWS
Pontypridd
Mid-Glamorgan

Editor's comment: Over to you readers. Can you help?

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

amateur radio rallies

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

NOVEMBER 12th
The 10th Great Northern Hamfest
Contact: Ernie Bailey G4LUE
Telephone: (01226) 716339 or (07787) 546515 (mobile).
The Tenth Great Northern Hamfest takes place today at the Metrodome Leisure Complex, Queens Road, Barnsley, South Yorkshire. Doors open at 1000.

NOVEMBER 25th
The Rochdale & District ARS Rally
Contact: John G7OAI
Telephone: (01706) 376204
Rochdale & District ARS are holding their traditional radio rally at St. Vincent de Paul Catholic Church Hall, Caldershaw Road, off the A680 Edenfield Road, approx two miles west of Rochdale. Doors open 1030 (1015 for disabled visitors). Entrance £1.

NOVEMBER 25/26th
The London Amateur Radio & Computer Show
Telephone: (01923) 893929
The London Amateur Radio & Computer Show is to be held for the last time at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. Trade stands, talk-in on 144 and 430MHz, Bring & Buy, special interest groups, free parking, disabled facilities, camp site, family attractions, licensed bar, catering and Morse tests. Doors open on Saturday at 1015 'till 1700 and on the Sunday from 1000 till 1600.

NOVEMBER 26th
The Bishop Auckland Radio Amateurs Club Rally
Contact: Mark G0GFG or G7OCK
Telephone: (01388) 745353/(01388) 762678
Taking place at Spennymoor Leisure Centre, which is ideally suited for both trader and disabled visitors boasting good parking and access to large ground floor hall this rally will feature all the usual radio, computer, electronics and Bring & Buy stalls, as well as catering and bar facilities. Doors open 1100 (1030 for disabled visitors). Admission is £1, under 14s free of charge. Talk-in on S22.

2001

FEBRUARY 4th
The 16th South Essex ARS Radio Rally
Contact: Brian Bellamy G7IIO
Telephone: (01268) 756331
E-mail: briang7iio@yahoo.com
Doors open at 1030 to the South Essex ARS Radio Rally which will feature Amateur Radio, Computer and Electronic Component exhibitors as well as home-made refreshments, free car parking with space outside main doors for disabled visitors. The venue for the rally the Paddocks (situated at the end of the A130), Long Rd, Canvey Island, Essex.

Letters Received Via E-mail

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

amateur radio news

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

Something to write home about

Turned To Perfection

*Feel like treating yourself or someone else to a **very special pen** for use in the shack and occasions to be proud of? **Rob Mannion G3XFD/EI5IW** has an idea for you.*

How would you like a pen with your Amateur Radio callsign or initials engraved on the side? Well, it's possible thanks to **Alan Doyle**, an 'All Ireland' junior wood turning champion based in Rosslare, County Wexford whose magnificent work is now being exported all over the world. In fact, everyone on the *PW* editorial team has one of his engraved pen sets with their callsign. Alan even made me a 'giant' fountain pen that I can hold easily!

Donna Vincent G7TZB *PW* News & Production Editor says "My set of a fountain pen and a roller ball turned from Irish Yew are a pleasure to write with. Both have a smooth writing action and are light to hold but at the same time weighty enough to give the pressure needed for the ink to flow. A lovely set of precision pens personalised with my callsign".

Made from native Irish timber with attractive plated metal components Alan Doyle produces them on the family farm in County Wexford and visitors staying overnight admire his workmanship - ranging from fruit bowls to magnificent lamp standards - before taking the pens they've bought as souvenirs to the four corners of the World.

You can choose from roller ball pens, propelling pencils or the deluxe (cartridge) fountain pens, making up the combination you want. Prices include the cost of callsign or initials on the pens and on the wooden presentation case. Prices (in Sterling) including airmail postage and packing are: £45 for the Fountain pen. The Propelling pencil costs £30, with the 'full set' comprising one fountain pen together with either a roller ballpen or propelling pencil for £90.

Alan Doyle,
Orchard Place,
Tagoat, Rosslare,
County Wexford, Eire.
Tel: 00 353 5332182 FAX: 00 353 53 32759

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

He shoots - he scores!

Kenwood Scores at White Hart Lane

Football and Amateur Radio is not a natural combination but all that could be about to change....

Supporters of Tottenham Hotspur Football club will no doubt be familiar with striker **Sergei Rebrov** but did you know he is a licensed Radio Amateur to boot? Following a 2-0 home win over Brentford for the North London side, **David Wilkins G5HY** presented Sergei **UT5UDX** with a TS-870S h.f transeiver.

● David Wilkins G5HY (left) pictured presenting Sergei Rebrov UT5UDX with a Kenwood TS-870S and certificate of honorary membership to GXOTKU.

Kenwood UK have supported Spurs for many years and therefore it was appropriate that the presentation took place in the Kenwood box overlooking the pitch at White Hart Lane. Sergei was also made an honorary member of the Kenwood Amateur Radio Club, **GXOTKU,** marked by the presentation of a certificate.

Sergei hopes to get on the air very soon with his UK callsign M0SDX. If you have a QSO with him we'd love to hear about it so make sure you let us know!

Another great radio read

Radio Active

Don't forget we now also publish Radio Active *magazine - a magazine designed to offer an overall insight into the world of communications.*

Every month Editor **Elaine Richards G4LFM** packs the pages with articles covering CB, scanners, cellular, satellite, tv, Amateur Radio, pmr and short wave listening - in fact there's something for everyone!

The November issue is on sale now with the December issue hitting the shelves on 17 November, priced at £2.25 *RA* is available from all good newsagents. So, go on pick up a copy, have a read - we're sure you'll find plenty of interest.

To let Elaine know what you think of *Radio Active* or if you have an idea for an article you'd like to see published e-mail her today at: elaine.g4lfm@btinternet.com

This month two *PW* readers are looking for some help - can you assist them?

amateur radio help

Help out your fellow amateurs

Can you Help?

I am looking for a manual for the FT-840. I have purchased the radio second-hand but unfortunately the manual has been lost. Can you help?

Graham Barlow G7TCS
E-mail: Graham@g7tcs.freeserve.co.uk

Can anyone help me with an FT-757 that has a display that has failed? I think it is the ICs that are at fault and it it appears that they are no longer available. Any suggestions on how to solve this?

Roger Luke GW3XJC
E-mail: lukes@btinternet.com

Low Power equals High Success

Several PW readers went home from this year's Leicester Amateur Radio & Computer Show with big smiles. They were all prize winners from the QRP Contest.

Irish Whiskey To Scotland!

Nick Foster GM0ULA won a bottle of Irish Whiskey at the Leicester show on Saturday 23 September - thanks to **John Corless EI7IQ**, Vice President of the Irish Radio Transmitters' Society. John thought it would be a good idea to donate a bottle of Jameson's Whiskey because the Editor of *PW* was issued with the callsign EI5IW and immediately referred to it as 'Echo India Five Irish Whiskey' instead of India Whiskey!

Unfortunately John had to return to Ireland on the previous evening but G3XFD/EI5IW was trusted to look after the bottle and present it to GM0ULA, who is a member of the Oldham Amateur Radio Club now living and working in Scotland. How did he win it? He had to guess G3XFD's age - which coincidentally was the same as Nick's house number! Another coincidence is that the whiskey was produced under the (safe) hands of fellow Radio Amateur Brian Tansey EI5HV who works at the Jameson distillery in Middleton, County Cork!

Oldham ARC's 'Double'

The Oldham Amateur Radio Club scored a 'double' this year as 'Runners-Up' in the *PW* 144MHz QRP Contest, along with their success as winners of the *PW* & Kenwood (UK) Club Spotlight Club Magazine Competition. Shown taking delivery of their solar panel prize from **Bob Keyes GW4IED** of Key Solar Products (left) are **Mike Crossley M1CVL** (centre left) and **Geoff Oliver G0JR**, (centre right) accompanied (far right) by long-serving contest adjudicator (and originator) **Dr. Neill Taylor G4HLX**.

Waffle Winners

Dave Wilkins G5HY of Kenwood (UK) Ltd. (left, with Contest Organiser/Adjudicator Neill Taylor G4HLX on the far right), presents the Kenwood TH-G71E transceiver main prize to **Dave Bevan GW4DMR** and **Anna Patterson MW0CCS**, who accepted the prize on behalf of their team - the 'North Wales Wafflers' at the Leicester Show. The 'NWWs' scored an impressive 268 contacts in 43 locator square earning them the *PW* 144MHz QRP Trophy Cup and the Kenwood prize.

First Novice Winner

Paul Walsh 2E0AUN made his own little bit of history on Saturday 23 September when he received the first *PW* QRP Novice Trophy Plate from Neill Taylor G4HLX in recognition of his winning entry. In the form of an inscribed English Pewter Plate, sponsored by Neill himself, this will be an annual award to be kept by the individual winner. Congratulations Paul!

If you want to be in the next year's winners list then make sure you enter the *PW* QRP Contest on Sunday 17 June 2001.

amateur radio clubs

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

BRISTOL

South Bristol Amateur Radio Club
Contact: Len Baker G4RZY
Telephone: (01275) 834282
Website: www.sbarc.co.uk

Meeting every Wednesday at Whitchurch Folkhouse, Bridge Farm House, East Dundry Road, Whitchurch, Bristol, South Bristol ARC offer an jam packed calender to its members. Events coming up include AGM on 15 Nov, Packet Radio Demo - 22nd, Annual Darts Match - 29th and Club QSL Card Display - 6 Dec. Go along and join in the fun!

EAST SUSSEX

Hastings Electronics and Radio Club
Contact: Doug Mepham
Telephone: (01424) 812350
Website: www.hastings.cx

Vital Spark is the club magazine of Hastings Electronics and Radio Club. This A5 sized publication is packed with club news, hints, tips, advice and ideas. In fact it echos the club's aims of encouraging and furthering the interests of its members in Radio, computers and electronics. Meeting on the 3rd Wednesday of the month at West Hill Community Centre, Croft Road, Hastings from 7.30pm the club is very keen to welcome new members.

NORTHERN IRELAND

Bangor and District Amateur Radio Society
Contact: Mike Stevenson GIXSF
Telephone (02842) 772383
Website: http://welcome.to/bdars

The Bangor club meet on the 1st Wednesday of every month in the Lock & Quay, Groomsport, County Down at 8pm. Please note that this is a **new** venue, the club is no longer meeting at the Clandeboye Lodge. Look out for Ian Wilson's talk on 6 December 2000 entitled "Old Bangor" it promises to be entertaining talk about Bangor in the 19th and early 20th Centuries. Visitors and new members are (as always) most welcome.

SCOTLAND

Dundee Amateur Radio Club
Contact: James Boag
Telephone: (01382) 884914

An amazing secret will be revealed at the Dundee club on 12 December when Ken McConnell will present a lecture on 'Operation Overlord' - a fascinating history of Signals Intelligence in the Second World War. The evening starts at 6.30pm with coffee with the presentation beginning at 7pm. Please note the event takes place in the Melrose Terrace Lecture Theatre, Dundee College.

Falkirk and District Radio Club
Contact: Bob Miles
Telephone: (01506) 844418
Website: http://fp.wavell.f9.co.uk/frc/

Join the Falkirk & DRC on 19 November for a Junk Sale from 10:30 - 16:00. The sale is described as a poor man's SARCON. To pick up a bargain go along to the Guide Hall, Jackson Avenue, Grangemouth. The price is £5 a table (admits 2) and £1 entrance. Talk In will be on S22.

Keep those details coming in!

Wall to wall Amateur Radio

Martin Lynch Gets Bigger!

Any excuse for a party is Martin Lynch's motto, so why not go along and join him and the 'gang' at his official opening party of his new retail showroom on Sunday 26 November?

After months of planning and negotiation, a brand new store dedicated to Amateur Radio is being opened by Martin and his team on Sunday 26 November. Located only a few doors along from the existing showroom (which will continue to be the main store and mail order area), the new shop will 'house' all the leading brands including Yaesu, JRC, Kenwood and Icom.

ML&S martin lynch & sons
Suppliers of Communications Equipment

During the 'party' there will be some great giveaways, an opening sale and the guarantee of no hi-fis, tumble dryers or drum kits in sight! Not even a Scooter! Just pure wall-to-wall Amateur Radio. Representatives from Yaesu, Icom and Kenwood will all be 'celebrating' with Martin and there will be some very special deals for all callers. Don't miss it! Sunday opening hours 10am-4pm.

Martin Lynch & Sons,
Retail Showroom,
128 Northfield Avenue, Ealing,
London W13 9SB.
Tel: 0208 566 1120, FAX: 0208 566 1207
E-mail: sales@mlands.co.uk
Website: www.HamRadio.co.uk

amateur radio trade

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

The complete service

Kitmaster joins Greenweld

David Johns, the man behind Kitmaster kits notifies the newsdesk to say that his range of valve radio kits are now being marketed under the Greenweld umbrella.

The new partnership of Greenweld and Kitmaster means that David Johns can continue to design his kits while working from the Greenweld premises in Brentwood, Essex. The range of kits currently includes a short wave battery three valver, one valve amplifier, two valve regen radio and the three valve receiver reviewed on page 18 of this issue. For more details or a catalogue contact:

Kitmaster Kits,
Greenweld,
Unit 24, West Horndon Industrial Park,
West Horndon, Brentwood,
Essex CM13 3XD
Tel: (01277) 811042, Fax: (01277) 812419
E-mail: service@greenweld.co.uk
Website: www.kit-master-co.uk
or www.greenweld.co.uk

amateur radio books

New titles for you to add to your bookshelf

Marconi In Wales

Here's something for all of you who are interested in Marconi's pioneering work in Wales.

Over the years I've occupied the Editor's desk at *PW* many 'home-brewed' publications have come my way. Ranging from lifetime works on complicated electromagnetic wave theory to self-published biographies they've usually got something in common: They're not cheap! I say this not to decry the efforts of the keen publishers but to draw attention to the fact that specialist publications with small print runs are inevitably expensive.

So, when *Marconi And His Wireless Stations In Wales* by **Hari Williams** came my way I was pleased and surprised because at the same time it's an attractive little publication (with a delightfully evocative front cover) and it's also priced to attract readers!

Fortunately for the majority who don't speak Welsh the book is extremely well prepared, written and presented in English even though the publisher's name is difficult for this ignorant Englishman to understand!

Within the book there's a charming mixture of good quality vintage photographs, 'home-brewed' drawings and diagrams. Hari Williams (Hari is presumably the Welsh spelling for Harry?) has done an excellent job with this book. The pioneering Marconi stations at Tywyn and Waunfawr are described in some detail although because of the widespread nature of Marconi's activities the station at Dorchester, Dorset (now in the middle of a small industrial estate) is also featured. There's even a photograph of the young lady wireless operators at the Tywynn station obviously from just before the First World War.

Altogether a fascinating book with much information on Marconi himself and a fascinating chapter on Sir William Preece who had done so much to encourage the young Senatore Marconi's early work. A must for any wireless historian or Amateur. Additionally, if you're planning to visit North Wales on holiday this is one book you must take with you. At £4.50 it's superb value. I thoroughly enjoyed it!

Rob Mannion G3XFD

Marconi And His Wireless Stations in Wales
Gwasg Carreg Gwalch, 12 Lard yr Orsaf,
Llanrwst, Wales LL26 0EH.
Tel: (01492) 642031.

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Order a subscription to *Practical Wireless* now and they'll also receive a message from the *PW* Editorial team telling them that their gift from you will be their own personal copy of *Practical Wireless* delivered by the postman every month next year.

To qualify for this offer please fill in the form on this page and send it to us by **15 December** (UK orders only) and the order will be despatched in time for Christmas. But, remember, overseas orders take longer to reach their destination.

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LASER DIODE?

In the last of his long running series Ian Poole G3YWX deals with laser diodes, something once in science fiction, which you can find literally anywhere nowadays.

Lasers are used in a variety of applications. There are several types but the most common are based around the semiconductor laser diode. These diodes are produced in massive quantities and and are used in commercial office equipment, CD players and in telecommunications applications.

The main advantage of a laser is that it produces what's termed **coherent light**. Light produced from an ordinary source such as a light bulb or l.e.d. is **incoherent**, having random frequency and phase with power distributed across all or part of the visible spectrum. Even what is termed monochromatic light does not contain a single frequency, but is more akin to relatively narrow band noise.

A laser source on the other hand produces a coherent signal on a single frequency, rather like an electronic oscillator. This enables lasers to be used in many applications where an ordinary light source is not suitable.

Laser idea

The idea behind the laser was first put forward by Albert Einstein in 1920 but it took until the 1960s before the first one was constructed. A variety of mediums can be used as the basis for a laser.

The first lasers used rubies, and later a helium-neon laser was developed, but it was not until 1970 that the first semiconductor laser was produced. To reach this stage an in-depth study of gallium arsenide, the basis for the first laser, had been carried out and was the result of many years of hard work.

Construction

The construction of the laser diode is basically as shown in **Fig. 1**. You can see that it contains heavily doped $n+$ and $p+$ regions.

During manufacture it's normal to start with an n+ substrate onto which the top layer is grown, then the doping is included. This can be accomplished in a variety of ways including diffusion and ion implantation.

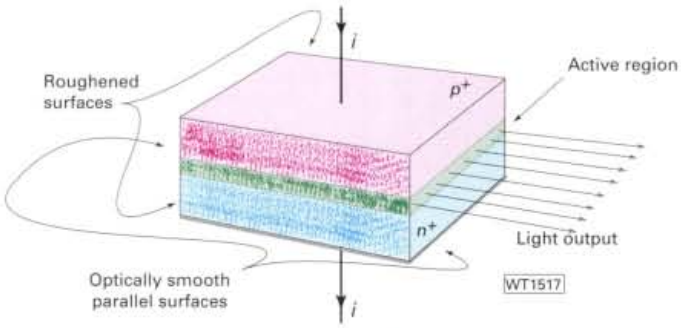
Several types of material can be used for laser diodes. However, they must be type III-V compounds like gallium arsenide or indium phosphate. Their type refers to the place of the elements in the chemical periodic table of elements. Whatever semiconductor is used it must be possible to dope it heavily, so this rules out compounds like silicon and germanium.

Apart from the electronic requirements there are also optical requirements so that the laser can operate. The first optical requirement is that the device must act as an optical resonator in the plane in which the light output is required.

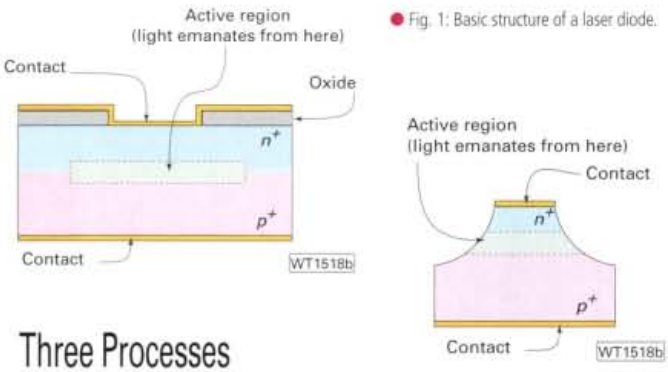
The two walls of the device that form the resonator must be made almost perfectly smooth. In this way they form a mirror-like surface that will reflect light internally within the device, although one of the walls is made slightly less smooth to allow some light to escape. In this way a resonant optical cavity many wavelengths long is created.

The two reflecting walls must also be exactly parallel to one another, and perpendicular to the junction, otherwise the laser action does not occur satisfactorily. Finally, to prevent laser action occurring in two directions, the remaining two walls of the device are roughened.

A variety of structures can be used for laser diodes, but two that are most widely used are shown in **Fig. 2.**



● Fig. 1: Basic structure of a laser diode.



● Fig. 2: Two typical laser diode structures.

Three Processes

There are three distinct processes that occur to enable a laser diode to operate, and these are: light absorption, spontaneous emission and stimulated emission. Light absorption occurs when light enters a semiconductor and when photons strike an atom there may be sufficient energy to release an electron creating a hole electron pair. (This effect is used in semiconductor photo-detectors).

Spontaneous emission occurs in l.e.d.s. The light produced in this manner is incoherent having random frequency and phase, although the light is situated in a particular area of the spectrum.

Stimulated emission is different. A light photon entering the semiconductor lattice will strike an electron and release energy in the form of another light photon. The way in which this occurs releases this new photon of identical wavelength and phase. Light generated in this way is coherent.

The main active area within the diode is the junction between the highly doped p and n type areas. Current flows across the junction because holes from the p-type region and electrons from the n-type region enter the junction and combine.

A number of other actions also occur. Some spontaneous emission occurs, and the light from the spontaneous emission causes stimulated emission. This light is reflected off the walls at either end re-entering the diode junction and giving rise to further light by stimulated emission.

As the diode forms an optical cavity, this is effectively the same as an electrical resonant circuit and selects light of only a given wavelength. Naturally there is some absorption of the light, resulting in the generation of holes and electrons but there is an overall gain in level.

Widely Used

Laser diodes are widely used. Possibly their most common use is within compact disc players for audio and computer applications where they are produced in millions.

They are also used in photocopiers and optical communications. Here they are able to transmit data at rates in excess of 20Gbits/sec. With the ever-increasing amounts of data being transmitted they are an essential part of today's communications scene and their future is secure for many years to come. PW

ICOM

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DUAL-BAND TRANSCEIVER (2M/70CM)

- User-friendly and true dual-band coverage
- Simultaneous dual-band receive with separate tuning and volume controls
- 200 memory channels with memory name capability
- CTCSS encode/decode as standard

IC-T81E

QUAD-BAND TRANSCEIVER (6M/2M/70CM/23CM)

- Amazingly compact with switchable quad-band coverage
- Multi-function 'joy-stick' switch allows quick and easy band-switching, volume control and mode selection
- WFM and AM receive modes, for FM broadcast and VHF airband reception
- CTCSS encode/decode as standard

IC-T2H

VHF (2M) TRANSCEIVER

- 6 W of transmit power and 500 mW of audio output
- Commercial grade durability to deliver performance under demanding conditions
- DTMF encoder with 5 memory channels built-in
- CTCSS encode/decode as standard
- Easy operation with customizable keys

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Count on us!

Radio Basics

This month Rob Mannion G3XFD passes on some more advice on coil winding for the less experienced constructor. Particularly those who have been following this series and having a few 'basic' problems winding their own coils!

The continuing feedback I receive from 'Radio Basics' (RB) readers has told me quite a bit about just what encouragement and further advice can be presented in future articles. And as you'll know from last month, I started off the new series by passing on a few soldering tips because this topic was very high on the list according to your letters.

Second on the list of problems is the topic of winding coils. So, let's now take another look at the type of coils that have featured in RB projects. Hopefully once I've run through the projects - concentrating on those annoying coils - those readers who ran into trouble and others who have joined us since - will be tempted to have a go, or try again as the case might be.

To help, and for the purposes of explaining the various coils, I'll be concentrating on the 3.5MHz to medium converter project, featuring the use of a car radio as a tuneable intermediate frequency (i.f.) unit - which was published in the October and November issues of *PW* 1998 (Photocopies available, with possibilities of some complete issues being available).

The converter project used a budget-priced colour television sub-carrier 4.43MHz crystal for stability and ease of setting-up to provide reception of the 3.5MHz Amateur Radio band on a medium wave band car radio (chosen because of the screened antenna input). The prototype worked extremely well ... but a number of readers ran into problems (especially with the b.f.o. coil!). Readers who are complete beginners may also find the RB column, dealing with coils and radio frequency chokes, published on page 20 of the January 1999 *PW* of interest.

● Winding single layer and multi-layer coils. These were wound on plastic formers but the same applies for the paper tube former (see text).

Looking At The Coils

Looking at the diagram, **Fig. 1**, the two coils which caused readers difficulties include L2A, L2B, L3A and L3B. However, by far the biggest problems were caused by L4 the beat frequency oscillator (b.f.o.) coil. (We'll look at this one later).

For simplicity I have strongly recommended that most of the coil formers used in the RB series should be wound on paper formers. This was an attempt to make the process simple and trouble free - and I still thoroughly recommend the idea for beginners.

So, let's start again by looking at the paper coil former. These are made from one sheet of universally available A4 paper using a standard-sized wooden pencil as the core or 'mandrel'.

Cut one sheet of A4 plain white paper into three strips (using the longest sides of the rectangle). Then roll the pencil and wrap the paper around it - but not too tightly - to form a tube.

Next, just as the paper edge is finally rolled up to form the tube you should moisten the strip's edge with an adhesive (I use Pritt Stick) before rolling the tube completely and sealing it. And if you've not made the tube too tight it will slide off the pencil.

Left for several hours to dry these paper coil formers are extremely cheap, quite robust and easy to wind. Finally - remembering my own days as an impecunious schoolboy (my pocket money went to pay for *PW* and radio components) this approach removes one of the biggest 'turn-offs' in radio construction I encountered: "Where do I get the coils from"?

How infuriating I found it when a designer used coils I couldn't afford or had no idea of the winding details. Not so with RB projects!

When the paper tube is dry you can again place it on the end of the pencil - inserting the pencil - pointed end first - half way up the former - ready to wind the wire. To hold the coil and pencil you can use a small bench vice or an appropriately sized hole (drilled horizontally) in the corner of your work bench designed to take the pencil. Once the pencil end is in the hole you in effect have a 'third hand' and can concentrate on winding the coil.

From Left Or Right

The choice of whether you wind from the right or left is entirely up to you - depending on whether you're left of right-handed. **However, when rewinding the coils the most important thing to remember is to always wind in the same direction**.

One of the few exceptions to the 'always in the same direction' rule is the pile wound coils - such as that used in the b.f.o. circuit within the circuit of Fig. 1. (that will be dealt with later).

When starting to wind the coil leave enough wire to provide a connection 'tail' (100mm should be enough). **All the coils wound on the paper tubes used in the 'RB' projects take up approximately 75% of the former's length using the specified 0.3mm diameter enamelled wire**. A narrow strip of *pvc* tape, dab of melted capacitor wax (candle wax is too brittle) or 'Blu Tack' will hold the wire in place as you wind.

If the coil is to be a single winding of (let's say) 0.3mm diameter wire, in most of the designs I present in this series it will need to be spaced side-by-side (in other words each turn touching - but not overlapping - its neighbour).

When the coil has been completed you can anchor the wire with the methods suggested. Again, leave enough wire for a connection link - don't cut the wire too short.

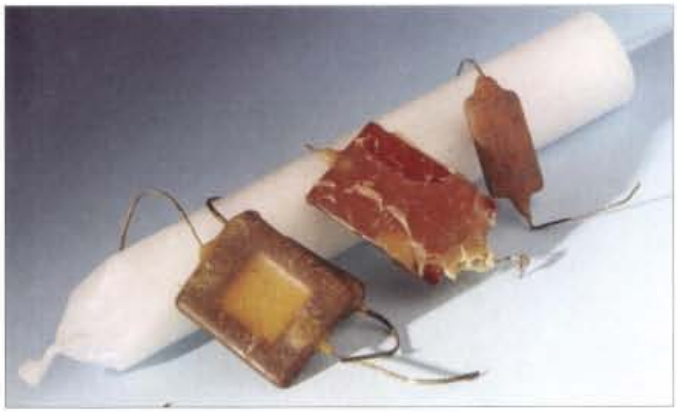
The antenna input coil, L1, in the circuit Fig. 1, uses a centre tapping for the signal input but don't worry, there are several ways to make this tapping. The simplest way is to wind the coil, complete it and then - by counting the turns from either end - find the centre point and prepare it for soldering.

● Using a ferrtie core with axial leads to wind radio frequency chokes (the cores are available from Sycom).

Using a very small narrow flat file you can now (very carefully) file off enough of the enamel insulation fro the wire to allow a soldered connection for the tapping to be made. **Warning:** be careful not to remove the enamel from more than one turn of wire and short circuit turns. Doing so will change the frequency of the resultant tuned circuit.

Another method (my preferred method) is to make a pigtail tapping when winding the coil. This is easily done when you reach the half way (or wherever the tap, or tappings are to be placed) by temporarily anchoring the wire at the tapping point and extending a loop (about 40mm will do) by taking the wire out to the length suggested and then returning it to the temporarily anchored wire. Twist the loop so that it forms a neck because of the twisting and

● Winding low inductance 'home-brewed' radio frequency chokes on resistor bodies.



● Various sources of wax (see text).

continue the winding, finishing the coil off.

Once the main winding has been completed, return to the tapping and tighten the twisting so that the point where the tapping leaves the main coil is quite tight. **Tip:** By using needle nose pliers you can get the junction of the tapping point quite tight. Don't overdo it though as you can break the wire.

Finally, you can prepare the tapping point for soldering. Scrape the enamel off carefully and tin the far end of the loop. I always prefer to drip (with the soldering iron tip) a very fine layer of old capacitor wax to seal the windings as this can stop any movement of the wire if it's a little loose.

Multiple Windings?

Are you worried about coils with multiple windings.? If so, **don't worry** because they're not that difficult and to help I'll describe the procedure I use.

Firstly - always remember that it's best to prepare the main winding first. Secondly, it's always a good idea to check the frequency coverage of the main winding - to see that all is well and it covers the frequencies you want - using a Dip-meter. If you don't have a 'dipper' of your own **I strongly recommend** you build the 'Tinny Dipper' project (Published in the December 1998 & February 1999 issues of *PW*) or buy a ready made meter.

If you're winding a coil similar to L2A and B in Fig 1, wind the coil A first, following the method I described for L1. When you've finished it, clearly mark the ends of the wire so that you know it's winding L2A.

The coil L2B is a coupling winding which is wound over the first winding. It's wound in the same direction as L2A but differs in that it has fewer windings. Wind the turns of L2B so that they spread evenly over the first winding. **Important:** It's essential that both L2A and L2B are wound in the same direction.

When winding is complete clearly identify the ends of L2B (folded paper tags are ideal as they can be slipped off during final assembly of the project) and the seal the completed coil with a light covering of wax. (I keep a selection of old wax covered capacitors for this job). It's smelly, but if you used an extractor fan as I described last month - it won't be too bad!).

The same approach can be used for L3A and L3B, the medium wave intermediate frequency (i.f.) output coil. **However, in the case of L3A it will have to be slightly pile wound (wound in layers) to keep within the length of the former**. The coupling winding L3B) is then wound over the top of the winding of L3A, with the windings of L3B kept as central (on top of L3A) as possible. Finally, seal the windings of L3B in place with wax as previously described.

The BFO Coil

The b.f.o. coil winding (L4) caused a great deal of problems for a few of our readers. And with benefit of hindsight (I'll be a wise man if I learn from all my mistakes!) I could have made it a little easier for the many beginners who follow the series. Sorry if L4 caused you any bother!

Confusion was caused by the fact I did not make it clear thinking that the original photograph of the project did the job for me) that L4 is in fact pile wound. In other words the coil is just wound lay upon layer until the centre point tapping number is reached. After making the necessary 'pig tail' tapping (as with L1) the rest of the winding can be completed and sealed.

Hopefully, the process of coil winding won't be so daunting in future. Have a go - and keep me informed on your progress - you could even send in a photo of you working in your workshop. Good luck! *PW*

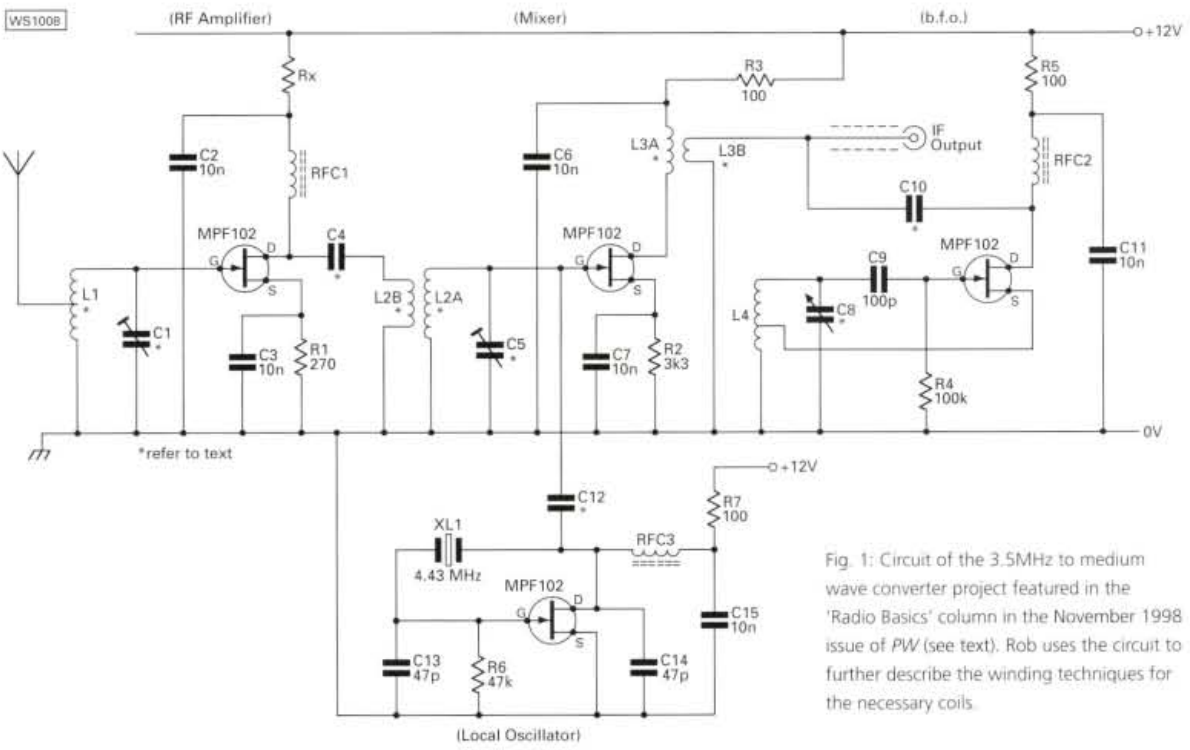


Fig. 1: Circuit of the 3.5MHz to medium wave converter project featured in the 'Radio Basics' column in the November 1998 issue of *PW* (see text). Rob uses the circuit to further describe the winding techniques for the necessary coils.

Cost:	£34.50 plus P&P
Company:	Kitmaster/Greenweld
Contact:	David Johns
Tel:	(01277) 811042

Kitmaster Three Valve Receiver

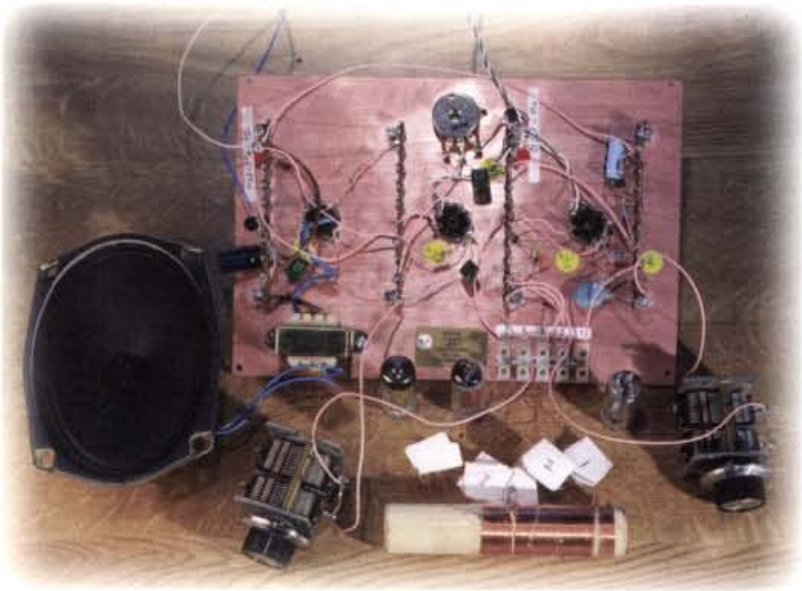


Fig. 1: The Kitmaster three valved receiver kit works well but G3XFD considers it's best built by constructors with previous experience.

Rob Mannion G3XFD uses his experience to evaluate a valved receiver kit. Bringing back many memories - so read on to see how he fared in Memory Lane.

The *PW* Editorial team, **Donna Vincent G7TZB**, **Tex Swann G1TEX** and I are constantly receiving 'phone calls and E-mails from *PW* readers telling us that they want to have a go a building valved receiver kits. Many remember the famous 'Heard All Continents' (HAC) kits from the 1950s and 1960s - and although those are no longer available - Kitmaster Kits have made a commendable effort to supply the demand.

The Kitmaster story started (for me) nearly ten years ago when I met **David Johns** - the man behind the kits during one of my *PW* 'Club Visits' to the **Colchester Amateur Radio Club** in Essex. He told me what he was planning and true to his word, following a very difficult setting up period, finding sources of the specialist the components necessary for valved project - the kits arrived on the market and have proved very successful.

However, several readers have contacted me to tell me how disappointed they were when their chosen projects arrived - to find that the budget priced kits contained components of obvious surplus origin. And here lies a fundamental problem: Just where do you get new valve holder, new variable capacitors, etc., for use with valves?

The answer is of course that it's not usually possible to buy new components unless you're aiming to build one of the incredibly highly priced valved audio amplifiers for hi-fi use. Recently I saw a kit for one such amplifier which left precisely 5p change from £1000. Radio Amateurs, being thrifty by nature, are very cautious (and sometimes a little mean) in expecting too much for a little and I ask anyone buying a Kitmaster kit to bear this in mind.

Radio Basics Approach

The best way to describe the Kitmaster Kit approach is to compare them with the projects I encourage readers to try in my 'Radio Basics' articles which have been described by sophisticated constructors as 'crude'. Yes, they may be crude and over-simplistic but they're far more likely to get the budding constructor going than a complex project would be!

Kitmaster projects have the same approach as I adopt. Simple, down-to-earth 'bare bones' projects - something that will work (and work well) but won't compare in looks to that sophisticated 'black box' you may be used to.

The kit reviewed was supplied ready assembled, **Fig. 1**. Despite this I know that assembling it would be well within my own capabilities. However, in my opinion it's not a project for the beginner. Considerable practical constructional experience building other radio receivers and non-valved kits will prove very useful indeed.

In fact I would go as far to say that the kit is an ideal 'novice valve equipment constructor's project'. Please bear this in mind!

The Project

Although no circuit diagram was provided, I quickly discovered from the point-to-point wiring and assembly diagram that the kit was a three valved receiver comprising one **un-tuned radio** frequency (r.f.) stage, one regenerative detector and audio frequency (a.f.) amplifying stage.

Valves used are the well known 1.4V filament 90V high tension (h.t.) types. Unscreened valve holders are provided and assembly is undertaken on printed circuit board material.

The receiver drives a loudspeaker and as supplied is designed to provide the builder with a m.w. receiver. However, it's quite capable of working on the short wave bands with minimum modifications.

On Air Challenge

Using any regenerative detector project on the air is a challenge and this receiver is no exception. On m.w. with 10m of wire antenna it provided many local and not-so-local broadcast stations and selectivity was good.

At night I logged 20 or so different stations and selective was adequate. Using another coil I'd wound (for coverage of 5.5MHz or so) connected to my 'long wire' antenna I heard the world and resolved c.w. and s.s.b.! But be prepared to adjust the reaction control frequently - this receiver needs 'careful driving' for good results and of course that's the fun!

Any good as a project? **Yes, but not for inexperienced constructors**. Ideal for someone who has built receivers before and wants to build a valved receiver.

Good value for money? Yes, despite use of surplus components - and everything you need is supplied (including wire and loudspeaker). Unless you're prepared to attend all the 'junk sales' and rallies you'd find buying these very expensive and difficult to find. A new - purely receiving tuning standard - variable capacitor can cost £15 or more!

Once you've built this kit in 'bare bones' style and gained experience you can rebuild it into a nice p.c.b. 'chassis' with slow motion drives for the tuning and reaction/regeneration controls and using 'skirted' B7G valve bases to accept screening cans (home-brewed from thin metal tube or reclaimed from those junk sales).

Enjoy some real radio - have a go yourself. *PW*

Product

The Kitmaster Three Valve Receiver

Pros & Cons

Pros: Good value for money, despite use of surplus components

Cons: Not for inexperienced constructors

Summary

Ideal if you want to build a 'first time' valve project try this kit. Hopefully, future kits will include full circuit diagrams (with the already supplied wiring diagram) along with more comprehensive general instructions. Although they're adequate for the more experienced constructor, more information will make tackling these kits a possibility for the less experienced.

My thanks go to David Johns at Kitmaster, Greenweld,
Unit 24,
West Horndon Industrial Park,
West Horndon, Brentwood,
Essex CM13 3DX.
Tel: (01277) 811042
FAX: (01277) 812419
for the loan of the completed kit.

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MAGNIFICENT MAGAZINES!

On behalf of the adjudication team, Rob Mannion G3XFD presents the results of the 2000 Club Magazine Competition. And Rob says that all the entries were "Magnificent Magazines"!

Once again I have the pleasure, on behalf of the adjudication team, to present the annual 'Club Spotlight' club magazine competition, jointly sponsored by *PW* and Kenwood UK. The adjudicating panel comprises of: **Dave Wilkins G5HY (Kenwood UK)**, **David Barlow G4PLE** (whose original idea started the competition) **Jim Bacon G4YLA**, **Tex Swann G1TEX** of *PW*, **Jamie Donaghy M0CLI** (representing the Salisbury Club and judging entries for the **G2FIX 'Bert's Bell'** Trophy for the National Club category only* see note below), and myself.

***Note:** Since last year's competition the Salisbury Club has closed. However, Jamie M0CLI has agreed to stay on the judging panel to help maintain the link with the late G2FIX's home Cathedral City. Tex Swann G1TEX is replaced by Jamie (five judges only on each category) for the National Club Category.

Magnificent Magazines

As this year's sub-heading indicates the entries received really were 'Magnificent Magazines' everyone of them. The standard was extremely high which made the judging panel's job very difficult, but enjoyable, indeed. (Although abridged adjudicator's comments are presented here in *PW* - all competitors are provided with photocopies of the original adjudication sheets).

There were four entries for the 'National Category' this year competing for The Bert Newman G2FIX Memorial Trophy (Bert's Bell') and although it was a very close run thing the **British Amateur Television Club's** (BATC) ***CQ-TV*** earned 49 points out of a possible 50.

Commenting on the BATC entry Dave G5HY said "Superb - sets the standard for others. The Editor is lucky to have so much content". Jim G4YLA commented: "A first class publication, good content and colour reproduction". My own comments were: "First class, fascinating reading - could get me back into ATV. No criticism"!

Nobody from the BATC's current committee attended the presentation of 'Bert's Bell' by **Hilda Rusbridge** (Sister of the late Bert G2FIX) - very ably supported by her family - at the Leicester Show on Saturday 23rd of September. However, long-time BATC member **Richard Guttridge G4YTV**, accepted it on their behalf.

Last year's National Category - the **Remote Imaging Group** (RIG) ***RIG Journal*** were just 'pipped at the post' this time and scored 48 points. Jim Bacon commented "As good as it gets - another set of first class magazines". Jamie M0CLI said "Eye catching colour covers, could only be improved by full colour contents".

● Hilda Rusbridge (Sister of the late Bert Newman G2FIX) shown presenting the 'Bert's Bell' National Club's Trophy to long-time BATC member Richard Guttridge G4YTV, who kindly agreed to accept it on the behalf of the BATC's committee, who were not present at the show.

The Royal Signals Amateur Radio Society (RSAS) ***Mercury*** magazine, scored 47 points this year and the judges' comments make interesting reading. David Barlow G4PLE said "Mercury has entered every year of the competition. Value for money, single-handed production, deserves recognition and to win in my opinion". My own comments sum it up well I think: "Well done Editor, much easier to read, what a marvellous achievement for a one man job! Excellent progress".

Once again the Dutch language (really it's the Dutch equivalent to the G-QRP Club Magazine *Sprat*) entered and earned 42 points. Despite the fact that only two of the judging panel can read Dutch - all the team appreciated the magazines. Dave G5HY commented: "Glad again to see an 'Overseas Entry'. Good magazine for a specialised hobby area. Good technical content and very clear diagrams". And although Tex Swann G1TEX's comments don't count for scoring purposes in the National Category (as explained) - I think they say it all: "A tremendous practically based magazine, well laid out and filled with interesting articles. I would sign up immediately for the English version when it arrives"!

Although the entries in 2000 were down on those in 1999 (seven then) the standard was very high. Well done everyone and we look forward to seeing **YOUR** entry again next year!

● *Old Hams News* Editor Geoff Oliver busy working on the production of the magazine.

Not So Unlucky Thirteen?

I have my doubts that 13 is an unlucky number - especially as we received that number of excellent entries for the 'Local Club' category. Incidentally, and the judges were pleased to discover this -it was the same number as the local clubs entering last year!

Again the standard of entries was superb. So much so that

UB SPOTLIGHT MAGAZINE COMPETITION 2000

the difference between the winner and runner-up was only half a point! Indeed, throughout the entries the clubs were running 'neck and neck'. Needless to say, the adjudication panel had another very difficult task! But what an enjoyable one it turned out to be.

Winners this year are the **Oldham Amateur Radio Club** (OARC) *Old Hams News* with 47.5 points out of a possible 50. In fact the club scored a 'double' by also achieving 'Runners-Up' position in this year's 144MHz QRP Contest too! So it was a busy time at the Leicester Show on 23rd of September when Dave Wilkins G5HY presented them with the *PW* & Kenwood 'Club Spotlight' Trophy before receiving their solar panel prize from Bob Keyes GW4IED for the QRP Contest award!

Dave's comments on the adjudication sheet sums up his feelings: "Well produced and well written - interesting and I enjoyed reading it".

Regarding OARC's magazine Tex Swann G1TEX and I both took note of the honest comment in one of the copies (referring to the adjudication panel's comments last year suggesting improvements) that they were beyond their budget but they would continue to try and produce the best magazine possible for their members. They did - and won! **And if there's any secret to winning the competition it has to be - producing the best magazine for your club - not a competition.** Both your club members and the judges will see and appreciate the results.

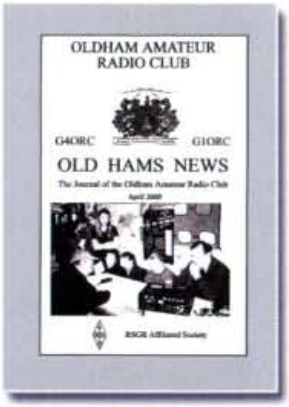
Runner-up this year, with 47 points was the **Cockenzie & Port Seton Amateur Radio Club** from Scotland. Dave G5HY commented: "Very nice indeed - good typeface and lay-out, good mix of club news and wider information". David G4PLE said "As one issue contained my life story I'd better not comment on content! Another brilliant set though - look what can be done with photographs! (they're using more photos this year). Tex G1TEX said "A slight change of lay-out this time - making it easier to read. Simple but effective".

General Comments

As I've said, standards are very high in this competition and the entry from the **Echelford Amateur Radio Society** (Middlesex) earned **46.5 points** and drew comments such as "Very professional, excellent photographs of committee." Acted on our comments last year - great improvement", "simply bound, interesting read, excellent photographs - covers hobby well", from the adjudication panel. We all agreed that this club has a potential winner with their magazine!

Crowstalk - the entry from the **Crowborough & District ARS** (which won first prize two years running) again entered an excellent choice of magazine. Their score of **46** points does not mean their standards are slipping - far from it - it reflects the ever climbing standard of entries. My own comments draws attention to this fact: "Better and better! Good read, good design, I can't think of any suggestions on how to improve it. Truly excellent"!

The Greater Peterborough ARC's entry scored **43.5** and drew an interesting comment from David G3PLE: "A monthly newsletter with good photos in Black and white. What I had in mind when I first suggested the competition. David awarded them maximum points of ten!



● Front cover of the *Old Hams News*. Although a simple front cover, it's backed up with a content that impressed all the judges.

The Yeovil & DARC ***YARC NEWS*** also scored **43.5** points. This well known club's entry drew favourable comments from Tex Swann G1TEX: "Another newsletter that fills all the needs to inform club members of the programs. But also finds space to provide technical articles as well. A good read". Tex awarded them 8.5 points out of 10.

The ARAC News - the entry from the **Andover Radio Amateur Club** was awarded **43** points by the judging panel. Dave G5HY commented: "good variety of content - and it's available on CD too"!

Cranium - **the Colchester Radio Club's** newsletter scored **43** points and was enjoyed by all the judges. Jim Bacon G4YLA wrote: "Excellent newsletter with a good mix of social and technical material. Jim gave the CARC nine points.

Cheltenham Amateur Radio Association's *CARA News* scored **42.5** points and drew the following comments from myself "A delightful 'friendly read' - shows what can be done with a simple practical approach" and from David G3PLE who said: " To be encouraged - a very good entry".

Mid Sussex Matters, the entry from **The Mid Sussex Amateur Radio Club** was awarded **42** points and drew comments such as: "Simpler lay-out was most effective" from Tex G1TEX and "superb up-and-coming entry" from myself.

The Worthing & District Amateur Radio Club's *Ragchew* entry also scored **42** points and led David G3PLE to write "Dedication of Editor shows, quality of content, information, news and forthcoming events. It has everything needed". (David awarded 9.5 points).

The Bracknell Amateur Radio Club's *Newsletter* entry was awarded 40.5 points and some very encouraging comments from Tex G1TEX: "Simple! One page and yet it does the job, very easy on the eye and informative. (Tex awarded them 9 points).

Warrington Amateur Radio Club's QSX WARC entry was awarded 40 points and won some encouraging comments from Jim G3YLA who said: "Another good result from Warrington. a very readable selection of articles". (Jim awarded them 8 points). My own comments "A traditional club magazine - well done Warrington" (I awarded them 8 points).

Next Year?

My comments on the adjudication sheet for the Warrington ARC's entry must surely demonstrate to everyone that all the entries were in actual fact 'winners in their own' right because of the high standards. And hopefully next year we'll see just as many good entries for the 'Spotlight' competition!

So, if you haven't entered your club's magazine/newsletter please do so - the judges enjoy reading all the entries. And in reading them we will get abundant proof that our hobby is alive and well - **ably supported by your club's magazine.**

Good luck in 2001 everyone! *PW*

● Geoff Oliver G0BJR, Editor of the Oldham Amateur Radio Club magazine *Old Hams News*, this year's winner of the 'Spotlight' trophy, is shown accepting it at the Leicester Show on Saturday 23rd September. Geoff (Editor for eight years and Club Chairman for 10 years) is accompanied by (centre) Club Secretary Mike Crossley M1CVL and Geoff Ashton M0AUG the OARC's Treasurer.

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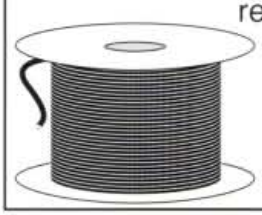

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ALINCO	DJ-G1 HANDY 2M WIDE RECEIVER	£129.00
ALINCO	DR-150 2M/FM/ 50w MOBILE	£200.00
ALINCO	DR-590 DUAL BAND MOBILE	£175.00
ALINCO	DR-599 DUAL BAND MOBILE	£245.00
ALINCO	DX-70T 100W MOBILE / HF	£475.00
ALINCO	DX-70TH TRANSCEIVER	£475.00
ALPHA	87A FULLY AUTOMATIC AMP	£3,350.00
AMERITRON	QSK-5 2.5kw QSK SWITCH	£199.00
AOR	AR-2002 BASE SCANNER	£199.00
AOR	AR-3000A RECEIVER	£495.00
AOR	AR-5000 RECEIVER	£1,199.00
AOR	AR-7030 REMOTE CONTROL RECEIVER	£595.00
AOR	AR-8000 HANDY RECIEVER	£199.00
AOR	AR-8200 MK1 HANDY RECEIVER	£280.00
BEARCAT	9000 XLT	£199.00
DAIWA	PS-120MK11 10amp PSU	£50.00
DAIWA	PS-304M11 20amp POWER SUPPLY	£85.00
DATONG	FL3 FILTER	£60.00
DATONG	RF PROCESSOR	£60.00
DIAMOND	GSV-3000 PSU	£100.00
HEATHERLITE	2M EXPLORER 2m AMPLIFIER	£399.00
ICOM	AT-150 ATU	£195.00
ICOM	IC-207 DUAL BAND MOBILE	£210.00
ICOM	IC-251E AC 2M Mulit-mode	£325.00
ICOM	IC-275H 100w 2m Mulit-mode	£575.00
ICOM	IC-275H 2M 100W BASE TRANSCEIVER	£550.00
ICOM	IC-3230 H DUAL BAND MOBILE	£175.00
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ICOM	IC-706MK1 TRANSCEIVER	£499.00
ICOM	IC-706MK11 DSP TRANSCEIVER	£599.00
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KENWOOD	TS-570DG TRANSCEIVER	£695.00
KENWOOD	TS-690 SAT TRANSCEIVER HF/6M	£695.00
KENWOOD	TS-780 DUAL M/M BASE	£350.00
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YAESU	FP-757GX SWITCH MODE	£95.00
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Yaesu's Forgotten Transceiver? It's Classic - The Yaesu FT-707

This month Rob Mannion G3XFD takes a look at a transceiver from Yaesu which could arguably be called 'Yaesu's 'forgotten classic' - the pioneering FT-707.

Rob Mannion G3XFD tries the Yaesu FT-707 and suggests you start looking now for a model on the second-hand market

Response from our readers to our newly extended 'It's A Classic' series - which has been running on an occasional basis certainly surprised the *PW* team! The report on the TS-830 certainly provoked a lot of correspondence, and the new GW owner of the rig I'd had to try, even got me to sign the manual at the Leicester Show!

One unforeseen results of the article were the several (good natured) complaints I got from readers who said that prices of TS-830s had risen since the article was published. All I can say in my defence is that none of the money comes my way! So, with your responses ringing in our ears I've started looking around for rigs we've perhaps missed first time round and which may well be overlooked nowadays.

Although I owned - and still own a selection of other pioneering Yaesu Amateur Radio equipment - I've never until now had the opportunity to use the FT-707. However, now that I've had the opportunity I wish I'd been able to have one in my shack.

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

The suggestion of trying the '707 came from **Bob G6DUN** at the Shortwave Shop in Christchurch when I returned the Kenwood TS-830, which had featured in the October issue. On the look-out for more classic equipment we got talking about older Yaesu Amateur equipment - it so happened that he had a '707 which had come his way. So, rather tempted I took it away with me.

The FT-707 was available in the early 1980s and was first reviewed (anonymously as was often the case in those days) by a 'Staff Member' in the May 1981 issue of *PW*. Interestingly although the review provided much technical information, the opinion I was looking for from the unknown reviewer was summed up in one paragraph simply as "It's really going to break my heart to send the review model back". Obviously the transceiver had left a lasting impression!

As we now approach 2001 it's all too easy to forget the impact the introduction of Japanese Amateur Radio equipment had on our hobby back in the early 1960s. In fact the earliest Japanese equipment I ever saw was in 1959 (or thereabouts) in the G. W. Smith & Co. (Radio) Ltd. shop in Lisle Street, not far from the famous Tottenham Court Road.

In those days there were several interesting shops selling surplus radio equipment of interest to Radio Amateurs and those like me who were budding Amateurs. However, farther down Lisle Street there were establishments best avoided unless you wished to be apprehended by the continually patrolling Vice Squad officers of the Metropolitan Police!

Fig. 1: The neat front panel of the FT-707 transceiver. The main tuning display fro the transceiver is provided by bright 'off white' l.e.d.s with a bar-graph type of indicator for power output indication. The digital frequency read-out is supplemented by a mechanical analogue dial counter. The neat and uncluttered control panel is exceptionally easy to use.

The Yaesu FT-707 - a transceiver ahead of it's time?

Sommerkamp & Yaesu

What made the Smith's shop in Lisle Street stand out from many of the others was the fact that along with selling a nice range of surplus equipment, they also sold Eagle equipment, Lafayette receivers (American looking but again - I'm fairly certain - also made in Japan) and one or two early Sommerkamp radio receivers from Germany.

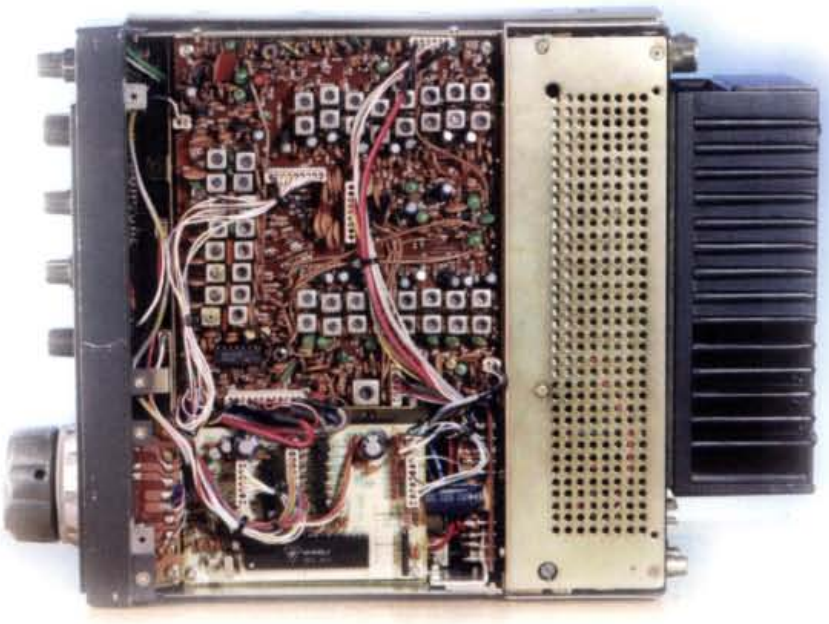


Fig. 2: Inside view of the transceiver, showing the upper side of the main p.c.b. with relatively few integrated circuits and many discrete components.

Manufacturer's Specifications

GENERAL

Frequency Coverage:	80m	3.5-4.0MHz
	40m	7.0-7.5MHz
	30m	10.0-10.5MHz
	20m	14.0-14.5MHz
	17m	18.0-18.5MHz
	15m	21.0-21.5MHz
	12m	24.5-25.0MHz
	10m	28.0-29.9MHz
Modes Of Operation:	l.s.b., u.s.b., c.w. and a.m.	
Power Requirements:	13.5V d.c., negative ground	
Current Consumption:	d.c. 1.5A receive	
	d.c. 20A transmit	
Case Size:	93 (h) x 240 (w) x 295 (d) mm inc. heat sink	
Weight:	approx 6.5kg	

TRANSMITTER

Power Input:	s.s.b./c.w.	240W d.c.
	a.m.	80W d.c.
Carrier Suppression:	Better than 40dB	
Unwanted Sideband Suppression:	Better than 50dB at 14MHz, 1kHz mod.	
Spurious Emissions:	At least 50dB down	
Frequency Response:	350-2700Hz (-6dB)	
Third Order Distortion Products:	At least 31dB down	
Frequency Stability:	Less than 300Hz drift over 30 minutes after 10 minute warm up, less than 100Hz drift after 30 minutes warm up	

RECEIVER

Sensitivity:	s.s.b./c.w.	0.25µV for 10dB S/N
	a.m.	1.0µV for 10dB S/N
Selectivity:	s.s.b.	2.4kHz (-6dB); 4.0kHz (-60dB)
	c.w. *	0.6kHz (-6dB); 1.2kHz (-60dB)
	c.w. **	350Hz (-6dB); 1.2kHz (-60dB)
	a.m.	3.6kHz (-6dB); 6.8kHz (-60dB)
Image Rejection:	60dB (80-12m)	
	50dB (10m)	
Audio Output Impedance:	4-16Ω	
Audio Output:	3W @ 4Ω @ 10% THD	
Variable Bandwidth Control:	Continuous from 300Hz to 2.4kHz (s.s.b./c.w. modes only)	
Modulation Type:	(s.s.b.) Balanced modulator (a.m.) Amplitude modulation of a low power stage	
Antenna Output Impedance:	50Ω	
Microphone Impedance:	500-600Ω (low impedance)	

* with optional 600Hz c.w. filter
** with optional 350Hz c.w. filter

However, although the Sommerkamp receivers were marked 'Made in Germany' it became obvious to anyone looking closely at the receivers that they were made in Japan and assembled in Germany. The Japanese maker's name? Yaesu Musen of course.

I still have some unusual Bakelite International Octal and several Mazda Octal baseboard mounting valve bases bought from the shop. They've lasted me many years and have proved extremely useful. But oh, how I now wish I then had the money to buy one of the early Sommerkamp receivers -as nowadays they are becoming very collectable indeed.

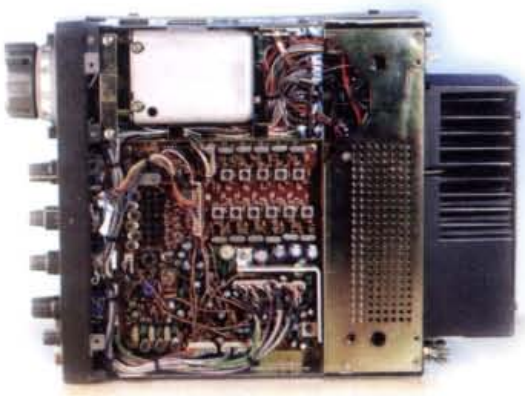
In fact, it's my opinion that the early Sommerkamp and Yaesu equipment will very soon become as collectable as the Eddystone equipment is now. So, whatever you do ... don't dump that older radio - it could be the start of your own collection.

Five or six years ago when I was attending the Dayton HamVention in Ohio in the USA with a party of *PW* readers I came across one chap who has a truly massive collection of Japanese Amateur Radio equipment on display outside in the huge 'Flea market'. None was for sale!

Additionally, None of it was later than 1980 and some went back to the early 1960s with one or two rarer items (particularly Morse keys) going back to the middle 1950s. Some of the collection included equipment made by Yaesu originally for the Japanese home market (this is how the famous FT-75 originally started so I've learned).

Hopefully as this series goes from strength-to-strength owners of rarer 'classics' will let us share the experience f owning the equipment (see 'Keylines' for further details on how you can help) and will be in contact with me on the subject. In the meantime I'll describe my own interesting experiences with the FT-707.

Fig. 3: Underside view of the main p.c.b. with the massive heat sinking for the p.a. stage on the far right with the shielding (with perforated screening) of the two transistor power amplifier on the near right.



Solid State

Basically speaking, the Yaesu FT-707 is a 3.5 to 28MHz fully solid state 100W s.s.b. and c.w. transceiver, capable of running a maximum of 100W. Using amplitude modulation it's capable of a maximum of 50W and the design is based round remarkably stable variable frequency and crystal-controlled oscillators.

Although the transceiver covers all the WARC allocations, strangely enough **it does not cover the 1.8MHz band**. The omission of 'Top Band' although surprising (especially if you enjoy 1.8MHz operations) nowadays, perhaps is more than compensated for by the inclusion of the WARC bands as they've become much busier.

I'm left wondering whether or not - 20 or so years ago would the lack of 'Top Band' have deterred me from buying the transceiver? Bearing in mind how little used the WARC bands were then I may have opted for another rig - and I would have been the loser!

The receiver circuitry on the FT-707 is rather unusual and extremely interesting. In fact, it's a double conversion superhet which ends up producing the original 8.9875MHz i.f!

The first 8.9875MHz i.f. is passed through a 20kHz crystal filter and then, after further processing is fed through the main s.s.b. filter (an extra c.w., filter was available as an option). The filtered i.f. signal is then mixed with a 19.7475 MHz local oscillator signal. The resultant 10.76MHz signal is fed through another crystal filter and mixed with another 19.745MHz local oscillator to produce the original i.f.

The rather protracted conversion

Fig. 4: Rear view of the FT-707 with fan protection and ducting screen removed. Note heavy duty cast aluminium heat-sinking ducts and the airways provided when the screening is in place.

and re-conversion process enabled the designer to provide the receiver with a continuously tuneable variable bandwidth over the i.f. pass-band with no change in the beat note of the incoming signal.

The process - although involved - is effective and is achieved by the clever use of a variable crystal oscillator (so beloved by the **Rev. George Dobbs G3RJV** for his QRP projects!) with just enough 'swing' to cover the pass-band of the filter. It's all worthwhile and the results are impressive bearing in mind the age of the transceiver.

In fact, everything on this transceiver is impressive. Especially when you remember that it predates the minuscule surface mount components by more than a decade. What a tribute to the designers!

On The Air

On the air the FT-707 proved to be a delight and I only had a few minor difficulties. I won't concentrate on them because I think they're mainly due to the limited dexterity I have with my left hand.

Generally speaking the transceiver is, as I've mentioned, a delight to use. The large tuning knob, although not a free spinning weighted control, has an exceptionally 'nice' feel about it. However, being somewhat old fashioned the main pleasure for me was having the beautifully illuminated (in a soft luminescent green) main analogue dial which rotates behind the deeply engraved very solid feeling aluminium tuning knob.

Being on the right hand side of the transceiver you might think that I (being left-handed of course) might have found the main tuning control difficult to use. Not so! Sat on my auxiliary desk to the left of my main transceiver (the Alinco DX-70) I found it very comfortable to tune and operate.

Despite the fact that the built-in loudspeaker is underneath the transceiver the folding stand mounted on the underside lifts it up high enough to provide perfectly acceptable audio. Transmitted audio is also good and several friends said my voice was very recognisable .

On c.w. the variable delay VOX switching used for keying follows the pattern used for most transceivers of the same era. I quickly got used to it again once I'd adjusted the 'hang' time to my satisfaction.

Performance on 7MHz - always an excellent test I feel proved to be superb. Bearing in mind that the transceiver does not have a high first i.f. and it's a far from new design - it proved excellent indeed. In fact I regard this transceiver as being a really good rig for the keen c.w. operator. The variable bandwidth feature really proved itself on the air and enabled me to complete several very difficult QSOs which were hampered by very noisy conditions.

I regard my Alinco DX-70 as being an excellent performer on 7MHz, as it comes fitted with narrow filters as standard. And recently I have managed to find myself (thanks to **Arthur Tait GM4LBE** who lives up in Lerwick on 'Mainland' of the Shetland Islands) an add-on W9GR DSP III unit which increases the versatility of the receiver.

Together the DX-70 and the DSP unit provide a formidable pair with which I can compare results on other equipment. However, despite the fact that they do work together well (the DSP unit's performance as a switchable bandwidth c.w. filter is superb) **I found that the FT-707 was also able to hold its own remarkably well in the same conditions, and this I proved by switching over the antenna during QSOs.**

The only time I was unable to continue a QSO was when I was working **Ger EI6DP** in Limerick, Ireland on s.s.b. The noise was so bad and conditions were so poor that the DSP III's noise reduction facilities had the edge over the sensitivity and I had to switch over to the DX-70/DSP III combination to complete the QSO.

Sensitivity, and selectivity make the FT-707 a good competitor even nowadays on the bands. On 3.5MHz I found it coped very well, and again c.w. was a delight. Trying the rig up on 28MHz to see if sensitivity 'dropped' off - I was pleased to see it hadn't. Everything I could hear on the DX-70 I could also copy on the '707.

In Rob's Collection?

So, now I've had the opportunity of trying the seemingly rather rare FT-707 you're probably wondering - did it impress me enough to add one to my collection? In reply you'd get a resounding yes!

My only regret is that I never came across the FT-707 before now. And although the design is well over 20 years old - it more than holds its own on the modern day Amateur bands.

The only problems (and these are probably only due to my disabilities) were in operating the Mode control switch (my finger size didn't leave much room between the microphone plug and the switch). Additionally the really tiny VOX gain control (in the 7 o'clock position underneath the main tuning knob) and the VOX delay knob (in the 5 o'clock position under the main knob) were awkwardly placed.

However, as the two controls won't be operated that much in practice, I don't see them causing much trouble. And that's the sum total of problems I found on this pioneering transceiver.

Keen on c.w. and the proud owner of an M5 series callsign? If so - take my advice and look out for a Yaesu FT-707 on the second-hand market - you won't be disappointed. PW

Yaesu Musen

The Yaesu Musen company have been involved with radio communications since the late 1950s. Their first equipment started arriving in the UK in the form of the now sought-after Sommerkamp receivers, made in Japan and assembled in Germany. Their UK base in now in Winchester, Hampshire.

Product

The Yaesu FT-707 3.5 to 28MHz transceiver, including WARC bands. (First marketed in the 1980s)

Pros & Cons

Pros: *Good value for money transceiver.*
Ahead of its time - and still an excellent performer.

Cons: *Obtaining spares for older transceivers can be difficult. However, this transceiver has a reputation for reliability.*

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

for the loan of the Yaesu FT-707

Summary

"Although the design is well over 20 years old - it more than holds its own on the modern day Amateur bands"... "Keen on c.w. and the proud owner of an M5 series callsign? If so - take my advice and look out for a Yaesu FT-707 on the second-hand market - you won't be disappointed".
My thanks go to The Shortwave Shop, 18 Fairmile Road, Christchurch, Dorset BH23 2L. Tel/FAX: (01202) 490099 for the loan of the review FT-707.

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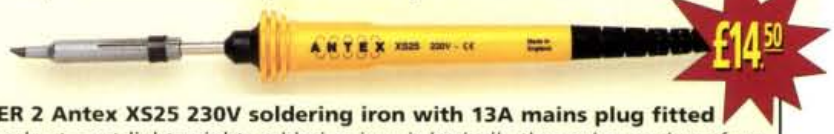

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MVT7300	H/Held Scanner 531Khz-1320Mhz 1000mem	£269.95
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YAESU VR500	Handheld Scanning Receiver	£199.99
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ZX 20-2	2 Element 14Mhz Beam 6.3dB Gain	£146.40
ZX 20-3	3 Element 14Mhz Beam 9.1dB Gain	£197.95
ZX 20-4	4 Element 14Mhz Beam 11.4dB Gain	£255.95
ZX 20-5	5 Element 14Mhz Beam 12.1dB Gain	£320.00
ZX 30-2	2 Element 10Mhz Beam 6.3dB Gain	£165.00
ZX 30-3	3 Element 10Mhz Beam 9.1dB Gain	£184.50
ZX 6-2	2 Element 50Mhz Beam 6.2dB Gain	£48.95
ZX 6-3	3 Element 50Mhz Beam 9.1dB Gain	£81.95
ZX 6-4	4 Element 50Mhz Beam 11.4dB Gain	£99.95
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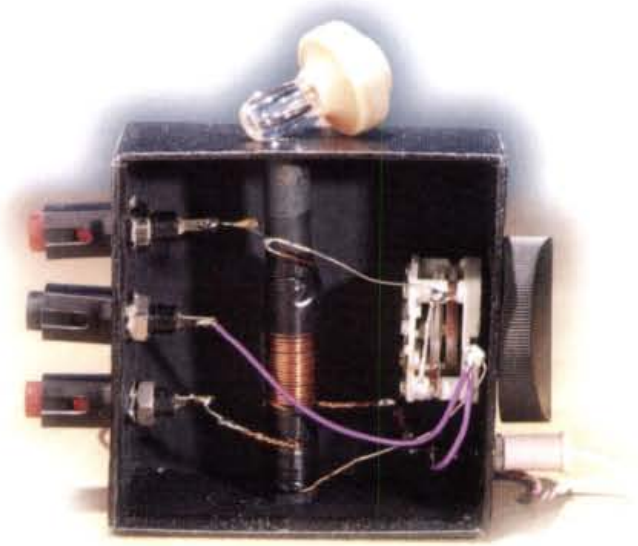
Carrying On The Practical Way

This month the Rev. George Dobbs G3RJV offers you an "Old Fashioned Christmas". So, join him in the Vicarage, sitting in front of a roaring fire, and have a go yourself ... after enjoying the appropriate quotation!

" England was merry England, when old Christmas brought his sports again"

Lullaby of an Infant Chief,

Walter Scott 1771 - 1832



● Fig. 1: The practical crystal radio G3RJV made from odds and ends around the workshop. It's a typical circuit with a tuned circuit (L1 and C2) feeding a germanium diode, which detects the signal to drive high impedance headphones (see text).

It has become a tradition ... well since 1996 anyway, for me to offer a Christmas project in this column. Something to provide a distraction from the rigours of the festivities and perhaps even be justifiable to other family members. In short - an excuse to withdraw from the cold turkey and old films showing on TV.

What could be better than taking your children, or grandchildren in to the workshop and introducing them to the magic of radio signals coming from a few parts that you (or they) have joined together. Everyone should build a crystal set at some time - they are magic things. I can still remember dragging my father up to my bedroom and clamping a pair of government surplus headphones over his head so that he could hear the radio signals I had captured.

My father probably heard the BBC's 'Home', 'Light' and 'Third' programmes all at the same time. Radio communications have moved on - but I make no apologies for offering the humble crystal set as a Christmas family project.

Recent Revival

Rather oddly there has been a recent revival in the interest in the crystal set. Indeed, there are several societies devoted to making and experimenting with crystal radios.

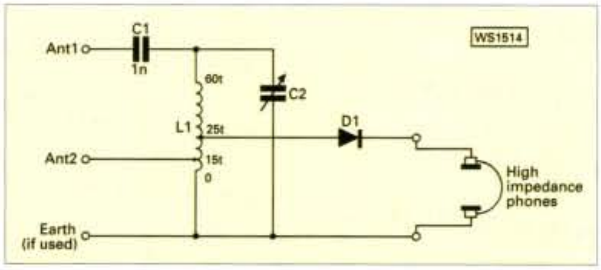
In fact, I managed to find over 50 'pages' on the Internet devoted, in some way or other, to building crystal sets! They can be an interesting, and cheap, area for experimentation but here we will stick with conventional designs and ideas.

The joy of the crystal set is that it requires no power apart from that of the incoming radio signal. They also requires very few components.

Unfortunately, the problem is that some of the components, like high impedance headphones and high value variable capacitors, are no longer easy to obtain. Fear not! I'll suggest alternatives. Ideally, a crystal radio is a spend-nothing project.

Practical Crystal Radio

The diagram, **Fig. 1**, shows the practical crystal radio I made from odds and ends in my workshop. It's the typical circuit with a tuned circuit (L1 and C2) feeding a germanium diode, which detects the signal to drive high impedance headphones.



I've modified the basic circuit slightly by tapping the tuning coil for antenna and diode matching. Notice also that I have allowed access for the antenna at the coil tapping and also at the top of the antenna via a large value capacitor (C1).

The tuning coil is wound on a scrap piece of ferrite rod from an old transistor radio. The total winding is 60 turns of 24s.w.g. enamelled copper wire with tapping points at 15 turn and 25 turns.

Don't worry - the coil is simple to wind. Secure one end of the wire to the rod with plastic tape and count on 15 turns. The turns are wound closely side-by-side.

At the 15th turn pull out a loop of wire about 20mm long and twist the loop to form a 'barley sugar spiral' tight to the rod. Continue to the 25th turn and make another loop and twist the wires. At the 60th turn, secure the end of the winding with plastic tape.

The next stage is critical for success. Both ends of the winding and the tapping points must be scraped free of the enamel coating and tinned with solder.

Using sandpaper or scraping with a small modelling knife will remove the enamel coating from the two ends and two tappings of the coil. This should expose clean, shining, copper.

Next, apply a soldering iron to the bare copper, wait until it is thoroughly heated and apply solder. **Useful tip:** If you use the copper wire, rather than the soldering iron tip, to melt the solder, then it will certainly be hot enough to allow solder to flow over the surface.

The tuning capacitor, C2, should be of a value in the order of a few hundred Pico farads. The old classic variable capacitor for such a radio was a "0.0005uF solid dielectric tuning capacitor". In other words - a 500pF variable capacitor with insulating material between the vanes.

Traditional solid dielectrics are not easy to find these days but fortunately we do have a direct equivalent. Most domestic 'a.m./f.m.' (long and medium wave and v.h.f.) radios use small tuning capacitors commonly called Polyvaricon capacitors which are ideally suited for this job.

Polyvaricons usually have two sets of vanes for l.w. or m.w. tuning and two sets for v.h.f. tuning. One slight problem is that the capacitance for the m.w. tuning range is usually somewhat less than 500pF.

In practice most of the Polyvaricons provide adequate coverage of the m.w. band with the coil in Fig.1. The more ambitious might like to add a switch to bring one or both of the sets of vanes in to the tuned circuit for a two-range medium wave coverage.

The diode, D1, really needs be a **germanium diode**. The commonest type is the OA91 but any other germanium diode would suffice.

High Impedance Headphones

I am lucky enough to have several sets of good high impedance headphones. Here I am talking about headphones with an impedance of some 1 - 2kΩ.

Unfortunately these days most headphones are in the range 8 to 16Ω and designed for the low impedance audio output of domestic appliances or Amateur Radio equipment. But don't worry - if you don't have a pair of high impedance headphones, all is not lost and **Fig. 2**, shows a couple of good alternatives.

The diagram in Fig. 2.(A) shows the use of use of a piezo-electric 'crystal' earpiece. (These are still quite readily available from component stockists). For some odd reason the earpieces are usually a fleshy pink colour with twisted leads. So if you have a single earpiece that looks like that, then it's probably a crystal earpiece. The impedance of such earpieces is very high, usually in the order of mega ohms.

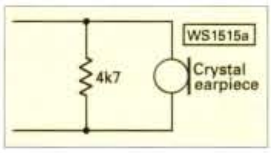
A high impedance headphone can be simulated by providing the crystal radio with a load resistor of about 5kΩ and connecting the crystal earpiece across the resistor. Although, in practice, I have found that simply using the crystal earpiece alone works just as well.

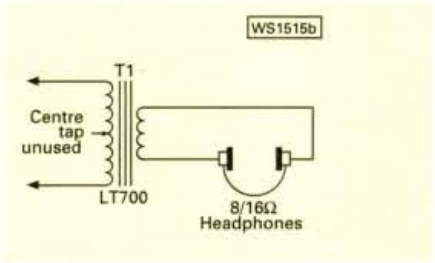
If you don't have a crystal earpiece, another alternative is shown in Fig. 2.(B). This uses a matching transformer to drive a conventional pair of headphones. This circuit works well with the common portable cassette player headphones.

I used the LT700 transistor audio output transformer to obtain very successful results. This has a centre-tapped primary of some 2kΩ impedance to a single secondary winding of some 8Ω impedance.

It's possible to cull similar transformers from old transistor radios, perhaps even the one used to provide the ferrite rod. These older radios often had discrete audio amplifiers with push-pull output stages using transformers like the LT700.

The headphones used on the portable cassette players are terminated with stereo jack plugs, so you need to know how to connect the output to drive both sides of the headphone. The diagram, Fig. 2.(C), shows that using the ring and the tip connections on these headphones will drive both sides. (In fact the two phones will connected in series which produces very satisfactory results).





Receive Enough Signal

The crystal radio is driven entirely by the radio frequency power of the signal and is reliant on receiving enough signal to drive the phones. This really does mean that you'll have to use a decent antenna.

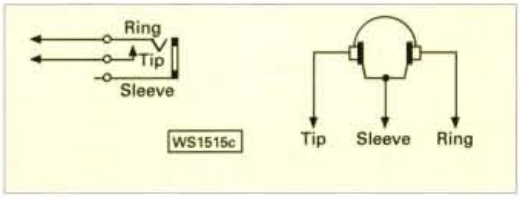
A long piece of wire works well and perhaps an existing antenna can be used. If you use a dipole or doublet antenna, join both sides to the input.

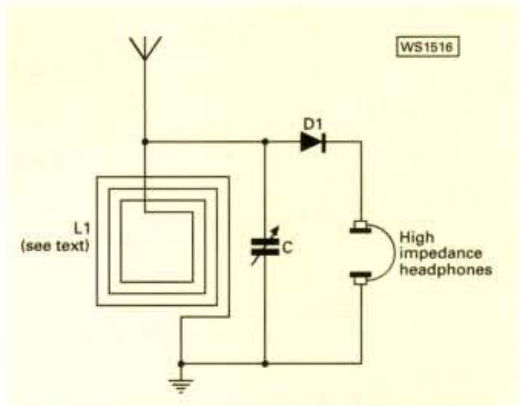
Alternatively, if you have a vertical or beam or some other fancy configuration driven by a coaxial cable, use the outer screen of the coaxial cable.

Common wisdom says that the crystal radio works better with an earth connected to the ground end of the circuit. Most times I have found that it makes little difference.

The radio described here should receive several stations in the medium wave band loud enough for comfortable listening. The real experimenter might like to add more frequent taps on the coil and try different positions for the best match for the antenna and the diode. Some antennas I tried worked better when connected to the top of the coil via C1.

● Fig. 2a: Don't worry - if a pair of high impedance headphones aren't available, all is not lost! Here G3RJV shows a couple of good alternatives (see text). Fig. 2b (inset) An alternative circuit using a transformer.





● Fig. 3: Circuit showing wiring connections enabling the use of portable cassette player headphones (See text for comments regarding impedance).

Novelty Radio

The diagram, **Fig. 3**, shows a nice novelty crystal radio in the 1920s style. It's built in a cigar box with the tuning coil is wound around the outside of the box.

The 25 turns are wound around the box and taken in through two small holes with tape holding the winding in place. For this one I used the absolute basic crystal radio circuit and even managed to find an old 0.0005μF solid dielectric capacitor, an old large glass germanium diode and a real pair of high impedance headphones.

Those without a cigar box or with a moral aversion to using the left-overs of smoking can use a shoebox. Just try the same number of turns wrapped around the shoebox and use whatever capacitor and headphones are available.

Happy Christmas! Enjoy this little bit of old-fashioned construction - it makes a nice change from surface mount components and modern equipment! *PW*

Variable Capacitors

Our American-based specialist author Joe Carr K4IPV is back in *PW* again this month. This time around he explains all about all the different types of variable capacitors - their uses and differences.

There's often much confusion regarding capacitors, so I thought it a good idea to take a longer look, especially as they are so important. Capacitors are devices that store electrical energy in an internal electrical field in an insulating dielectric material. They are one of the two components used in r.f. tuning circuits (the other being **inductors**).

The capacitor, like the inductor, is an energy storage device but while the inductor stores electrical energy in a magnetic field, the capacitor stores energy in an electrical (or electrostatic) field; electrical charge (Q) is stored in the capacitor. I shall explain more about that later on.

The basic capacitor consists of a pair of metallic plates facing each other and separated by an insulating material called a **dielectric**. This arrangement is shown schematically in **Fig. 1a** and in a more physical sense in **Fig. 1b**.

The fixed capacitor shown in Fig. 1b consists of a pair of square metal plates separated by a dielectric (i.e. an insulator). Although this type of capacitor is not terribly practical, it was once used quite a bit in radio transmitters.

Glass & Tin Foil

'Ham' spark gap transmitters of the 1920s often used a glass and tin-foil capacitor fashioned very much like Fig. 1b. Layers of glass and foil are sandwiched together to form a high voltage capacitor.

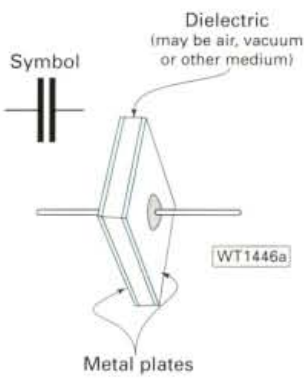
A one-foot square capacitor made of three millimetre thick glass and foil has a capacitance up to about 2000pF, depending on the specific glass material used.

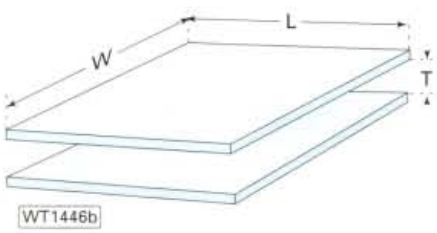
Units Of Capacitance

The capacitance (C) of the capacitor is a measure of its ability to store current, or more properly electrical charge. The principal unit of capacitance is the Farad (named after the English physicist Michael Faraday).

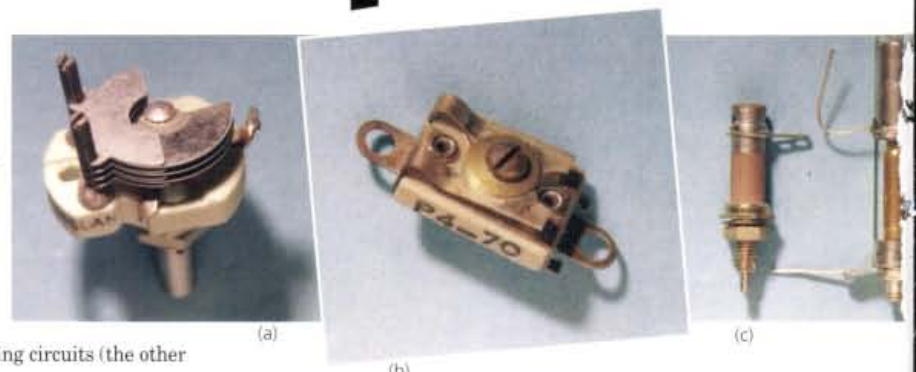
One Farad is the capacitance that will store one coulomb of electrical charge (6.28×10^{18} electrons) at an electrical potential of one volt. Or, in mathematical form:

$$C_{(Farads)} = \frac{Q_{(Coulombs)}}{V_{(Volts)}}$$





● Fig. 1: (a) Basic capacitor and structure and a (b) parallel plate capacitor.



● Fig. 2: Variable capacitors: a) air variable; b) mica compression trimmer; c) piston trimmers (ceramic body on the left and glass body on the right).

The Farad is far too large for practical r.f. electronics work, so sub-units are typically used instead. The microfarad (μF) is 10^{-6} Farad ($1F = 10^{6}\mu F$), the nanofarad (nF) is 10^{-9} Farad and the picofarad (pF) is 0.000001μF, which is 10^{-12} Farad.

The capacitance of the capacitor is directly proportional to the area of the plates (in terms of Fig. 1b, LxW), inversely proportional to the thickness (T) of the dielectric (or the spacing between the plates, if you prefer) and directly proportional to the dielectric constant (K) of the dielectric.

Dielectric constant is a property of the insulator material used for the dielectric. The dielectric constant is a measure of the material's ability to support electric flux and is thus analogous to the permeability of a magnetic material.

The standard of reference for dielectric constant is a perfect vacuum, which by definition has a value of K = 1.000. Other materials are compared with the vacuum. The values of K for some common materials are:

Vacuum	1.0000
Dry air	1.0006
Paraffin (WAX) Paper	3.5
Glass	5-10
Mica	3-6
Rubber	2.5-35
Dry wood	2.5-8
Pure (distilled) water	81

Variable Capacitors

Variable capacitors are, like all capacitors, made by placing two sets of metal plates parallel to each other (Fig. 1a and 1b), separated by a dielectric of air, mica, ceramic, or a vacuum. The difference between variable and fixed capacitors is that, in variable capacitors, the plates are constructed in such a way that the capacitance can be changed (**Fig. 2a**).

There are two principal ways to vary the capacitance. Either the spacing between the plates is varied, or the cross-sectional area of the plates that face each other is varied.

The diagram in Fig. 2a shows the construction of a typical variable capacitor used for the tuning control in

The True Story

radio receivers or the v.f.o. in older transmitters.

The capacitor consists of two sets of parallel plates: the stator plates are fixed in their position and are attached to the frame of the capacitor. The rotor plates are attached to the shaft that is used to adjust the capacitance.

Another form of variable capacitor found in radio receivers is the compression capacitor shown in **Fig. 2b**. It consists of metal plates separated by sheets of mica dielectric.

In order to increase the capacitance, the manufacturer may increase the area of the plates and mica, or the number of layers (alternating mica/metal) in the assembly. The entire capacitor will be mounted on a ceramic or other form of holder and if mounting screws or holes are provided, then they will be part of the holder assembly.

Still another form of variable capacitor is the piston capacitor shown in **Fig. 2c**. This type of capacitor consists of an inner cylinder of metal coaxial to, and inside of, an outer cylinder of metal. An air, vacuum or (as shown) ceramic dielectric separates the two cylinders and the capacitance is increased by inserting the inner cylinder further into the outer cylinder.

The small compression or piston style variable capacitors are sometimes combined with air variable capacitors. Although not exactly its correct usage, the smaller capacitor used in conjunction with the larger air variable is called a trimmer capacitor. These are often mounted directly on the air variable frame, or very close by in the circuit. In many radios the 'trimmer' is actually part of the air variable capacitor.

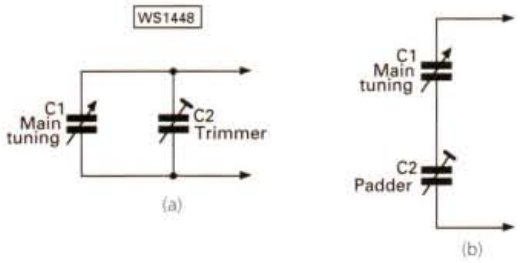
Two Applications

There are actually two applications for small variable capacitors in conjunction with the main tuning capacitor in radios. First, there is the true 'trimmer', i.e. a small-valued variable capacitor in parallel with the main capacitor (**Fig. 3a**) - these capacitors are used to trim the exact value of the main capacitor.

The other form of small capacitor is the padder capacitor (**Fig. 3b**), which is connected in series with the main capacitor. The error in terminology referred to above is calling both series and parallel capacitors 'trimmers' when only the parallel connected capacitor is properly so-called.

Air Variable Capacitors

The capacitance of an air variable capacitor at any given setting is a function of how much of the rotor plate set is shaded by the stator plates. In **Fig. 4a**, the rotor plates are completely outside of the stator plate area and because the shading is zero, the capacitance is minimum.



● Fig. 3: (a) Parallel connection indicates a trimmer capacitance; (b) series connection indicates a padder capacitance.

In **Fig. 4b**, however, the rotor plate set has been slightly meshed with the stator plate, so some of its area is shaded by the stator. The capacitance in this position is at an intermediate value.

Finally, in **Fig. 4c** the rotor is completely meshed with the stator so the cross-sectional area of the rotor that is shaded by the stator is maximum. Therefore, the capacitance is also maximum.

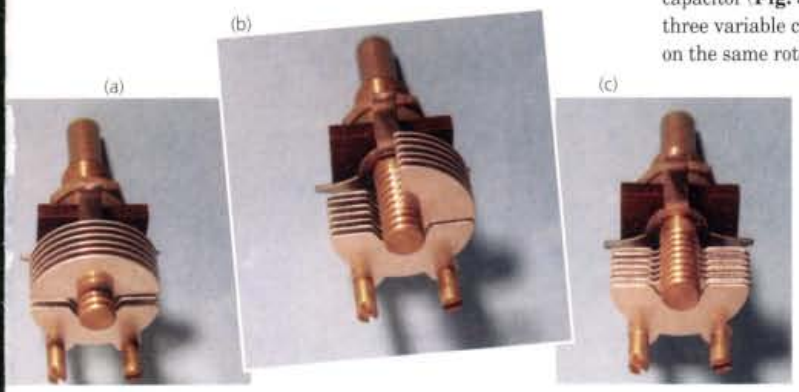
Remember these two rules:

1. **Minimum capacitance is found when the rotor plates are completely unmeshed with the stator plates.**
2. **Maximum capacitance is found when the rotor plates are completely meshed with the stator plates.**

The illustrations of Fig. 4 show a typical single-section variable capacitor - the stator plates are attached to the frame of the capacitor, which if of metal construction is often grounded. On larger units there's usually a rear plates with bearings to ease the rotor's action.

The single-section variable capacitors were often used in early multi-tuning knob radio receivers (the kind where each r.f. tuned circuit had its own selector knob). But that design was not terribly good, so the ganged variable capacitor (**Fig. 5**) was invented which are basically two or three variable capacitors (as shown) mechanically ganged on the same rotor shaft.

In Fig. 5, all three sections of the variable capacitor have the same capacitance, so they are identical to each other. If this capacitor is used in a superheterodyne receiver, the section used for the local oscillator (l.o.) tuning must be padded with a series capacitance in order to reduce the overall capacitance. This is done to permit the higher frequency l.o. to track with the r.f. amplifiers on the dial.



● Fig. 4: Capacitance is a function of how much rotor plate area is inside the stator plates: a) minimum capacitance; b) intermediate capacitance; c) maximum capacitance.

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When Martin Lynch and his team thought of the Morse Camp idea over a year ago, little did we think that so many of you would want to be involved and more to the point, be one of the many who have passed at one of the organised events.

Unlike other retailers who simply 'jump on the band wagon' trying to cash in on genuine financial and personal involvement by ML&S in getting projects like this off the ground, please remember who really cares about the future of this unique hobby.

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Fewer Plates

In many lower cost superheterodyne radio receivers you will find variable tuning capacitors in which one section (usually the front section) has less capacitance (fewer or smaller plates) than the r.f. amplifier section. Sometimes called cut-plate capacitors the l.o. section plates are cut to permit tracking of the l.o. with the r.f.

The variable capacitors shown earlier have the rotor shaft in the geometric centre of the rotor plate half-circle. The capacitance of this type of variable capacitor varies directly with the rotor shaft angle, as a result, this type of capacitor is called a 'straight line capacitance model'.

Fig. 5: Photograph of a three-section ganged air variable capacitor.

Unfortunately, the frequency of a tuned circuit based on inductors and capacitors is not a linear (straight line) function of capacitance (it's a square root function). If a straight line capacitance unit is used for the tuner, then the frequency units on the dial will be cramped at one end and spread out at the other (you've probably seen such radios).

But some capacitors have an offset rotor shaft (**Fig. 6**) that compensates for the non-linearity of the tuning circuit. The shape of the plates and the location of the rotor shaft are designed to produce a linear relationship between the shaft angle and the resonant frequency of the tuned circuit in which the capacitor is used.

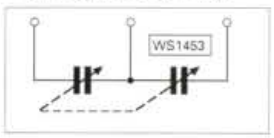
Fig. 6: Constant frequency capacitance (Note the offset turning centre).

Special Variable Capacitors

I'll take a look at some special forms of variable capacitor - first up is the **Split Stator Capacitor**. This type of capacitor is one in which two variable capacitors are mounted on the same shaft and the symbol for the split stator capacitor is shown in **Fig. 7**.

The split stator capacitor normally uses a pair of identical capacitors, each the same value, turned by the same shaft and the rotor is common to both capacitors. Thus, the capacitor will tune two tuned circuits at the same time.

Fig. 7: Split-stator capacitor (right) and its circuit symbol. Both capacitances have the same value at any setting.



Now on to **Differential Capacitors** and, although some differential capacitors are often mistaken for split stator capacitors, they're actually quite different.

The split stator capacitor is tuned in tandem. In other words both capacitor sections have the same value at any given shaft setting whereas the differential capacitor is arranged so that one capacitor section increases in capacitance, while the other section decreases in exactly the same proportion.

The illustration in **Fig. 8** shows both the mechanical construction and circuit symbol for a differential capacitor. **Note:** that the rotor plate is set to equally shade both 'Stator-a' and 'Stator-b'. If the shaft is moved clockwise, it will shade more of Stator-b and less of Stator-a, so **Ca** will decrease and **Cb** will increase by exactly the same amount.

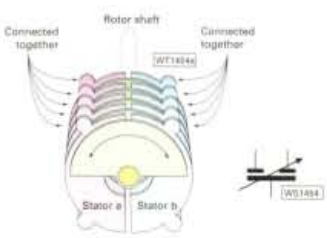


Fig. 8: Differential capacitor, circuit symbol and diagrammatic structure.

Note: the total capacitance (Ct) is constant no matter what position the rotor shaft takes, only the proportion between Ca and Cb changes.

Differential capacitors are used in impedance bridges, r.f. resistance bridges and other such instruments. If you buy or build a high quality r.f. impedance bridge for antenna measurements, for example, it's likely that it will have a differential capacitor as the main adjustment control - the two capacitors are used in two arms of a Wheatstone bridge circuit.

Be careful of planning to build such a bridge, however, because differential variable capacitors are very expensive.

Transmitting Variable Capacitors

So, what about **'Transmitting' Variable Capacitors**? Firstly, the main requirement of this type of capacitor (and certain antenna tuner capacitors) **is the ability to withstand high voltages**.

High-power Amateur Radio or a.m. broadcast transmitters will have a d.c. potential of 1500-7500V on the r.f. amplifier anode, depending upon the type of tube (valve) used. If the transmitter is amplitude modulated, the potential can double. Also, if certain antenna defects arise, then the r.f. voltages in the circuit can rise to quite high levels. As a result, the variable capacitor used in the final amplifier plate (anode) circuit must be able to withstand these potentials.

There are two forms of transmitting variable capacitor typically found in r.f. power amplifiers and antenna tuners. A transmitting air variable capacitor is like the other forms of air variable shown in this article, except that the plate spacing is wide apart to account for higher voltages used in transmitters.

The other form of transmitting variable is the vacuum variable. This type of capacitor is a variation of the piston capacitor, but it has a vacuum dielectric (K-factor = 1.0000). Some vacuum capacitors are driven from a 12V d.c. or 24V d.c. electric motor. Other vacuum variables are manually driven.

Variable Capacitor Cleaning

Amateur Radio buffs often find that the main tuning capacitors in their equipment are full of 'crud', grease and dust. Similarly, 'Hams' working the 'Hamfest' flea-market circuit looking for linear amplifier and antenna tuner parts often find just what they need, but the thing is all 'mucked' up with scum, grease and other stuff.

Fortunately, there are several things that can be done about cleaning variable capacitors. First, try using dry compressed air, it will remove dust, but not grease. Aerosol cans of compressed air can be bought from a lot of sources, including automobile parts stores and photography stores.

Another method, if you have the hardware, is to ultrasonically clean the capacitor. The ultrasonic cleaner, however, is expensive so unless you have one don't rush out to lay down the 'bucks'.

* ***Editorial Note: Opticians in the UK often have these machines for cleaning spectacle frames. Providing the capacitor isn't too large they may be able to help, especially if you get your glasses there!***

Still another way is to use one of the product for degreasing ('degunking') used by automobile mechanics. And I understand from the Editor that this material is freely available in the UK.

Warning of Danger: At one time, carbon tetrachloride was used for this purpose ... and you will see it listed in old radio books. However, carbon tetrachloride is now well recognised as a health hazard. **DO NOT USE CARBON TETRACHLORIDE** for cleaning, despite the advice to the contrary found in old radio books.

Now you should be able to recognise all those capacitors that you find at the next radio junk sale and you'll know what to look for when you want one particular type to finish off a project. Good hunting!

PW

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After months of planning and negotiation, a **Brand New Store** dedicated to Amateur Radio has once again been opened by Martin and his team. Located only a few doors along from the existing showroom (which will continue being the main stores and mail order area), the new shop will include all the main brands including Yaesu, JRC, Kenwood and Icom.

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The telephone numbers and email address stay the same, along with all the helpful and knowledgable staff. Martin will be in the new store full time, having employed new staff to run his ever increasing Scooter business.

Electronics-In-Action

Hello and welcome to 'Electronics-in-Action' for December. In this issue I've got news of some super CD-ROMs for your new computer, an update on the L.Ormand Sparks radio circuit, a programs to get the oscillator tracking 'just-right' on your radio and a few books to consider for your holiday reading!

Let me start of with a the latest in the series of CD-ROMs from **Matrix Multimedia**.The new 'course' *C For PICmicros* is an interactive CD-ROM which aims to cover all the needs of students and professionals who would like to learn to program in 'C' for embedded microcontrollers. Other CD-ROMs available from Matrix Multimedia include, *PIC Tutor, Analogue Filters, digital works, Analogue Electronics* along with others covering electronics and maths related subjects. They're all excellent teaching aids. For more details have a look at their web site **www.matrixmultimedia.co.uk** or contact 10 Hey Street, Bradford BD7 1DQ. FAX/Tel: (01274) 730808

Back In Time

I've had an E-mail from **Graeme Scott** (*graemescott@home.com*) who found the reference to the 'L Ormand Sparks' in an earlier E-i-A Graeme found himself transported back in time by the reference as he wrote "I used one of the designs for the first radio that I ever made. Since then, a continuous stream of nostalgic memories have reminded me of the great pleasure I had with this simple two valve battery-operated radio. It would only operate with earphones, but that was perfectly alright because at the school that I was attending as a boarder (Larchfield School in Helensburgh, Scotland) we were not allowed to have radios. I appealed to **Mr Clark, the Headmaster**, that **John Logie Baird** (the Scottish inventor of television) had attended the school some 30 years before me and so I got a special dispensation, provided that I used earphones.

"One of the most remarkable things about this radio was that the 'high-voltage' supply was only nine volts and was provided by one of the old-fashioned grid bias batteries (which lasted a full year). The filaments of the two valves were wired in series and powered by a 3V bicycle headlamp battery that was good for months. It was extremely economical on batteries! I finished constructing the first one in 1944, just a week before the summer holidays. I remember that the 1C5/GT valves cost 11/6d each, a fortune in those days.

"When I first switched it on, nothing happened, no sound in the earphones. It was about this time that I got the bright idea that things might be improved by twiddling a screwdriver in amongst the wiring at the base of one of the valves. There was a very brief and silent flash of light from the top of the valves and I noticed that the fine wire cantilevers which had previously been bent under tension holding the filaments in place were now straight and there was a small amount of white powder on the inside surface of glass at the top.

"For the last few days of term, I was very depressed. When I went home for the holidays, I told my father that something had gone badly wrong and in floods of tears told him that both valves were blown. I don't think I actually gave him any specific details about how it happened - just that they were blown. To my great surprise and relief, he suggested that we take it to a local radio shop, have them check it out, and buy two new valves.

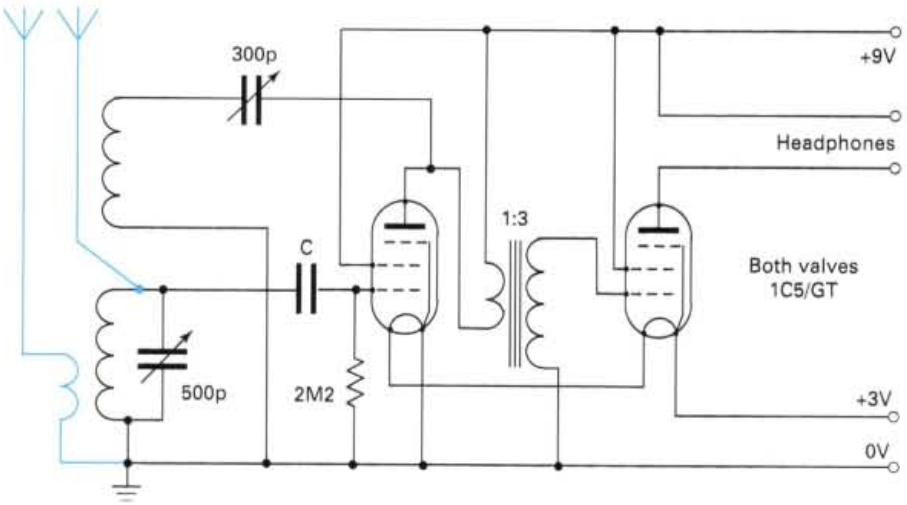
"We took it to a local radio store in Willesden Green (London NW2). The serviceman checked the wiring, installed a pair of brand-new valves, and the darn thing worked! Next morning, I discovered that when the reaction condenser was turned up too far that it would transmit all kinds of noises to my parents HMV radiogram. And as we were living within line of sight of the GPO laboratories at Dollis Hill, I was very concerned that I might get arrested. Over the next six years I constructed and sold over 20 of the sets to various other boys at Larchfield and Fettes.

In My Sleep

"Way back in those days I could have drawn the circuit diagram in my sleep. However, after 50 years, some of the details of the exact way the reaction coil and capacitor were connected escapes me. I think that the original coil was about 150 turns on a 30-35mm diameter former, possibly with a centre tap going to ground. I originally used a ready-made coil as recommended by Sparks. But later on, I wound a coil around the box as a frame aerial finding the right number of turns by experiment.

● Just two of the series of electronic teaching aids available on CD-ROM from Matrix Multimedia. (See text for contact details).

"The circuit diagram shown (**Fig. 1**) below is as I remember my slightly modified version of the original. I still remember the smell and feel of the blueprint. (just a hint of ammonia). In later years (1949) I made myself a miniaturised radio based on a ferrite rod antenna, a Germanium diode detector and a surplus three 'peanut 'valve hearing aid amplifier. As a teenager with a



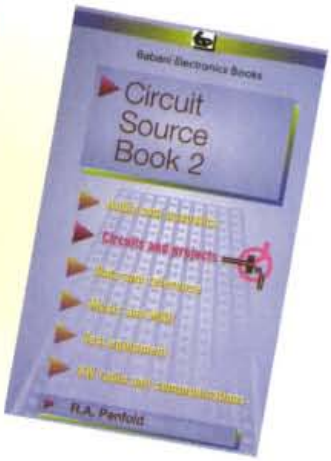
● Fig. 1: This is how Graeme Scott remembers the 'L Ormand Sparks' receiver circuit. (I've added two possible (in blue) antenna connections if you do not use a frame antenna! G1TEX)

single earphone radio in my pocket, I think I might have started something". **Thanks for the information Graeme. I wonder if there's anyone 'out there' who remembers buying one of your radios?**

Practical Oscillator Circuits. £4.99

Getting Started In Practical Electronics. £4.99

Circuit Source Book 1. £4.99



Circuit Source Book 2. £4.99

Free Software

Now I turn to an offer of some free software. **John Grice** has offered a small program called *STRACK#1* to find out the component values that give best tracking of oscillators and tuned circuits in superhet radios. John says that he has been using computers to carry out this function since about 1985, and he wanted a problem to try out his new laptop computer (bought so he "could compute in bed" he tells me). The program that I have from John, runs on a simple DOS based IBM, either in DOS or in a DOS window running under *Windows*.

The program is free to anyone who would like a copy as John says he would like it in the "public domain - free to all". So, if you would like a copy, you'll find it to download from our web site (http://www.pwpublishing.ltd/pw/tex) just follow the links to find it. or send me a formatted floppy disk and a sticky label with your name and address on it. Mark the envelope with the code 'STRACK#1' please.

Books For The Holiday

As I haven't featured any books in recent columns and as it's my last E-i-A before Christmas, I hope you will find my selection of interest. I've specifically chosen books suitable for beginners and inexpensive volumes that won't make a hole in the pocket.

All communications are based on oscillations of one form or another so, I'll start with the book *Practical Oscillator Circuits* by **A. Flind**. This small pocket-sized book in the Babani range (BP393) has over 130 pages and deals, in a practical manner, with many types of oscillators, from a.f. to r.f.. There are six chapters dealing with: 'Timer Based Oscillators', 'CMOS Resistor Capacitor Oscillators', 'Op-Amp Resistor Capacitor Oscillators', 'Waveform Generator IC Oscillators', 'Inductor Capacitor Oscillators' and 'Crystal Oscillators'. The final chapter headed, 'Practical Construction Methods' rounds off the book.
I feel that the two chapters on LC and crystal oscillators on their own make this book worth the £4.99 tag. The book is very practically based, and each of the circuits described is presented with a very good description of its working. There are h.f. oscillator circuits using either Colpitts (split capacitor) or Hartley (split inductor) with one two or three transistors or f.e.t.s as the active devices. For audio and l.f. work there are descriptions of oscillators using c.m.o.s. oscillator dividers with an audio frequency output from an h.f. oscillator. All-in-all an excellent choice for the bookshelf.

Another Babani book that is very practical in its approach to the subject covered, is *Getting Started In Practical Electronics* from **Owen Bishop**. With 30 practical projects described within the 190+ page book there's sure to be more than one project of interest for everyone! The projects themselves and a section of good advice labelled' 'Essentials Of Electronic Construction' are contained in eight chapters. The first five chapters of the book are: 'Components', 'Ohm's Law', Circuits', 'Putting Things Together' and 'Trouble-shooting'. Then follows chapters six, seven and eight with the projects themselves.

Chapter six labelled 'Ten First Projects' include a project called 'The Music Box' which I think is an ideal way to reuse the small sounders that appear in some of the greetings cards - rather along the lines of the BBC program *Blue Peter!* Chapter seven has ten slightly more involved projects for you to build, before you come on the chapter eight, 'Ten Challenging Projects'. The thing I like about this book is that almost all of the projects are described in good detail, including layouts (and p.c.b. patterns) that are easy to follow. At £4.99 this book is also very good value for money!

Penfold's three

My final book ideas are all by the prolific pen (word processor?) of **R. A. Penfold** and the first two are similar but complimentary. *Circuit Source Book 1* and *Circuit Source Book 2* cover similar ground in that they both offer page after page of circuit ideas. Book one, with its three chapters covers 'Filters', 'Amplifiers' and 'Miscellaneous' in chapter three.

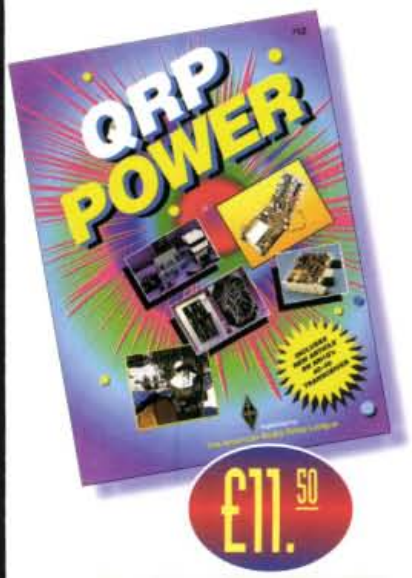
In book two you will find four chapters dealing with 'Oscillators', 'Monostables And Timers', 'Digital Circuits', with 'Power Supplies Etc.' as the final chapter title. In total within both books there are almost 400 pages of circuit ideas to be found. I've used similar, but more expensive, 'cookbooks' like these as start points for many of my project ideas (and I still use them). After all - why re-invent the wheel? Although you can choose the book that has the ingredients for the projects that you are interested in, why not get them both? At under £10 together they're a bargain!

The third book from R. A. Penfold is *Simple Short Wave Receiver Construction*, a book that I have mentioned before. The topics covered in this book are the broadcast and Amateur Radio bands and propagation topics, simple antennas and earthing. The practical projects described are include crystal sets, tuned radio frequency (t.r.f.) radios, single side-band (s.s.b.) reception and a direct conversion receiver. All the projects can be made for very little cost, and extensive details are given for each of the projects described. This is the least expensive of the Babani book described, but at £3.95 it should still be in your stocking on Christmas morning!

Well once again space and time mean I have to sign off now. I'll see you in the next session of Electronics-in-Action.

Tex

Book Profiles



£11.50

Always keen to keep his bookshelf full of good reading Rob Mannion G3XFD has once again selected some more titles he thinks will also interest readers.

QRP Power

Compiled by Joel Kleinman N1BKE & Zack Lau KH6CP/1

There's an insatiable demand for constructional projects from the low power (QRP) fraternity within Amateur Radio and the American Radio Relay League (ARRL) are really 'switched on' to the continuing demands. To this end the ARRL have produced what is in effect a series of re-printed articles from their journal *QST, QEX*, and *The ARRL Handbook*.

There's much to interest the constructor from h.f. to v.h.f. and beyond. Design of a 7MHz rig is covered, plus 'Ugly' receivers, and high performance single signal d.c. receivers are also described. Other sections include a super simple s.w.r. indicator, refinements in crystal ladder filter design. Interestingly, there's also a section covering a single conversion microwave s.s.b./c.w. transceiver, plus a multimode phasing exciter design for 1 to 500MHz. Although some of the reprinted photographs are rather dark, the drawings and diagrams are the usual ARRL standard.

An excellent book and very highly recommended.

RSGB Yearbook 2001 Edition

In my day-to-day office work this book is absolutely indispensable and it's always to hand when readers telephone or write to me with queries. So much so that I now have my own reference copy - because the main office copy was always found in my care! The callsign listing is always very helpful - both UK and Irish listings are very useful indeed.

However, the *Yearbook* comes into its own with the host of other data: band plans, beacon details, repeaters, Amateur Radio frequency allocations, and national and local club information. It's a book I always recommend to newcomers to the hobby and would never be without myself.

Highly Recommended.

£15.99

The Amateur Radio Operating Manual

Edited by Ray Eckersley G4FTJ

This manual improves every time it's re-published. I don't know whether or not it's the RSGB's intention to emulate the ARRL's excellent

£24.95

manual on the same subject - but if they are it's working! Carrying on (although inevitably some material is duplicated) from the excellent *Yearbook* - this manual has sections including: The Amateur Service, setting up a station, operating practices and procedures, DX working, contests, mobile and portable operating satellite and space communications, data communications, image techniques, and special event stations. Very helpful appendices are provided, including international series callsign information (excellently presented) along with others, including a very helpful 'foreign language phone contacts' section. It's a book I'll have on my operating desk.

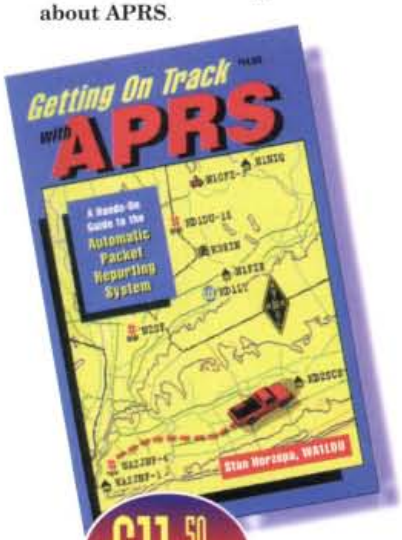
Highly Recommended.

Getting On Track With APRS

Stan Horzepa WA1LOU

I'm considered to be a something akin to a dinosaur by some of my computer and data-communications orientated colleagues and friends - **yes I am that 'old fashioned'** in my approach to the hobby. However, even though I am not active on many modes nowadays **I am very keen to learn** about the new modes which seem to be arriving. The latest which seems to be full of potential is the Automatic Packet Reporting System (APRS) which seems to be all the rage in the USA. The system is an integration of software and hardware that enables packet radio users to track real time events graphically, amongst other features. For instance rather than watching boring lines of text you can watch what's happening on a map on your computer monitor! Want to learn more about this fascinating topic? The book covers DOS, Macintosh and Windows specifically APRS 7.7b for DOS, MacAPRS 2.6.0 and WinAPRS version 1.1.3).

An ideal book for anyone interested in learning more about APRS.



£11.50

Antenna Workshop THE G5RV ANTE

Opening the Antenna Workshop for us this month is Peter Dodd G3LDO, who takes a look at how the G5RV can become an even better general use antenna.

When a newcomer to the h.f. bands is looking for a suitable antenna a G5RV is sure to be one of the favourites. This antenna is regarded by many as the panacea to the multi-band antenna problem and you don't even have to make it - many antenna equipment retailers offer made-up G5RVs. So why has this antenna become so popular?

The late **Louis Varney G5RV**, designed the antenna over 40 years ago, primarily to give a clover leaf pattern and a low feed impedance on 14MHz. The usual commercially available G5RV, shown in **Fig. 1**, is fed in the centre and has a top of 31.3m, a total of three half-wavelengths on 14MHz.

The feed impedance on 14MHz is low because the feed-point is at the centre of the central half-wave section. The mid-band resonant feed impedance at that point is around 90Ω into the 10.36m matching section of open-wire feeder. The feeder is used as a 1:1 transformer, repeating the feed impedance at the lower end.

Because of this reflected 90Ω impedance, the lower end of the matching section can be connected to a length of 75Ω impedance coaxial cable (albeit with a balance to unbalance problem) as a convenient way of routing the feed to the transmitter in the shack. It was for these reasons the antenna became so popular.

The G5RV also presents low impedances on other bands, which fell within the impedance range of earlier Amateur radio transmitters that had pi-output circuits. Thus a G5RV antenna could be connected directly to the transmitter without an additional a.t.u. This represented quite an advantage over routing open line feeder into the shack and using an a.t.u.

However, for the G5RV to work the top dimension and the matching section must be as shown in Fig. 1. If 300Ω ribbon or slotted line is used then the length of the feed section must be adjusted to take account of the velocity factor. (multiply 10.36m by the velocity factor).

Additionally, the G5RV geometry cannot be altered by converting it into an inverted-V or bending the ends to fit into a small available space without upsetting its feed impedance. And on the 10, 18 and 28MHz bands the feed impedances can vary considerably.

Many modern all-solid state Amateur band transceivers have transmitter output stages that are easily damaged when operated with high s.w.r. on the feed cable to the antenna. Or, they have an 'a.l.c.' circuit that reduces power in some proportion to s.w.r. So, in these cases it's obvious that an a.t.u. between the low-impedance feeder and the transceiver is required.

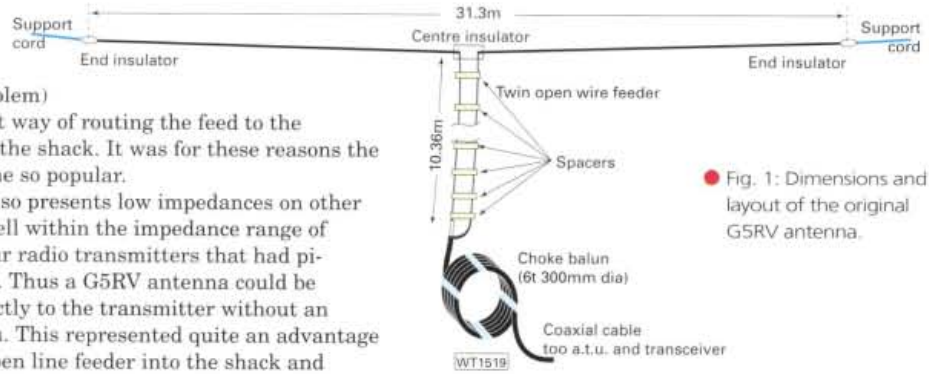
To sum up, the G5RV antenna was suitable as a multi-band antenna in the days when Amateurs had longer gardens, used pi-output valved transmitters **and** before the WARC bands were allocated.

Louis Varney mentioned§1 that the most efficient feeder to use is the open-wire variety, and may be used in conjunction with a suitable a.t.u. for matching. He added that by using 25.6m (84ft) of open-wire feeder the system will permit parallel tuning of the a.t.u. on all bands which brings us to the Open-Wire Tuned Dipole.

Tuned Doublet

The open-wire tuned dipole antenna, also know as the Tuned Doublet or random-length dipole is very simple, yet is a most effective and efficient antenna for multi-band use. This antenna is fed with balanced open wire tuned feeders, as shown in **Fig. 2.**

An a.t.u. is used to convert the unbalanced output from the transceiver to a balanced feed and also to take care of the wide variations of feed impedance on the different bands. The tuned doublet should be at least a quarter wavelength long at the lowest frequency of operation, where it radiates with an effectiveness of approximately 95% relative to a half-wave dipole.



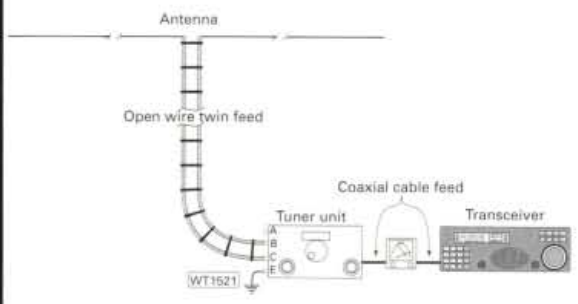
● Fig. 1: Dimensions and layout of the original G5RV antenna.

However, the feed impedance of such a short antenna results in very high s.w.r. when fed with 450Ω line. While the antenna is quite efficient the impedances at the end of the tuned feeder will be outside the matching range of the average commercial a.t.u. using a toroidal balun to provide a balanced feed to the tuned feeders.

If you have the space then use a dipole with a length of about 3λ/8 on the lowest frequency. This is halfway between quarter-wave and half-wave and will work very well if you can't erect a full half-wave on 3.5MHz.

A 3λ/8 dipole has an effectiveness greater than 98% relative to a half-wave dipole, and the s.w.r. values are far easier to match, being in the region of 25:1 on 600Ω line, 24:1 on 450Ω line, and 25:1 on 300Ω line. This dipole, for 3.5MHz, is approximately 30m long, which means that any length from 27 to 30m will make an excellent radiator on all h.f. Amateur bands,

● Fig. 2: The tuned open-wire dipole using a balanced tuned transmission line connected to the balanced output of the a.t.u. B and C. The real advantage of this antenna is that dipole length is not critical, because the tuner provides the impedance match throughout the entire antenna system, whatever the dipole length may be. If you are short of space the antenna could be cut for 3λ/8 of a wavelength on 7MHz and it will tune all bands from 7 to 28MHz. You can still put out a signal on 3.5 or even 1.8MHz by connecting the feeders together and using them as a single wire antenna feed A and using a good r.f. earth.



NNA A MULTI-BAND CENTRE FED ANTENNA

3.5 - 30MHz, including the WARC bands.

If you don't have room for a 27m length of straight wire for operation on 3.5MHz, a 3-5m portion of each end may be dropped vertically from each end support. There will be no significant change in radiation pattern on 3.5 and 7MHz. However, there will be a minor change in polarisation in the radiation at higher frequencies, but the effect on propagation will be negligible.

It is often thought that a high s.w.r. on a transmission line, such as that described above to connect the feeder to the a.t.u., will radiate. This doesn't happen, **provided** the currents on each conductor of the balanced feeder are the same i.e., they are balanced.

Balanced ATU

The multi-band antenna should, ideally, be fed using a balanced a.t.u. The classic balanced a.t.u. is the link-coupled or inductively coupled a.t.u. as shown in **Fig. 3**. The unbalanced input is inductively coupled to the main inductor. Since the mutual inductance between the coils is critical for maximum efficiency, the coupling is varied either by a movable link or by a series input capacitor as shown.

The arrangement shown in Fig. 3 is fine for one band. However, a single coil and link for all h.f. bands does not provide the best coupling ratios for all possible conditions and some of the best solutions use plug-in coils, one for each band. A home-made balanced a.t.u. using this approach was recently described by **Ted Garrott G0LMJ**[§2].

In Ted's design, a total of nine coils covered 1.8 - 28MHz. Two separate capacitors are used for output tuning, providing the facility of equalising the current in each feeder line, being monitored using two r.f. current meters.

There are few commercial balanced line tuners around, but two such tuners are the **Johnson Matchbox** (an old design, which does not include the WARC bands) and the **Annecke** (a more modern design made in Germany).

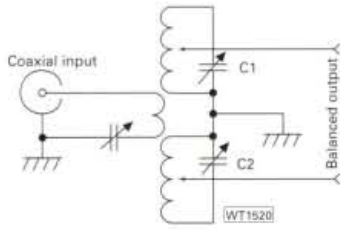
Internet antenna 'guru' **L.B. Cebik, W4RNL**, notes[§3] that for those seeking the most efficient transfer of power to balanced lines, nothing beats a properly designed and constructed link coupled a.t.u. However, for operators who change bands frequently, the inconveniences of plug-in coils may be worse than the losses inherent in more typical tuners. If you have internet access, check out the W4RNL website for a super a.t.u. and antenna tutorial.

The Z-Match

Another link coupled a.t.u. that has been around a long time is the Z-match. Originally designed as the tank circuit of a valved p.a. stage[§4], the anode of which was connected to the top or 'hot' end of the multi-band tuned circuit. It was fed directly from the p.a. valve, with its internal (source) impedance of several thousand ohms

When the circuit was adopted as an a.t.u.[§5] the tank circuit is fed directly from a source which requires a 50Ω load via a 350pF variable coupling capacitor connected to the top (or 'hot') end of a multi-band parallel-tuned LC circuit.

In spite of the great difference between the required 50Ω load for the transmitter and the relatively high impedance of the tank circuit the Z-match enjoyed considerable popularity, most likely due to its simplicity. Z-match a.t.u. s were produced commercially and are easily available and cheap. An example of such a unit is the S.E.M. unit shown in **Fig. 4**.



● Fig. 3: Typical link-coupled antenna tuner circuit.

● Fig: 4: The S.E.M. 'Transmatch' matching unit, which shows the general construction of a Z-match a.t.u.

The T-Tuner

If you want to buy a new a.t.u. these days the only type available is what is known as the 'T-Tuner' or 'T-match'. This a.t.u. has enjoyed considerable popularity in the USA, being described as the 'Transmatch'. The T-network comprises two series variable capacitors with a variable inductance (usually a roller coaster) connected between the point were the two capacitors are connected and earth.

The T-match has the advantage is that it can provide an acceptably wide range of impedance transformations without the requirement for large-value variable capacitors. Its disadvantage is that it is single ended and unbalanced. Most commercial T-match a.t.u. s provide a balanced out by incorporating a balun. The degree of balance is not as good as the balanced a.t.u. described earlier.

The MFJ VersaTuner V, shown in **Fig. 5** uses a T-match tuning arrangement. It has provision for selecting various antennas using a switch and has a cross-needle power and s.w.r. meter that is particularly convenient to use. The ability to switch in a dummy load is also a useful feature. In fact this is more than an a.t.u. – it is an antenna management system. PW

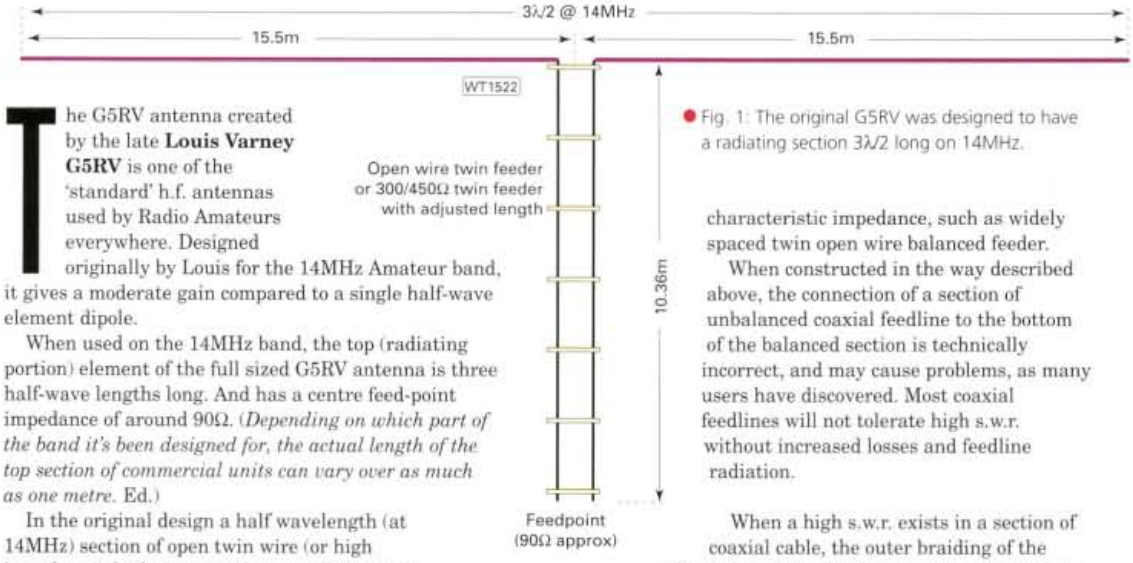
● Fig. 5: Looking into the business 'bits' of the MFJ VersaTuner V.

REFERENCES

§1 The G5RV Multi-band Antenna, *Radcom*, July 1984
§2 'A balanced Line ASTU', Ted Garrott, G0LMJ, *Radcom* July/August 1998
§3 'Link Coupled Antenna Tuners: A Tutorial', L.B. Cebik, W4RNL, internet <http://www.cebik.com/radio
§4 'To Turrets - Just Tune', King W1CJL, *QST* March 1948
§5 'The Z-match Antenna Coupler', King W1CJL, *QST* May 1955

EFFECTIVE IMPROVEMENTS TO THE

Anthony Johnson G4DUC provides this month's second look at the ubiquitous G5RV antenna and says that it's possible to make some effective improvements to your set-up by altering the way you feed it!



● Fig. 1: The original G5RV was designed to have a radiating section 3λ/2 long on 14MHz.

The G5RV antenna created by the late **Louis Varney G5RV** is one of the 'standard' h.f. antennas used by Radio Amateurs everywhere. Designed originally by Louis for the 14MHz Amateur band, it gives a moderate gain compared to a single half-wave element dipole.

When used on the 14MHz band, the top (radiating portion) element of the full sized G5RV antenna is three half-wave lengths long. And has a centre feed-point impedance of around 90Ω. (*Depending on which part of the band it's been designed for, the actual length of the top section of commercial units can vary over as much as one metre.* Ed.)

In the original design a half wavelength (at 14MHz) section of open twin wire (or high impedance) feeder was used as an effective 1:1 impedance transformer so, reproducing, at the lower end of the section, the same 90Ω impedance that occurs at the feedpoint of the antenna element itself.

However, there is no need for this matching transformer at all if the antenna is used solely for the 14MHz band. It would be acceptable to connect a low impedance feedline directly to the centre of the top, radiating, element with no detriment to performance.

In Detail

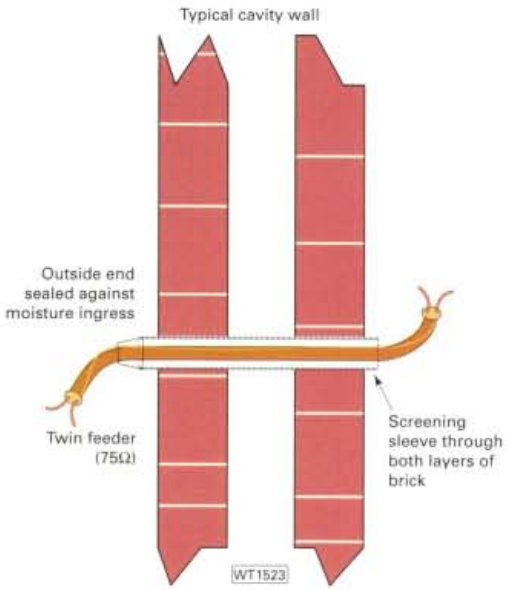
Let's now look at the design, as shown on **Fig. 1** in a little more detail. One half of the radiating top element is 15.5m, now add in the length of the transformer section (10.36m) give an overall length of 25.86m. This is a wire length that is useful in relation to some Amateur bands, as it can provide an impedance which suitable for connecting to low impedance feedline.

The low impedance effect is not available on all bands, due mainly to high reactive impedance values, tending to give a high s.w.r. values. However, if the feedline is capable of operating efficiently under higher s.w.r. conditions then satisfactory results may be obtained.

As shown the radiating top section and the matching section of the antenna form a balanced doublet system. Ideally the matching section should be constructed with a high characteristic impedance, such as widely spaced twin open wire balanced feeder.

When constructed in the way described above, the connection of a section of unbalanced coaxial feedline to the bottom of the balanced section is technically incorrect, and may cause problems, as many users have discovered. Most coaxial feedlines will not tolerate high s.w.r. without increased losses and feedline radiation.

When a high s.w.r. exists in a section of coaxial cable, the outer braiding of the cable is forced to carry undesirable r.f. currents. Under these conditions, the feedline contributes a major part of the actual radiating system, and is a source of EMC and TVI/BCI problems if not corrected.



● Fig. 2: Taking the twin 75Ω feeder through a cavity wall is easy if you follow this layout. Remember to weatherproof the outside of the sleeve though, otherwise a lot of water could come in when it rains.

Often Misunderstood

Another aspect of the G5RV antenna that is often misunderstood, is the true purpose of the vertically hanging impedance section. I've heard it said that 'that the matching section should hang vertically from the radiating element to give some vertically polarised radiation'. **This is not true!**

The real reason that the transformer section should hang vertically from the radiating element is to maintain system balance. It is advantageous to keep the whole system as symmetrical, both physically and electrically, as possible.

If we can accept the losses, the feeder radiation problem can be corrected. An effective means of correction is to 'choke off' the coaxial braid currents immediately they try to appear in the coaxial cable - at the point where the coaxial cable meets the balanced feedline. A current choke, immediately after the change-over from balanced to coaxial cable, is a method used, and all of the types of r.f choke that may be used have been published.

In his 'Antenna Workshop' article this month **Peter Dodd G3LDO** shows the use of a multi-turn looped cable method. Another r.f choke method that might be used to wind the coaxial cable itself, several times through a large ferrite ring (see later for more detail).

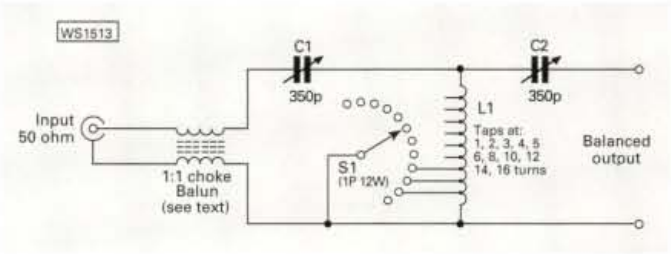
Technically Correct

It's technically correct to connect a balanced twin feeder to the bottom of the matching section. This action promotes and maintains system balance, eliminating undesirable feeder radiation.

A downside of using twin feedline is that it has a tendency to be 'user unfriendly'. In this application it cannot be buried in the ground or fastened to metallic structures without seriously affecting its performance.

If the matching section were continued back to the shack with a similar high impedance feedline, then the G5RV loses its identity - simply becoming a doublet antenna. However, this can provide multi-band operation with

G5RV ANTENNA



excellent efficiency and, used with a suitable balanced antenna tuning unit, provides effective results over the Amateur h.f. spectrum.

To maintain the identity of the G5RV, the ideal feeder to use is 75Ω balanced twin. Although, as with the coaxial feedline, there will still exist as high s.w.r. on some bands this feedline will improve the effectiveness of the system as a whole.

Also with 75Ω twin, the close spacing of the conductors makes it easy to maintain system balance when routing it past nearby structures or conducting objects. Providing the feeder doesn't run closer than about ten times the distance between the conductors, then system balance should be maintain.

This 'rule-of-thumb' distance when using the commonly available 75Ω twin is around 30mm minimum distance in reality. There may however, be some problems when routing the twin feeder into an indoor shack.

When getting coaxial feeder into the average shack, the usual way is to drill a ho;le through a window frame or the brickwork and pass the cable through. With 75Ω twin it's desirable to maintain an equally distributed capacitance around the cable, especially when other cables pass through the same hole.

Snug-Fitting

A snug-fitting narrow metal sleeve or a length of coaxial cable screen slipped over the feeder for the length of the hole will be effective in meeting the required conditions. The technique is shown in the illustration of **Fig. 2**. The metal sleeving must be electrically isolated from other conductor, to be effective. The outer point should also be suitably weatherproofed.

With the likely exception of the 14 and 28MHz bands, there may be a high s.w.r. on the feeder. Under these conditions the twin will act like a tuned feedline, meaning that a transformed reactive and resistive combination will be presented to the station's a.t.u.

Any available balanced output a.t.u. that incorporates a balun transformer in the output is not recommended for this setup, as the balun cannot deal with reactive components very well. They may give n apparent match, but this is often at the expense of wasted power dissipated in the balun rather than going to the antenna.

A 'proper' balanced a.t.u. such as the 'Z-match' is a much better option. Another simple solution to this problem is the following design which is flexible and capable of being optimised for each Amateur band. What is the arrangement that is so, flexible you may ask! The answer to that is a 'T'-match with a choke balun input circuit.

The circuit of the 'T'-match a.t.u. is shown in the circuit of **Fig. 3**, where you will see simplified circuit consisting of a single multi-tapped coil and two variable capacitors of 350-500pF. This arrangement provides an efficient power throughput with good balance however, to realise a balanced output it's necessary to 'float' the network and its case at r.f. potentials.

A convenient way of 'floating' the unit is to use a balun in the input to the circuit so, isolating the coaxial feed from the antenna feedline. As the balun is at the input and operates close to a resistive matched condition it works with maximum effectiveness.

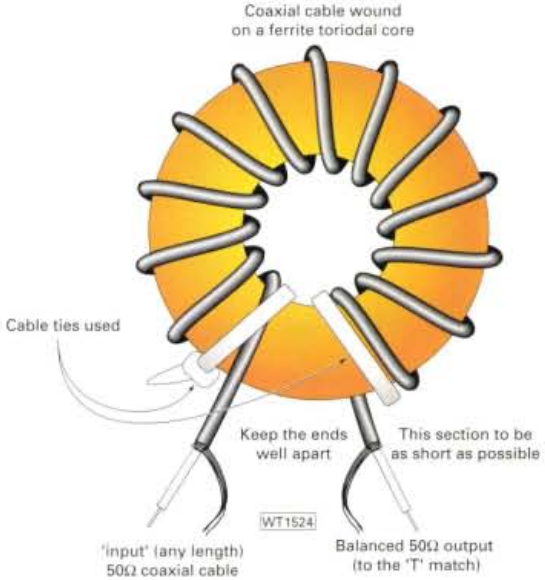
The coil, L1 consists of a single layer winding of 18 turns heavy gauge (1.5-2mm), spread over 100mm. The former used for L1, should be around 60-65mm diameter, be fairly robust and may be made from any material that doesn't absorb moisture. Plastic water piping makes a good former for this project.

The coil has taps at 1, 2, 3, 4, 5, 6, 8, 10, 12, 14 and 16 turns taken to a 12-way switch which should be of excellent quality and as large as possible. An alternative would be some form of plug and socket combination on the casing of the unit. But it's important not to use a metal case to house the unit as the closeness of the metal can change the effective balancing of the unit due to stray capacitance.

● Fig. 3: The circuit chosen by Anthony should be built in a solid insulated box. This is because the right-hand side of the circuit is 'hot' in terms of r.f. and may cause burns if care is not taken with the construction and operating it! (See text for more details of the tapped coil and capacitors).

Best Balun

The best type of balun, and one I've found effective in this situation, is the type made by winding 15 turns of RG58 coaxial cable on a large ferrite (type 61) toroidal core. this will work with up to around 1kW input. A smaller version could consist of 15 turns of RG303 coaxial cable on a 37mm type 61 ferrite toroidal core. This would be adequate up to around 100W input.



● Fig. 4: A suitable input balun consists of 15 turns (rather than the 12 turns illustrated) of coaxial cable on a type 61 ferrite toroidal core. Power levels of up to 1kW may be handled depending on the cable and ferrite sizes. (See text for more details).

As the unit and the controls are 'hot' at r.f. it's essential that all controls are non-metallic and that the unit is housed in a suitably strong and secure insulated box. All controls should have plastic shafts to the 'outside world' to protect the operator. If using a plug and socket arrangement for coil tappings **do not adjust the tappings when transmitting. Do so at your peril!**

In Use

In use this 'T'-match can be a little tricky to use, if you've never used one before so, a few words about how it's done. Until you've found out the best positions for the controls on each of your working bands, start with both capacitors around mid-range and the coil at its minimal inductance point (maximum number of shorted turns) then quickly try each capacitor in turn to give the lowest s.w.r. reading. Note its value!

Add more inductance then try again, taking note of the lowest value of s.w.r. if lower than before, note this new value before trying more inductance. Always use the minimum inductance possible on each band. As everyone's location and set-up is going to be different, I cannot say what values you will find for any band.

There may also be unfortunate feeder lengths that make setting on one or more bands difficult, but persevere try a different length of feeder!

Constructing, or modifying a G5RV antenna system with open wire feeder can result in a useful and effective multi-band antenna system that is a joy to use on all h.f. bands. I hope you enjoy the process! PW

Valve&Vintage

The piles of 1950s *PW*s on the counter informs us that it's Phil Cadman G4JCP's turn on duty in the 'Vintage Wireless' shop this month, looking at 'all dry' valves and your letters.

A warm welcome to my final column of this year. No doubt the arguments as to whether this year really is the last year of the century will have, by now, begun all over again. Whatever the outcome, rest assured, I'll be staying firmly in the **last** century. Appropriately, this time I'll be tying-up some loose ends and telling you about some letters I've received on topics raised in previous columns. Shortly after my DL96-based, 1mW transmitter was published in *PW* September, **Johnny Apell SM7UCZ** very kindly sent me a couple of DL93 battery valves. Thanks Johnny!

The DL93 isn't as common as the other DL9x-series valves, so you may not have come across it before. It was designed for use in transmitters and high-power (by battery-valve standards) audio output stages. With a 150V anode supply, a single DL93 can produce 1.2W output at 50MHz. Anyone for six-metre QRP?

Using The DL93

It's easy to modify my 1mW transmitter to use the DL93. Referring to the circuit diagram on page 45 of the September issue: move the grid connection from pin 6 to pin 4 and short out R4, the resistor in series with the filament.

The DL93's filament takes a whopping 200mA - four times that of a DL96. So the resistor would drop way too much voltage.

With an h.t. of 19V I got slightly less output from the DL93 as I did the DL96. This wasn't too surprising considering the DL93 is designed to use a much higher h.t. supply voltage than the DL96.

What was surprising, however, was the complete absence of the 'Cadman Effect'. (This is the *PW* Editor's name for the inverted dip in anode current I found when using the DL96 and DL94 at these low voltages). Before trying the DL93, I'd done some tests with my original transmitter at higher voltages. They showed that the DL96 I was using only lost the Cadman Effect with an anode supply of 45V or more.

Intriguing Behaviour

The behaviour of the DL valves at low voltages has intrigued me. As has the reason for their anomalous behaviour. My own view is that it's caused, at least in part, by the partial elimination of the space charge* as the control grid swings positive on each r.f. cycle. This effect is utilised to advantage in space-charge tetrodes, of which the 12K5 is probably the best known.

***The space charge is the cloud of electrons that surround the heated cathode.**

When used as an audio driver in car radios, the 12K5 has grid 1 connected to +12V while the audio signal is fed into grid 2. The positive voltage on grid 1 nullifies the space charge surrounding the cathode, thereby allowing a relatively high anode current to flow even at low anode voltages.

I'd still like to hear from anyone who can either confirm my suspicions, or can offer an alternative explanation. Also, is there anyone with lots of spare time available who could plot low-voltage curves for these battery valves?

Characteristic Curves

Actually, it has occurred to me that using computer-controlled power supplies and measuring equipment, it's possible to automatically generate characteristic curves. At least for valves operating at relatively low voltages. Can I suggest this as a potential student project for anyone at college or university? (The explanation of the Cadman Effect providing a theoretical basis for the project).

Another little gift I received from Johnny was a photograph of a lovely little variable-frequency, electron-coupled oscillator/transmitter he'd constructed, **Fig. 1**. It uses a 6L6G, which with 200V-300V on the anode produces 2W-3W output on 3.5MHz.

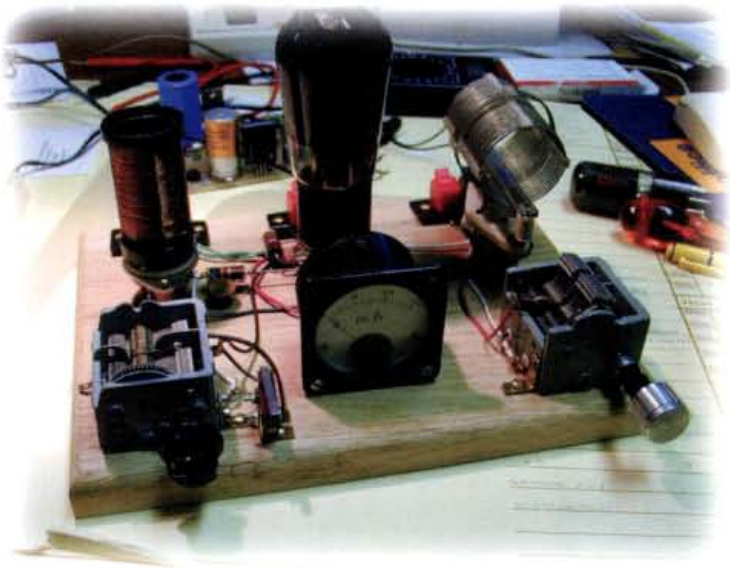


Fig. 1: Johnny Apell SM7UCZ sent G4JCP a photograph of a variable-frequency, electron-coupled oscillator/transmitter he had built. It uses a 6L6G, which with 200V-300V on the anode produces 2W-3W output on 3.5MHz (see text).

In this type of oscillator, the anode circuit is tuned to either the second or third harmonic of the grid frequency. If expertly built and handled, such an oscillator can produce a signal almost equal to that of a crystal-controlled oscillator.

I must point out that an oscillator like this would not normally be connected directly to an antenna. Indeed, that would be a sure way to provoke a visit from the authorities!

Instead, the oscillator would have been used to drive a tuned amplifier and/or power stage. However, in the early days of radio such single-valve transmitters were used. At least they were better than spark transmitters!

Mere Flyweight!

In another letter, this time from **John Gomer G8UNZ**, I was gently reminded that the Grundig 700L 'Reporter' tape recorder I featured a while back, was a mere

flyweight compared to some other 'portable' recording equipment of yesteryear. I'd thought the Grundig heavy at 35lbs (16kg) but John tells me he has a portable recorder which weighs a little more!

John's 'recorder' is a 78r.p.m. gramophone disc cutter which was used by BBC Northern Island in the 1950s. It consists of a very substantial cutting lathe, a 20W EL37 amplifier, a motor-generator, two car batteries and numerous ancillary items like cable drums and microphones. All that for providing four minutes a side!

John also told me that the way to sort the "men from the boys" back in the 1970s, was to run up Glastonbury Tor in Somerset with a Nagra IV over your shoulder. (For the benefit of those who don't know about such things, the Nagra was portable tape recorder which was first manufactured in 1951).

The Nagra IV made its appearance in 1968. All Nagras were (and still are) built to a very high standard, and are respectably solid. In other words, **heavy**. Even the latest Nagra IV, the IV-S, weighs a significant 15lbs (6.8kg).

All this is a far cry from the portable Digital Audio Tape (DAT) and MiniDisc recorders of today. I see the latest Sony personal MiniDisc machines can fit inside a shirt pocket and run from a single AA cell. Okay, so they're for consumer rather than professional use, but the advance of technology in sound recording is quite staggering.

Helium Through Glass?

In my June 2000 column I asked if anyone could confirm if it's possible for Helium gas to leak through the glass envelope of a thermionic valve. An E-mail from **Alan Bye G3TCI** answered the question: **yes, it certainly is possible.**

Alan told me about a Mass Spectrometer Leak Detector, used for detecting extremely small leaks in hermetically-sealed instrument capsules. This incredibly sensitive detector was calibrated by letting tiny amounts of Helium gas diffuse, at a known rate, through a thin, quartz-glass tube.

There's no need to panic, though. Even with a thin quartz tube, the leak rate was tiny with **individual molecules** being counted by the detector. So the amount of Helium that might diffuse through the relatively thick, hard glass of a valve envelope would be very tiny indeed and easily captured by the getter.

Alan also comments on the type 8012 valve I mentioned in the same issue. He explained that around 1950, while still a young short wave listener, he won a pair of these valves in a lucky draw. He duly put them in safe storage, awaiting the arrival of his transmitting licence.

Alas, they were never used. The QQV03-20A and QQV06-40 double-tetrodes became available which were ideally suited for use in Amateur transmitters.

Interestingly though, Alan did discover that the 8012 had been designed for pulse-power oscillator use in low-power wartime radar equipment. The unusual anode and grid connections were arranged to fit into silver-plated lecher-line assemblies. A bit of history!

The 1960s & 1970s

Who remembers the catalogues published by electronic components suppliers inthe 1960s and 1970s? There were - amongst others - **Home Radio (Mitcham) Ltd., G.W. Smith & Co. (Radio) Ltd., Henry's Radio Ltd., LST Electronic Components Ltd.** and **Electroniques Ltd.** By the way, that's not a misprint: Electroniques is how they spelt their name.

I bought catalogues from both Home Radio and G.W. Smith in the very early 1970s. I also sent off a 10/- (50p) postal order for a Henry's Radio catalogue but didn't receive anything. Henry's Radio: you still owe me!

Being a poor young lad, much of what I coveted in those catalogues was out of my reach (cue violins). Fortunately, many components, including expensive transformers and valves, could be salvaged from scrap radio and television sets.

Cheap transistors and diodes were available from Bi-Pak Semiconductors and Bi-Pre-Pak Ltd, with their famous 10/- packs. I don't know why, but 10 shillings seemed to be a fundamental unit of currency to these companies.

With the price of a single Mullard OC71 anything between 3/- (15p) and 6/- (30p) depending on the supplier, Bi-Pre-Pak's 10/- pack of 200 untested transistors was always tempting. Trouble was, if you were lucky, you got 200 diodes (invariably one of the junctions was either open circuit or short circuit). If you were unlucky, then you got less than 200 diodes!

Bi-Pak and Bi-Pre-Pak always strenuously maintained that they had no connection with each other, despite the similarity in their names and products. I, amongst others, never quite believed that assertion. Does anyone know for sure?

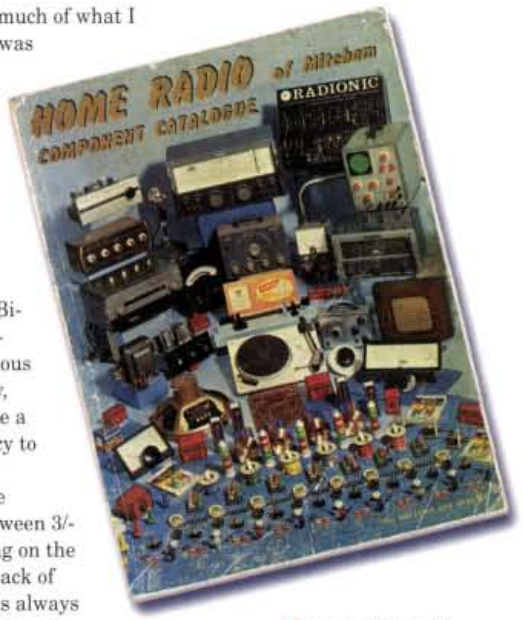


Fig. 2: Phil G4JCP managed to obtain a 1963 Home Radio catalogue. He say it's fascinating to see what was available, and how much things cost.

Save Those Catalogues!

To my eternal regret, during one particularly ferocious spring-clean, all my old catalogues were unceremoniously thrown away. Can I ask you **not to do the same**. If you have any old catalogues, or get offered any, please, for goodness sake hang on to them.

I have managed to obtain a 1963 Home Radio catalogue, **Fig. 2**. It's fascinating to see what was available, and how much things cost, even in relatively recent times. Going beyond simple nostalgia, there are snippets of component data included in these catalogues which make them a very useful source of information.

While on the subject of old literature, do you like the musty smell of old books? Seems you either love it or loath it. Personally, I rather like the smell of old books.

The same can be true for old radio sets. Some have their own distinctive aroma, peculiar to their manufacturer, while others pick-up the odour of their surroundings. Either way, the scent of gently cooking dust lying thinly on output and rectifier valves, is all part of the 'vintage' experience.

Finally, remember the Magneta tuner/amplifier found in Bavaria by **Juergen Bittner**, and I wondered how it managed to get so far from home? Well, I did discover that the **Magneta Time Co. Ltd.** used to manufacture and supply public address equipment to the NAAFI (Navy, Army and Air Force Institutes). Unfortunately, the set in question seemed a little young for that explanation.

As it turned out, that was indeed the answer. During restoration work on the set, Juergen found a little poster inside entitled: 'Navy Army & Air Force Institutes. Notes on care of a Billiard Table'! Case closed, I think.

Talking of closing, I'd better do the same. So, cheerio until it's my turn 'in the shop' again. Please send your comments and letters to me either via the *PW* offices, via E-mail to **phil@valveandvintage.co.uk** or direct to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.**

A very happy Christmas and New Year. See you in 2001! *PW*

"In my June 2000 column I asked if anyone could confirm if it's possible for Helium gas to leak through the glass envelope of a thermionic valve. An E-mail from Alan Bye G3TCI answered the question: yes, it certainly is possible".

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Please help us to help you by preparing your advert carefully. Any advert on these pages which contains bold **??** marks indicates that the Editorial staff could not read/interpret the wording.

Some reader's adverts are becoming very long! To be fair to **all** readers, so that everyone has a fair chance, we must limit the **words** to 30 - please try to keep to this length. If you have an advert of 50 words or more please submit two adverts (the current month and a previous month's 'corner flash' will be accepted) and - space permitting - we will include the second advert the same month. In future, any advert that's considered to be too long will be edited to suit or 'held over'. **Thank you for your co-operation. Editor.**

For Sale

2m and h.f. bargains - shack clearance, 'phone/E-mail for detailed list. No reasonable offers refused - great bargains. Tel: (01473) 814151 or E-mail: julian@pjiredale.freeserve.co.uk

100W h.f. FT-757GX, full spec., f.w.o., boxed, £345. New Vectronics dummy load, 1.5k, 1-650MHz, £50. 'Bathtub' and 'Junkers' Morse keys, £45 each, as new, boxed, g.d.o., 0.44-280MHz, £65. RAF 'key', type 'B' in rare A1 condition/original, 1940 air ministry box, £70. G3XBE for silent key. Tel: Notts (07866) 077249.

100W PA ex Icom 701, £30. A14 a.t.u., £25. Heathkit VF-1U video, £20. Heathkit s.w.r., £20. Lap top 286, 1Mb, 60Mb HD, l.c.d., charger with Baycom/Hamcomm s.w., £40. Ben, Worcs. Tel: (01567) 43253 or E-mail: 106312@compuserve.com

A collection of *Short Wave Magazines* in binders, April 1987 to Feb 2000. Anyone interested please ring Lake on (01202) 871738, Ferndown area. Offers.

Alinco DR112 2m (144MHz) mobile, £75. IC-W2E dual-band hand-held, boxed, £60. Trio 2300 2m (144MHz), £50. Boxed 70cm (430MHz) collinear, £10. Adonis desk microphone, £30. Tel: Staffordshire (01283) 713063.

Andrew LDF2-50 3/8in foam dielectric heliax cable, 50Ω, 1kW and 2.29dB per 100ft at 433MHz, £1.35 per metre, free carriage over 20m, spec., see www.andrew.com Peter G4GYI, QTHR. Tel: (01789) 763565.

AR-88D s.w. comms RX. HRO MX s.w comms RX. Signal gen. (Marconi) 995B/5 a.m./f.m. with manual Oscilloscope (HP) mod 141A with manual. Two boxes assorted valves. Taydor valve tester mod 45C with manual. Anthony Coleman, 61 Keal Avenue, Flat 1/3, Glasgow G15 6NZ. Tel: (01419) 443865.

Claude Lyons Regulac 0-270V 2A (heavy), £15. Radio spares 250VA auto transformer, 200/240V to 115V 2.1A (heavy), £15, offers please. Syd Fenwick G3AIO, Kent. Tel: (01892) 822836.

Codar AT5 1.8/3.5 a.m./c.w. TX + p.s.u., £50. Sailor type 66 marine h.f. RX, £60. D-100 DXTV converter, £85. Yaesu FT50B, FL50B, FV50 novice HF 25W TX/RX, £100 or swap some of the above for FT-290. Tony G0IYH, W. Lancs. Tel: (0976) 345407 anytime.

Collectors radio and TV servicing books for 50/70s Malloy and Poole, many diagrams, etc., set of four volumes, Radio 56/58 single volume. Derek on (01297) 34889.

Commodore 8032SK 8296D computers, disk drive tractor printer, two Dymar walkie talkies and charger need be recrystaled, must go. Offers also 486 tower computer, 33MHz, buyer collects. Eric Cressey, Essex. Tel: (01255) 672884.

Eddystone 840C, £110. Sony ICF-2001D, £100. Pye six channel base transceiver with various mobiles, please note Pye is a.m., £50. All must be collected from Monkseaton. Mike on 0191-297 0197 1200-1800.

Fairhaven RD500 radio database, superb all-mode receiver, 0-1750MHz, £525. AR8200 hand-held all-mode scanning receiver, 530kHz to 2040MHz, £200. Tel: (01852) 200237, E-mail: willy@kilmelford.freeserve.co.uk

Heil HM10 + boom (Yaesu), £45. AOR AR8000, £170. Atlas 210X with mains console, £150. Keith on (01925) 225067.

HP54100A 1GHz digitising oscilloscope, v.g.c., £400. Systron Donner 18GHz frequency counter, v.g.c., £100. Tel: S. Hertfordshire 0208 953 4994.

Icom 735 h.f., PS55 p.s.u., AT150 auto a.t.u., fist mic., SM8 desk mic., all mint condition, all boxed, plus all manuals, £500. SGC2000 marine h.f. rig, mint, boxed, £600. Tel: Manchester 0161-284 1402.

Icom IC-706 MkII h.f./v.h.f. base/mobile, excellent condition, boxed with manual, hand mic., and SM6 desk mic., 1.9K s.s.b. filter plus voice synthesiser fitted, boxed as new, full mobile kit, £525 o.n.o. Alan G4YYD, Lancs. Tel: 0161-797 7893.

Icom IC-970H top base transceiver 144/430MHz a.m., f.m./w s.s.b., fitted YX-R96 RX module, 50-905MHz, new, boxed, £1250. Icom 737A transceiver, good condition RX, auto a.t.u., boxed, £575. Daiwa PS-304II 30A p.s.u., £75. Icom 701 transceiver, 160-10m, 100W, £160. TM-707 dual-band mobile, new, boxed, £235. PX, want Icom 765, 756, 775 h.f. transceiver. Bob G4AFY, Kidderminster. Tel: (01562) 747480.

KDK FM2030 2m transceiver and manual, as new condition, £95. Solatron 0-500V d.c., + 2 x 6.3V a.c., 5A power supply, heavy, offers. Zetagi 0.5 to 500MHz frequency counter with manual, £45. Tel: S. Wales (01269) 870076.

Kenwood 711E multi-mode, 2m (144MHz) base station, hardly used, excellent condition, £350 - complete handbook and boxed. Jack G0RWX on (01306) 887057.

Kenwood TM-255E multi-mode, shack use only, hence v.g.c., with manual and original mic., £275. Tri-band vertical antenna, £40. Icom IC-R2, two weeks old, case plus many extras, £120. Tel: London (07748) 904969 anytime.

Kenwood TM-732E dual bander, detach head carkit, boxed, £175. ATU SEM transmatch with Ezitune, £50. Cobra 148GTL epromed 10m, £50. G4YTF, Leics. Tel: 0116-220 4446.

Kenwood TS-850S, internal a.t.u., audible frequency module, absolutely as new, all original packing, virtually unused due to military service, sale due to impending departure from country, £750 - no offers. Mick, Plymouth. Tel: (01772) 766373.

Kenwood TS-870, mint, boxed, £950. Trio TS-780, boxed, £300. Icom receiver R7100, boxed, £450. Icom receiver, R72, boxed, £350. Kenwood a.t.u. 230, £50. SP950, £30. Yaesu SP767, £30 o.n.o. Tel: 0161-427 1809.

Kenwood TS-950SD, linear Ameritron AL-80AX, Daiwa CNW-518 antenna tuner, MFJ-1278 data controller, mic., Kenwood MC-60A, all for £1800 o.n.o. All in mint condition with handbook, buyer check and collects. G0DSI on 0191-422 5923 or E-mail:WSZEB1@cableinet.co.uk

Kenwood TS-950SDX boxed mint cond £1600 ono. Cushcraft R7000 plus 80m kit as new £250 ono. VCI HFT 1500 3KW a.t.u. as new £200 ono. MFJ-934 a.t.u. & artificial ground as new £150. Tel: (01772) 783324 or (07931) 607483 buyer collects.

Kenwood TS-950SDX, excellent condition, boxed, £1750 o.n.o. Cushcraft R7000 + 80m, as new, £250 o.n.o. VCI HFT1500 3kW, brand new, a.t.u., £150. MFJ934 a.t.u. and artificial ground, £140. Tel: (01772) 782677 or mobile on (0793) 1607483.

KW s.w.r. meter, £10. D. Busby G4HFL, Bucks. Tel: (01844) 346274.

Military valve radios, Russian 19 Set, c/w p.s.y. and bits, 38 Set, complete outat, Larkspur C12 c/w p.s.u. and bits, Larkspur C13 + bits. Complete vehicle installation, P.O.A., all sensibly priced to clear. Tel: (01775) 766398 after 7pm.

Mortec orange monitor, Epson VGA14 colour monitor, radio spare components, 1950, 1960, any offers. Bob Allen on 0208-452 3119.

Nasa h.f. 4E receiver, B/light, stand and assorted power pack, mint, £85 plus postage ??? 30kHz to 30MHz. Tel: 0191-526 7902.

Oscilloscope 2225, 50MHz double beam, cost over £600, accept, £250,. AVO Mk4 valve tester, offers. Thurlby digital multimeter, £90. CR100 receiver (b28) blue front, excellent, £150. Tel: (01872) 862291.

Realistic base scanner PRO-2042, 25-1300MHz, with one gap, as new, boxed, manual, also has wide band antenna, £110. Buyer collects. H.R. Siddall, Holmesfield, Tel: 0114-289 0192.

Silent key sale G3CQE: Icom IC-2E, IC-4E, Yaesu FT-202R, FT-101ZD, FL-2100, Standard C7800, Trio TR7500, Ambit G3WPO GDO, sensible offers considered. G4AXU, QTHR. Tel: Bridport (01308) 897351.

Silent key, G3GAO: TS-830S with SP230 speaker, AT230 a.t.u., remote VFO 120, all mint, £250. Bird 43 thruline, mint, £25. Decca KW107 supermatch 1kW a.t.u., £25. Tokyo 70cm (430MHz) power amps, HL-300, HL-63U, both new, £25 each. Chris Castle, son-in-law. Tel: (02380) 255437 evenings and weekends please.

Silent key, G3GAO: Yaesu YD844 bench mic., £5. DL610 dummy load, 200W (cont), £10. Realistic scanner, RC PRO-57, £20. 1kW low-pass filter TV3300, £10. Shure 444 bench mic., £50. Heathkit dip meter HD1250, mint, £5. Friod FL101, pair, £10. Chris Castle, son-in-law. Tel: (02380) 255437 evenings and weekends please.

Taylor 45A valve tester with manual, large quantity of valves, lots of 4pin PM2, etc., books, Lafayette HE80, Marconiphone, 2 valve wireless MOD248, lots of tran's, etc. Fred on (01989) 750725.

TCS-12 TX, RX, a.t.u. home-brew P/S, spare RX, scrap TX, fist mic., handbook, loads of spare valves, leads, etc.,

Packard-Bell (pre-amp a.m.), afraid buyer must collect, £300 'job lot'. Peter G4VUN-259) on (01287) 634397 or (01677) 460302.

Ten Tec Argosy 525D, 5/50W h.f., 8-pole i.f. and audio c.w. filters fitted, complete with matching p.s.u. and manuals, good QRP, in good condition, £175. John G4KKG, QTHR. Tel: (01935) 425327 or E-mail: g4kkg@btinternet.com

Ten Tec Corsair II, all h.f. amateur bands, £350 o.n.o. Titan gap vertical antenna, great for small garden (but not for one neighbour), £250 o.n.o. View erected and take away. Martin, West Oxon. Tel: (07798) 642370 or (01993) 840027.

Tonna PRO XL 17-ele 2m (144MHz) beam, as new, 17dBi gain, 10.5m boom, cost, £200, accept, £100 - no offers. Pete M5ABN, Cambs. Tel: (01480) 457347.

Trio TS-120, lovely QRP radio, £210. BNOS 25A p.s.u., £60. Star Master key, £25. Wanted auto a.t.u. for Yaesu 847. Malcolm G0EBD on (01743) 367087.

Trio TS-830S h.f. TX/RX, with remote Kenwood VFO-240, filtered speaker SP-230, Yaesu FC-902 a.t.u., and dummy load. Plus a Trio 2m (144MHz) f.m. TX/RX TR-7930.All in v.g.c. £600 the lot, due to bereavement. Kevin on Durham 0191 3773 136.

TS-820 h.f. transceiver, MC50 microphone, manual, good working order, ideal first rig, 10-160m, non WARC, fitted with 12V supply, but mains operated, £175. Buyer collects. G4ZDG, Coventry. Tel: 0247-668 0325 after 5pm.

Yacht Boy 400, as new, £85 including postage. AR-108 airband scanner, £35 including postage. AKD HF35/HG3M, boxed, manuals, long wire, aerial computer lead, disc, JVFAX, etc., p.s.u., £100. John on (01634) 401159.

Yaesu 757 GX2 and FP-707 p.s.u., £350. Lake DTR7/5, built by Lake, £85. Trio TS-520, £100. OHR sprint 80m transceiver, £50. All manuals, please inspect and collect. Edward G0WDT, Newcastle. Tel: (01782) 717837.

Yaesu FT-101 transceiver, base station and SP102 speaker, less than 50 hours use from new. Yaesu manual and log book and mic., h.f., all brand, £500. Buyer collects - excellent radio. Mick, Stoke on Trent. Tel: (01270) 872941.

Yaesu FT-101E h.f. transceiver, in full working order, with c.w. filter and fan, mic., leads, manual, boxed, all in very good condition, £100. Bob G4KSG, QTHR. Tel: (07747) 760768.

Yaesu FT-2600M 2m (144MHz) f.m. transceiver, one month old, as new condition, £120 o.n.o. Pete, Bristol. Tel: (01454) 882465.

Yaesu FT-726R 2m/70cm multi-mode base with matching SP-102 speaker, excellent condition, original packaging and instructions, £450 o.n.o. Garry, Shropshire. Tel: (01952) 461316.

Yaesu FT-990 a.c. transceiver, three filters fitted with manual and boxed, excellent condition, £850 o.n.o. Yaesu SP6 extension speaker, boxed, excellent condition, £75 o.n.o. Watson 308 base mic., £35. Andrew on (01642) 278955.

Yaesu FT-990 a.c., very late model, excellent condition with filters, boxed, £800 o.n.o. Watson 308 base mic., boxed, £35 o.n.o. Yaesu SP6 extension speaker, boxed, excellent condition, £70 o.n.o. Andrew, Middlesbrough. Tel: (01642) 278955.

Wanted

3 or 4 gang tuning capacitors, valve type IFTs, coils and coil packs, mech filters, etc., good price for the right parts. Tel: (01935) 872011 or E-mail: yety@btinternet.com

Automatic antenna tuner AT850 for Kenwood TS-850. Tel: (01522) 721897 or matthew.coulter@talk21.com

CW narrow filter for FT-77, XF 8.9kHz, also Densbury star master keyer, does anyone have a vibroplex double paddle or bug key? Swap for ICF-2001D. Keith on (01827) 56825 weekends please.

Drake C line, R4C receiver plus T4XC, etc., any condition considered. R4C preferably with noise blanker fitted, please E-mail or 'phone Dave G3RCQ on (01708) 374043, E-mail: g3rcq@supanet.com

Eddystone EC10 or EC10 MkII, good order. For sale Realistic DX-394 receiver, good condition, £50. e. Foster, 72 Vimy Road, Billesley, Birmingham.

Eddystone, still require an Eddystone EC958/7 or 7E, would consider version 12. Tony G0LGT, Chesham. Tel: 901494) 778352 evenings please.

Field telephones - has anyone got a pair of MkI or MkII F telephones for sale? Clive, Birmingham. Tel: 0121-608 3188.

Help! pre-programmed TTL prom wanted for Pye PFX to get on to 70cm. Tel: (01623) 464942.

HF transceiver, solid state, would consider valve P/A with frequency read-out, must be in excellent condition, with manual, boxed if possible or what have you? Consider full line up , up to, £400. Brian G0ADL on 0161-280 3064 or E-mail: edithb@cwctv.net

Hokushin HF5V vertical antenna, must be in v.g.c., sensible price please, also require Sommer T-25 vertical antenna. Mike, Durham. Tel: 0191-389 2822 or (07980) 137617 (mobile).

Instrument knobs from WW2 and 1950s, about 1in 1/8in dia., with identifications around the edge, also KW107 or 109 a.t.u. WW2 era bulb housings, as used in 19 Set, p.s.u., etc. Chris on (01775) 766398 after 7pm.

Kenwood PS-950 speaker for Kenwood TS-950SD. John G3YJD on (01908) 379250.

KW Vespa transmitter, MkII. Tel: (01925) 659946.

Military sets, big or small, suitcase sets, RAF or army, any service or country, also Morse keys, into large brass types, military or commercial, have sets to swap. Ben on (01562) 743253 or 106312.1035@compuserve.com

Philips RL798 f.m. and a.m. deluxe 7 wave band short wave radio or model Philips No. 638 or Pye model Piccadilly No 6000, also tuning dial for Hacke radio, Super Sovereign, no. model RP 75Mb. H. McCallion, 8 Strathard Close, Coleraine, Co. L.Derry N. Ireland BT51 3ES. Tel: 028703 43793.

Power supply for Heathkit HW100. Tel: (01269) 871382.

RAF RX, type TID83 wanted for museum. Douglas G3KPO on (01983) 567665 or QTHR.

RSGB Radio Communications Handbook, 4th or 3rd edition, to help with studies for RAE and home construction afterwards. Kieran, Winchester. Tel: (01962) 624795 or E-mail: black.five@cwcom.net

Siskin multi cat connection, details and software needed please, postage will be refunded, any help received with thanks. Ian G0UAA, 34 Hargher Street, Burnley, Lancs BB11 4EG.

Spy radio sets and manuals, as used by resistance forces, American, British, French, Polish, German, Russian, etc., any spare parts, incomplete or damaged sets, good price paid, send details to: Bill G8PUJ, QTHR. Tel: 0208-508 0838.

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Icom v.h.f. 211E trans. for h.f. transceiver. Tel: N.E. Scotland (01349) 884655.

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Swap ADI AR-146 2m (144MHz) rig, CTCSS, 50/10/5W and memories for Sangean ATS-909 short wave receiver, 2m (144MHz) rig in good condition. David on (01268) 776401.

Trio R-1000, Lowe SRX300 (needs attention), FDK multi 700 AX + Belcom linear 2, C144 s.s.b. + 4m Dynamo Lynx, Morse key and other bits, transverter, TNCs, etc. for Yaesu FT-100 or similar. Steve on (01305) 820077 or (0794) 4380786.

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

Last time around I promised to provide details of the annual Leonid meteor shower which take place in November but first I'll take a look at some unusual propagation that occurred during the 144MHz contest in September.

Andrew Thomas G8GNI mentions that although his QTH (IO92) is not the best of locations for v.h.f. work, he did think that conditions during the IARU (International Amateur Radio Union) 144MHz contest held on 9-10 September were quite good. He heard many more continental stations than usually expected and noted an increase in stations operating from the south-west of England.

Andrew reports that he was very pleased to contact the rarely activated locator square, IN79, situated on the Lizard peninsular, Cornwall. Thank you G8T for a new one!

On the 'v.h.f.-DX-discuss' internet reflector **Mike Tubby G8TIC** mentioned that he was operating the 144MHz contest station G8T on behalf of the Blacksheep Contest and DX Group. The contest team were using a JST245 h.f. transceiver, a home-made transverter, BF988 mast-head preamplifier and a high power 3CX800 amplifier.

A pair of 10-element DJ9BV Yagis were located at 12 and 16m above ground from a site 80m a.s.l. Mike reports that conditions at the start of the contest were quite normal, but after an hour or so he noticed some very unusual propagation.

Many of the UK high power contest stations such as G5B, M8L and MD6V were much stronger via the secondary backscatter path than on the correct beam-heading. It was very difficult to determine the correct direction in which to beam as moving the antenna array by as much as 80° would give no apparent change in signal strength.

The unusual propagation affected most UK stations except those located less than 100km away. Contest stations across The Channel such as F1CXX/P, F5KAR/P and F5KUM/P were also very strong on the scatter path. However, stations located further north and east from Lizard Point such as OT0M, OT0Z and PA6NL exhibited no backscatter type signal or only small traces of it.

At its peak, around 1830UTC, the multipath propagation was so strong that some signals sounded almost auroral and were difficult to copy. By 1930UTC most signals on the 144MHz band had returned to normal but some of the unidentified scatter remained up to 2000UTC.

Mike mentions that one of the contest team suggested that it could be a form of field aligned irregularity (fai) which might result when there is a high maximum usable frequency (m.u.f.). However, this doesn't explain the very large azimuth bearings on the received signals.

EXCELLENT SITE

For those that don't know the location, The Lizard, Cornwall, is excellent for v.h.f. working. The site overlooks the sea for approximately 240° giving an amazing take-off into large areas of Europe. It also benefits from marine-path ducting allowing large signal enhancements to occur often as the Sun is setting and the atmosphere cools.

Coincidentally, I used to live and operate from this rare locator square over 25 years ago whilst carrying out training at Goonhilly Satellite Earth Station. I did this for three years and was active on the 70, 144, 430 and 1296MHz bands.

The photograph, **Fig. 1**, shows me setting up my 430/1296MHz contest station from the IN79 locator square back in 1976. In my opinion the propagation noticed by Mike G8TIC was nothing more than tropospheric backscatter from an atmospheric duct that frequently occur over the sea, especially in the early evening.

It's almost as if the marine duct was being formed into a giant billboard reflector shape enabling v.h.f. signals to be scattered back to the receiving antenna array. Tropospheric backscatter is the extreme form of large angle scattering and has slightly lower loss than side scatter. It is most often heard from a station with a high effective radiated power (e.r.p.) when your two beams are side on to each other and the direct signal is much weaker.

Tropo backscatter is often recognised by its rough, almost auroral, audio quality caused by the random addition of incoherent signal wavelets. **Andy Cook G4PIQ** also agrees with my explanation that it was tropospheric backscatter.

Andy reports that he can often tell where local high power stations are beaming by peaking up on their backscatter signals. He suggests that the strong received signals may have been caused by the presence of specific weather fronts that afternoon and that this was made even more noticeable because most contest stations wouldn't have been directing their v.h.f. signals towards the south-west of the UK.

Both the antennas of G8T and other contest stations would therefore have been side-on to each other. I wonder if any readers of this column have noticed similar effects on the v.h.f. and u.h.f. bands?

LEONID METEOR SHOWER

Very soon the Earth is going to pass through a belt of interplanetary debris called the Leonid meteor stream. This meteor shower occurs every year in the period November 15-19 with peak activity on or around November 17.

Past observations of the Leonid meteor shower have shown that approximately every 33 years the shower reaches storm proportions. The last peak was in 1966 and for the past three years the reflections from the Leonid meteors have been excellent.

Keen v.h.f. operators make use of the shower by beaming towards the ionised trails and scattering their signals well beyond the horizon. The trails ionise in the E-region at a height of around 90-110km. (Three major divisions of the ionosphere are designated by letters, termed the D, E and F regions.). With the ionisation occurring at a height of 100km it's possible to scatter signals up to 2000km away although most contacts you'll normally make will lie in the range from 1200 to 1600km.

During the Leonid shower in 1997 I made 27 s.s.b. contacts on the 144MHz band with stations in Austria, Croatia, France, Germany, Hungary, Italy, Norway, Slovenia, Spain, Switzerland and Yugoslavia. My contacts were made between 0657-1129UTC with signal strengths peaking to S9 on occasions and many bursts lasting two to three minutes in

DAVID BUTLER G4ASR PROVIDES DETAILS OF THIS YEAR'S LEONID METEOR SHOWER AND TAKES A LOOK AT SOME UNUSUAL PROPAGATION ON 144MHZ.

Fig. 1: David Butler G4ASR setting up his 430/1296MHz station on The Lizard (IN79) in 1976.

duration. Best DX was YU7EW at 1859km and two Italian stations at 1829 and 1827km.

Conditions in 1998 were absolutely fantastic with the 144MHz band open all over Europe for hours at a time. It was tremendous. Between 0300-1145UTC I made 54 contacts with stations in 20 countries including all those worked in the previous year plus the Czech Republic, Denmark, Finland, Lithuania, Poland, Portugal, Russia, Slovakia and Sweden.

My best DX contacts included RW1AW at 2231km and the station of LY2WR at 1884km. Last year the activity was still good but nothing like that experienced in 1998. Between 0130-0430UTC I made 14 s.s.b. QSO's, my best DX being the station of TK5EP located on Corsica.

So what could happen this year and when will the peak activity occur? Much of the uncertainty in predicting Leonid storms in the past has been due to the assumption that the cometary dust was more or less constant in density, varying from the most dense near the comet and becoming less and less dense farther away from its orbit and the comet's position in orbit. However, this did not take into account the possibility of stable dust trails in a similar orbit, trails that could after several revolutions become quite narrow and dense.

Over the next three years the Earth should closely encounter individual dust trails at various distances. Thus, between 2000 and 2002 there appears to be an excellent chance of one or more meteor storms. In fact, each year may have several peaks separated by several hours and one of these peaks may produce a storm.

There are several differing predictions on the quality and quantity of the Leonid meteor stream for this year. According to various scientific sources there seems to be possibility of three peaks with the first occurring at **0924UTC on November 17**. However, this is not supported by others who calculate that the Earth will pass through two trails at **0344 and 0750UTC on November 18**.

Each of the predictions uses different methods and the several possible peak times are the result of different trails of ejected material from different perihelion passages of the parent comet. So, just because one particular peak does not occur, this does not mean that another is less likely.

There could also be other unexpected brief peaks in addition to those predicted above. With experts disagreeing the best bet will be to keep your radio on at all times and use it to alert you when conditions are improving. Remember though that 2000, 2001 and 2002 are the last times for the next 30 years when anything exceptional is expected to happen so get on the v.h.f. bands and make some noise!

Virtually all contacts are made using c.w. or s.s.b. on the 50, 70 and 144MHz bands. Although you may be able to make contacts with low power it can be a bit frustrating.

Medium power 50-100W will give good results especially if coupled with a good antenna and low-loss feeder cable. A horizontally mounted Yagi antenna of between 8 to16-elements will be sufficient but it will be useful to be able to rotate it towards selected activity areas throughout Europe.

In my opinion it's best to follow the laid down IARU Region 1 meteor scatter procedures and these can be found in various v.h.f. handbooks. For up-to-date details you can also look on the internet at **http://www.scit.wlv.ac.uk/vhfc/iaru.r1.vhfm.4e/5B.html**

Another useful source of similar information can be found on the UK Six Metre Group site at **http://www.uksmg.org/ms_operating.htm** These Web pages give details of timing, reporting system, reporting procedures and confirmation procedures. However, if the shower is really good, it may be possible to dispense with convention and make quick s.s.b. exchanges using traditional signal reporting methods.

One operational aspect that is often overlooked is that most (but not all) showers rise and set just like the Moon or Sun. With moonbounce communication you need to see the Moon to bounce signals to the other side of the world and it's exactly the same for meteor scatter contacts.

The shower needs to be above the horizon before you can use it for communication purposes. Each shower has different rise and set times, but for the Leonid stream the only thing you need to note is that in Europe they rise above the horizon around 2330UTC and set the next day around 1230UTC. Try making contacts between 1400 to 2200UTC and you will be very disappointed!

Here are my suggestions for making some DX contacts on the v.h.f. bands during the Leonid shower. Go into the shack around 2300UTC on Friday November 17. Point your antenna into mainland Europe and start listening on the s.s.b. meteor scatter calling frequency 144.200MHz.

You probably won't hear anything at first, but after an hour or two you should start to hear some DX stations. Listen to the operating practices of the more experienced stations before you get going.

Don't stay on 144.200MHz all the time. Spread out around the s.s.b. sub-band. When a burst occurs other stations will find you.

You my even hear activity on the national calling frequency 144.300MHz. Use clear unambiguous phonetics, make rapid exchanges, callsigns and reports are all you need.

Try to keep individual exchanges to around five seconds and a complete QSO in less than 15 seconds. Continue this until 1200UTC on Saturday November 18. It may also be worthwhile taking a look at the band on the previous morning between 0800-1100UTC. Good luck!

DEADLINES

That's it for this month. Please let me know how you got on during the Leonid meteor shower.

If you're a little uncertain what to do or have any other queries regarding meteor scatter operation, send me an E-mail or telephone me. I'll be happy to help. Please forward any news, views, comments or photographs to the address and by the date given at the top of the column. Thank you for your letters and good luck with the DX.

73 David G4ASR

HF HIGHLIGHTS

BY CARL MASON GW0VSW

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

I'm starting with some good news. Following the request for help with PSK31 last month, Robin Trebilcock GW3ZCF has been in touch with Bob Seabourne G0UHN to offer help. Bob says "Thanks for all the information. As you have probably gathered I am new to this exceptional mode. As a result of Robin's E-mail I have received some useful tips and information which has also included some up to date band plan information. This should make my PSK31 operating more successful in the future". Glad we could help you Bob.

Ken Evans M0AQQ, St. Helens writes that he has experienced problems with stations calling CQ without first checking to see if the frequency is in use. Ken says "It happens to me regularly. One incident occurred whilst operating QRP/p in Norfolk. My QRO contact asked the offender to "please QSY" as he was in contact with a QRP station.

"This request was ignored, and the operator continued to call for an Icelandic callsign. This went on for sometime before the operator finally cleared. Attempts to continue my QSO failed as the other station had now gone! I wonder if we can all learn from this and try to be a little more courteous when we start to operate"?

DX NEWS

Bogdan 5N3CPR should now be back in Nigeria after a short break at home in Poland. He is a keen 18MHz c.w. operator and can usually be found around 2200–0100UTC on or below 18.070MHz. He runs a FT-100 into a half sloper antenna and the QSL route is via SP5CPR.

The Polish Special event station **3Z0MM** will be active until 30 November on all bands. The station celebrates the millennium of the historical meeting of Polish King Chrobry with the German Emperor Otton III in Szprotawa. Please QSL via the bureau or direct to **SP3JHY, Jerzy Ryks, os.B Chrobrego 3/IV/7, 67-300 Szprotawa, Poland**. (Thanks to **Tedd Mirglotta KB8NW** and the *OPDX* bulletin).

YOUR REPORTS

Don McLean G3NOF in Yeovil, Somerset starts us off by saying "There has been a marked improvement in band conditions since August. The l.f. bands have been open during the day, although 3.5MHz has been very noisy.

"North Americans have started coming through on 28MHz and the long path to Australia and New Zealand has opened most days from 0800–1000UTC on 14, 18 and 21MHz. Pacific stations have been heard around these times with good signals coming in over the North Pole. "Some openings also occurred later on around 1900UTC. The short path to Asia on 21MHz has been open most days between 1000 and 1900UTC".

Also active on 18MHz was Don G3NOF who used s.s.b. to reach FO0PT (French Polynesia), OX/DK8XT (Greenland), T77C (San Marino), VK9XV (Norfolk Island) VP5VAC (Turks & Caicos Islands) and 9V1XE (Singapore) between 0800 and 1100UTC.

On to 21MHz now and the PSK31 of **Robin Trebilcock GW3ZCF** in Bishopston, near Swansea. Using his IC-775 and 50W Robin worked between 1630 and 1900UTC and lists contacts with BV4VE (Taiwan), WA6WDX (U.S.A.), LU4LEC (Argentina), XQ5CL (Chile)

THIS MONTH CARL MASON STARTS OFF WITH SOME GOOD NEWS.

THE 7 & 14MHZ BANDS

Ted Trowell G2HKU, Isle of Sheppy, Kent say's "Conditions have generally been much better this month with just the odd day of very poor propagation". On 7MHz Ted used his Ten Tec Omni 5, 70W of c.w. and a G5RV to work ZL2CD (New Zealand) and TI3TLS (Costa Rica) at 0530UTC and a little later JA0BCD (Japan) at 2000UTC.

On to 14MHz now and **Sean Gilbert G4UCJ** in Milton Keynes who also comments on the "much improved" band conditions. Using his Alinco DX-70 and 30W of c.w. Sean lists contacts with VK0MM (Maquarie Island), HC5AI (Ecuador) and PZ1DV (Surinam) all around 0830 UTC. Later in the evening at 2041UTC was SV9/GW0VSW (Crete) EU015 who was using an IC-706, 70W and a folded half-size G5RV mounted to a water tank on the roof of his apartment!

Good to have you in the log Sean. Between 2100 and 2330UTC followed V51AS (Namibia), A71EZ (Qatar) and 9K2UNI (Kuwait).

Fig. 1: A very happy looking Robin Trebilcock GW3ZCF pictured in his shack (note this is how *PW* likes to see it's readers - happy and looking at the camera!)

THE 18 & 21MHZ BANDS

The 18MHz band has had its share of good openings and Ted G2HKU was pleased to work HK7AAG (Colombia) with 5W QRP at 1800UTC. Additionally, HF0POL (South Shetland Islands) and ZP6CW (Paraguay) were worked with 70W around 1900UTC.

QSL via XQ5GTH and HS0ZBS (Thailand). His one s.s.b. QSO was with the Olympic Games special call AX8NSB (Australia) at 1537UTC, QSL via VK8HA.

Also operating was Sean G4UCJ who logged c.w. contacts with 5V7VJ (Togo) at 1043, YB2LSR (Indonesia) 1455, ZG2FX (Gibraltar) 1458 and finally 9M2TO at 1500UTC.

THE 28MHZ BAND

Ted G2HKU found 28MHz was open most days with some good DX heard, despite the increase of Continental CB interference! Little amateur activity was noticed at his QTH. Perhaps a few more CQ calls on this band might help?

Ted's log shows c.w. contacts with ZD9ZM (Tristan da Cunha), SU9ZZ (Egypt), A45XR (Oman) and J3, G3TBK (Grenada) all contacts made around 1500UTC. Using just 5W QRP, Ted worked FR5FD (Reunion) and 8P9JS (Barbados) at 1900UTC.

A change of mode now as Don G3NOF used s.s.b. to work BY1DX (China) at 0852UTC, D2BB (Angola), V26EA (Antigua), 5B4/G0DEZ (Cyprus), 8Q7XX (Maldives) and finally YI1BGD (Iraq) this station being operated by Roger G0TLC. All contacts between 1400 and 1700UTC.

SIGNING OFF

Many thanks to our reporters for their efforts this month. Your logs show that you have all been enjoying yourselves. Keep up the good work!

73. Carl GW0VSW

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Kenwood PS-52 PSU for TS850-etc. £119
MFJ-207 HF SWR analyzer £49
Yaesu YD148 desk mic £49
Garmin GPS3 road map as new £249
Revex WS40 2m/70cm SWR/PWR meter £49
Garmin GPS 2 plus £129
MFJ949E 300watt tuner + dummyload £119

VHF/UHF Transceivers

Yaesu FT2600 latest 60w 2m mobile new £149
Yaesu FT767GX HF+6+2+70 built in ATU, PSU all mode , bargain. £799
Kenwood TM733E true dualband mobile 50/35w £239
Uniden Marine VHF h/h inc nicads new £119
Kenwood TM732E dualband mobile wide TX/RX £199
Alinco DR150 2m mobile 50watts Airband RX £175
Alinco DJG5 2m/70cm hand held dual display £189

HF TRANSCEIVERS

Yaesu FT1000mp/ac version new £1795
Icom IC737 Auto ATU boxed and mint £699
Kenwood TS140 0-30mhz all mode 100w £399
Yaesu FT990AC auto ATU 100watts £799
Icom IC707 0-30mhz £399
Yaesu FT840 0-30mhz £449
Yaesu FT767GX HF+6m+2m+70cm, ATU, PSU £799
Yaesu FT100 HF+6M+2M+70CM DSP new £799
Yaesu FT920 HF+50mhz auto ATU DSP etc £899
Icom IC735 HF transceiver all mode 100w £425
President Lincoln 10m Amateur transceiver new £199

SHORTWAVE RECEIVERS

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AOR7030 0-30mhz all mode remote control £499
Lowe HF150 0-30mhz 62 memories mint £219
Lowe HF225 0-30mhz boxed PSU mint £249
Yaesu FRG100 + keypad boxed as new £339
Kenwood R5000 0-30mhz boxed as new £449
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Bearcat 220XLT 200 memories 66 to 956mhz £99
Bearcat 9000XLT base 25-1300mhz 500 memories £189
Icom PCR1000 10months warranty 0-1300mhz £249
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Fairhaven RD500 database remote control etc £549

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Alinco DJ-480 70cm FM H/Held £99
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Icom IC-04E 70cm FM H/Held with Case £75
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SHORTWAVE RECEIVERS

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Drake MS4	Speaker and PSU	
Drake DC3	Mobile DC to DC converter	
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Heathkit HW5400	100W SSB transceiver (80W 10m) With matching PSU	£350
Icom IC746	HF and 6m. This one has hardly been used.	£950
Icom IC738	(RARE!) complete with auto ATU. In great shape!	£725
Icom IC725	In good working order.	£425
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Kenwood TS940S	A nice example of this excellent radio	£725
Kenwood TS830S	Choice of 2	from £300
Kenwood TS520	In good working order. Just serviced.	£200
TenTec Corsair	A very nice example. Just serviced.	£350
Yaesu FT101ZD	Almost mint	£325
Yaesu FT980	In good condition. Works well.	£425

VHF/UHF EQUIPMENT

Icom IC02E	2m handheld, keypad entry, manual. Good Condition	£70
Icom 471H	QRO 70cms multimode base station transceiver.	£375
Kenwood TH215A	US spec (144-148MHz) 2m FM handie. Good Working Order	£85
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Icom PS15	15A PSU	£100
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Motorola	Repeaters. OK for 2m. In 19" rack unit, lockable door	£50
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Tono 550	Comms terminal for CW and RTTY	£30
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Yaesu FV101Z	External VFO Mint	£100
Yaesu MD100	Desk microphone. In nice condition.	£75

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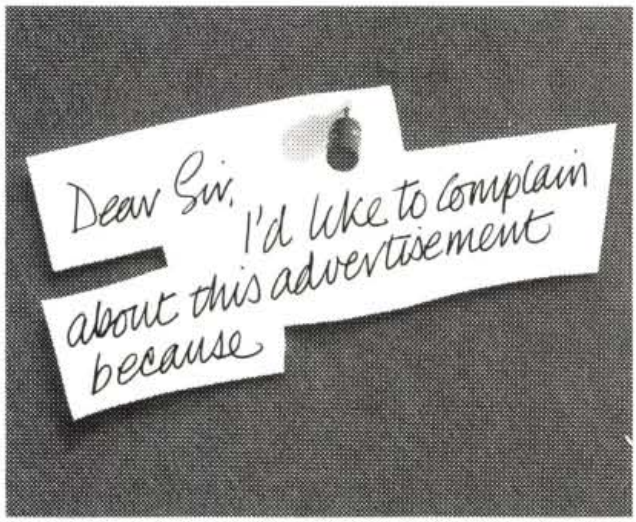

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EN91	7.50	5U4G	10.00	6SC7	3.00	7360	25.00
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Well, another year rolls on, and In a way, it's been a sad year for the Packet network. Migration from radio to the telephone has taken its toll and I am sad to see that happening.

Being a purist at heart, I would like to see a completely independent data network supported by Amateur Radio enthusiasts. However, I am living in the past I guess, modern technology has overtaken our hobby and left it behind.

Once upon a time, there was some 'street-cred', to use a modern phrase, in stating that it was possible to talk to somebody in the USA, Australia, or wherever, using Amateur Radio. Now it can be done while walking down the high street using a mobile 'phone, and not only that, it is possible to look at the Internet at the same time via radio.

We cannot fight progress, if that's what it is, but we can have a viable alternative. I still have the same enthusiasm I had 40 years ago, talking with friends all over the world that I have made in that time.

It's not quite the same on the telephone. I cannot imagine somebody calling 'CQ' for example and would not wish somebody to 'cold-ring' me for a chat - I have enough of those from double-glazing firms!

So, thank you for your support over the last year, especially those that sent me supportive messages regarding my last comments on the use of radio versus telephone. I can see that there are a lot of you out there with the same views.

My comments were used in a couple of newsletters, in the UK and abroad, where there seems to be similar problems. So, let's see if we can revive some of the interest that abounded in the mid 1980s for the data network.

RIGBLASTER

Right, preaching over and it's down to work! The RIGblaster connects your radio to your computer's sound card. It's the easy and modern way to get on the air with PSK31, SSTV, RTTY, AMTOR, Packet, c.w., Contest Voice Keying, HSCW meteor scatter, and other new modes.

Your computer and a RIGblaster take the place of the older expensive adapters or TNC's. The RIGblaster comes in three versions; the M8 works with all radios that use 8pin screw on microphone connectors, the M4 with all radios that use 4pin and the RJ works with all modular RJ45 8 wire equipped radios.

The M4 does not work with RJ22 or RJ12 connectors. Plug-in jumpers select the particular radio wiring for that connector version.

The RIGblaster eliminates ground loops, matches the sound card audio and provides fully automatic audio and push to talk (p.t.t.) control. You'll have completely normal station operation without unplugging or manual switching.

Amateur sound card software automatically controls the p.t.t and audio via a DB25F serial connection on the RIGblaster. A p.t.t. interrupt feature controls contest voice keyer sequences.

At anytime you can talk over your computer with the mic over-ride circuit. The AUTO/VOX selector switch allows VOX operation without a serial interface.

The RIGblaster comes complete with 12V wall supply, a 36in radio mic cable, plus a CDROM of sound card amateur software. Price discounts on several licensed software packages are included.

The RIGblaster is presented in a dark gray aluminum case with protective feet. A microphone jack, mini toggle switches (auto and channel selection) and digital audio and power l.e.d.s are on the front panel.

The rear panel has mini jacks for audio in and out, RJ45 rig cable jack, 12V socket, the level adjustment control, and a standard DB25F serial connection. Plug it in, load the software, and you can enjoy operating the new way.

So far reports on this method of using data modes on h.f. have been good. So, if you fancy trying this method, take a look at the Web site, **www.westmountainradio.com**

DIGIPAN

Next I have *DigiPan*, which is a new freeware program for PSK31 and stands for Digital Panoramic Tuning and brings the ease and simplicity of Panoramic reception and transmission to PSK31 operation.

DigiPan provides a panoramic display of the frequency spectrum in the form of an active dial scale extending the full width of the computer screen. Depending upon the transceiver i.f. bandwidth, it's possible to 'see' as many as 40 to 80 PSK31 stations at one time.

In the first half of next year, Small Wonder Labs (the manufacturers) will introduce an inexpensive 14MHz PSK31 transceiver kit that makes full use of *DigiPan*'s panoramic capabilities through the use of a 4000Hz wide band i.f.

When used with existing transceivers, *DigiPan* displays 2000 to 3000Hz of spectrum space, displaying all, or almost all, of the active PSK31 stations on the band at one time, and clearly showing unused frequencies available for calling CQ. Tuning to a station, or to an empty frequency, is done by pointing with the mouse cursor and clicking the left mouse button. *DigiPan* also has a 'Snap' function to snap the cursor quickly to the center of the displayed station, and a.f.c. to keep it tuned there.

The panoramic capabilities of *DigiPan*, means you don't need to use the transceiver tuning control! Just set the transceiver to either the low or high end of the PSK31 portion of the band and use the mouse for station selection.

ROGER COOKE G3LDI WISHES YOU ALL A "MERRY CHRISTMAS" AND TRIES TO REVIVE THE INTEREST IN DATA COMMS THAT WAS EVIDENT IN THE 1980s.

● Fig. 1: RIGblaster connects your radio to your computer's sound card.

For memory-equipped transceivers, only one or two memory frequencies are generally needed to cover the PSK31 portion of any band, and changing band segments can be done instantly with the press of a switch. An electronic dial scale shows either the actual frequency of reception or the tone frequency being used.

Actually *DigiPan* has a type-ahead buffer and twenty-four operator-configurable macro keys with a simple-English macro language that can be used to control almost all the operational functions of DigiPan and eliminate repetitive typing, leaving the operator free to enjoy the QSO. *DigiPan* also has a built-in logging feature that logs the call, name, QTH, time, date, frequency, RSTs, and remarks, and an automatic search and display function that continuously displays the call, name, and QTH of any station previously logged for easy reference during a QSO.

DigiPan is a joint effort between **Howard Teller KH6TY**, and **Nick Fedoseev UT2UZ**, the author of MIXW32, who wrote the actual program, and is intended to make PSK31 operation easier and more enjoyable for everyone. Look at the URL and download a copy of the program - **http://members.home.com/hteller/digipan/**

● Fig. 2: RIGblaster is available in three versions (see text).

BACK-UPS

Following the discussion in the September issue, on making easy back-ups, the following comes from **Derek Hughes G7LFC**.

"Godfrey Manning's point about backing data up on to an identical hard disk is a good one, however it can easily be turned in to one of the best ways of backing your data up by purchasing a copy of Norton's Ghost Personal Edition software. Like any other pieces of backup software, it will create a copy of all the files on your hard disk, but it scores over the rest by being able to create bootable hard disks.

Ghost comes in DOS, Windows 3x, Windows 9x, Windows NT 3/4 and OS/ flavours (all in the same box), so you can use it to back-up anything from the earliest 386SX computers, right through to the latest kit you can get your hands on. However, if you're running Windows 3.x/9x, it's best to boot your computer into DOS at start-up and use the 'archaic' version.

If you run the Windows version of Ghost some Windows files may be in use and will not be backed up properly. Having loaded the DOS version of Ghost, a few menu selections will start the duplication of your main hard disk on to your spare 'back-up' hard disk. The beauty is, though, that the duplicate hard disk will be bootable. If your main hard disk fails, you simply need to replace it with your back-up hard disk (a jumper change may be required) and boot your computer up.

Norton Ghost is available from the Norton web-site at www.symantec.co.uk for £35 and can be immediately downloaded. As it's only 2Mb in size, this shouldn't be a problem. You can also obtain it from branches of PC World.

● Fig. 3: Check out the Symatec website to purchase a copy of Norton Ghost.

AMATEUR RADIO BACKBONE

Here is a letter from Mr. A.E.Vinters G0WFG:

I am chairman of the STELAR group, a charity that exists to promote electronic communication (especially Amateur Radio) in schools and colleges. I was heartened to read your support for a high speed backbone for data comms. I've been convinced of this for some time and am currently working on a project that I hope may make this possible. In STELAR we are investigating the creation of a high speed data network for schools using the microwave bands.

Construction is moving ahead of a simple 10GHz link as I write this. To date we have received a small sum of money from the Royal Society to buy bits and pieces for our research, and we are working with the co-operation of the University of Bradford Department of Cybernetics. We have about 70 schools who are currently members of STELAR and who could become involved in this project.

The stimulus for this came from a visit I made to Germany last year to see their approach to encouraging data comms in schools. To put it mildly they are streets ahead and I came away chastened but determined to do something, hence the STELAR project.

I suspect that like you I see that the future for our comms industry is very much tied up with radio and using the spectrum efficiently, hence we need people who appreciate this and have the required knowledge. This is where working with schools on projects such as the microwave link is important. If we fail our young people in this then the outlook for our comms industry is bleak.

The Germans were quite open, stimulating interest in schools so that in 10 years time German industry would be in a key European position to exploit

● Fig. 4: The University of Bradford's Department of Cybernetics are working with STELAR to promote electronic communications (see text).

communications to the maximum. Clearly we have to get a move on!

I see a possible microwave backbone as a desirable project for all Radio Amateurs interested in data but it needs co-ordinating and pushing strongly. STELAR might just be the umbrella to get this off the ground.

If you would like to contact me my phone number is **(01422) 823622**.

Just in case this column is not read by members of the DCC, I am passing a copy of Tony's letter to them.

AND FINALLY

Just had a very pleasant chap on the 'phone, who has joined a computer software club. With his first order he was given a free Surf Master Internet bundle, giving him free access to the Internet:

"Can you help him install it?" he asked.

"Sure" I replied. I proceeded to take him through the installation.

He said, "What comm port do I choose?"

I replied, "Do you know what comm port you're modem is on?"

He said, "I don't have a modem"!. Here ended the conversation.

Please send your Amateur Radio related mail via packet, the Satgate system and keep it alive. Have a great Christmas and a Data-full New Year.

Roger G3LDI

IN VISION

BY GRAHAM HANKINS G8EMX

17 COTTESBROOK ROAD
ACOCKS GREEN
BIRMINGHAM B27 6LE

E-MAIL: graham@ghank.demon.co.uk

PACKET: G8EMX@GB7SOL

THIS MONTH GRAHAM G8EMX WELCOMES MIKE COX AS NEW BATC CHAIRMAN.

The British Amateur Television Club (BATC) is pleased to announce that **Michael Cox**, Chartered Engineer (CEng), Fellow of the Institution of Electrical Engineers (FIEE) has accepted the Club's invitation to be its President for the next two years. At the top of any committee list, the President of any club or society is, ideally, a person who carries considerable experience, a lifetime of achievement and has earned substantial respect within that, or a very closely related, specialist interest. Their appointment should add to the status of that society, together with their ongoing contribution to its progress. Mike Cox brings all of these to the BATC.

When Mike joined the BATC in 1955 he was a student. A practical engineer, he built and demonstrated a 'flying spot' scanner at the club's convention that year. Professionally, Mike had graduated and worked initially for Marconi at Chelmsford, moving on in 1959 to Rediffusion at Wembley Studios as a maintenance engineer. This period saw Mike construct his next amateur TV project - an iconoscope camera, followed by a solid-state syncronising pulse generator, which was published in the BATC's quarterly magazine *CQ-TV*.

The early 1960s saw Mike become Independent Television's only colour development engineer, where he became involved with demonstrations of NTSC (the American colour system), PAL and SECAM (European systems) on three line standards. To generate the colour image needed for any exhibition, Mike used his home-built vidicon camera (an improvement on the iconoscope) and a colour synthesiser. This synthesiser became the prototype of a commercial version, promptly christened a 'Coxbox' by the German purchaser of one of the first units!

In 1966 Mike decided to build, 'just for the hell of it', a three vidicon colour camera. This too appeared in *CQ-TV* and at the BATC Convention, as well as in professional television when it was used at Teddington to replace a faulty commercial camera!

Meanwhile, the 'Coxbox' was selling to ITV companies and in Germany. This persuaded Mike to consider starting his own business, Michael Cox Electronics Ltd, manufacturing television coding, switching and mixing products which by 1985 was employing over 100 staff. In 1988 Mike was invited to join the International Broadcasting Committee's Management Committee, and has been associated with the IBC every since, currently holding the position of vice-President.

Having relinquished some business associations, Mike says: "I now have a little more time for interesting activities. My laboratory at home has a fair selection of equipment to help design, build and test video circuits. It also carries a few computers, DV cameras and a pair of Sony DV recorder-players".

Mike is enthusiastic about his new Presidency of the BATC: "My hope is that the club will go from strength to strength during the next two years and beyond and I will do all that I can to help this. I am looking forward to my term of office".

FIFTY YEARS ON

Ever since its beginnings, more than 50 years ago, the BATC has produced a magazine for its members in the United Kingdom and around the world. Early gallant efforts of *CQ-TV* were simple typed 'news sheets' of A4, duplicated or photocopied then posted by the dedicated volunteers on their committees of the day. As 'copy' increased, the format changed to 'folded A4' (A5), carrying an illustrated front and back cover, still written by the members but printed by a commercial company.

The A5 style for *CQ-TV* served the BATC steadfastly until 1999, with the club committee constantly striving for innovation to what was a vital link with the membership. Colour on the cover pages became a regular feature, with occasional colour content.

John Wood G3YQC and **Mike Wooding G6IQM** have been two notable past Editors, often writing much of each issue themselves! Others on the committee would 'proof read' and the final printed copies would be intensely examined at committee meetings.

Ian Pawson became the present editor of *CQ-TV* in Winter 1996 and saw the advantages of changing the magazine to the almost universal A4 format. This would eliminate a lot of the 'reduction' process that could render circuit diagrams difficult to read and enable the whole magazine to be easily transferred electronically to the commercial printing company in Leicester that the club now use. The BATC Chairman **Trevor Brown G8CJS**, considered *CQ-TV* to be: 'where this Club could shine' so the BATC submitted its latest editions for the *Practical Wireless* Club Spotlight Magazine Competition.

This year, the efforts of everyone concerned were enough to gain the 'Bert's Bell' National Magazine National Club Category award, received on behalf of the BATC by a long-standing club member, **Richard Guttridge G4YTV**, at the Leicester Show in September. Our new President, Mike Cox, comments: "I have noticed over the years the enormous improvement in *CQ-TV*, which reflects great credit on the editorial team." Don't forget that *CQ-TV* now has its own web site at **http://www.cq-tv.com**. The BATC's home page can be found at **http://www.batc.org.uk**

BEACONS GROUP

Alan Kendal G6WJJ, Chairman of the Beacons Repeater Group, whose efforts continue towards a 1.3GHz ATV repeater in Birmingham. Alan tells me: "The Worthing transmitter for the repeater has had a new crystal fitted, to put the output frequency at 1316MHz as recommended by the BATC and some trimmers have been replaced with higher quality components, improving the output power. The dual-Alford Slot antenna has been repaired – some connections were broken and screws missing".

Alan adds: "A 'black brick' p.a. will be built soon; then, when two more callsigns have confirmed that they are willing to be closedown operators, the BRG will be submitting its application for a licence".

Best wishes for a Merry Christmas and a Very Happy New Year from the BATC! See you 'In Vision' next year!

Graham G8EMX

● Typical colour/bar/grey scale video test pattern as seen on oscilloscope and monitor. Frequency counter has a 50Ω input for direct measurements of low power transmitters.

DOWN UNDER

BY CHRIS EDMONDSON VK3CE

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CHRIS EDMONDSON VK3CE LOOKS AT THE COMMUNICATIONS INVOLVED IN THE SYDNEY 2000 OLYMPIC GAMES

Thanks to the excellent television images from the Olympics, we can now assure you that we walk on our feet, not our hands, that no kangaroos or people toting spears wander the streets of Sydney, some of which are actually paved. What next...?

I guess it would be fair to say that Radio Amateurs in Australia have been shaken out of their complacency. A rude awakening, this one. Let's wind the clock back for a moment to understand the circumstances...

"And the winner is... ***Sinny****!"*

While the Games of the 27th Olympiad are now but a fond memory, those fateful 1992 words of the IOC chief put an amazing juggernaut into action. For 16 frenetic days, the area around Homebush in Sydney, Australia, was a seething mass of activity.

Years of preparation went into the glitzy show of the 2000 Olympic Games. Juan Antonio proclaimed them the best Olympics ever (and they certainly were for the UK medal tally; well done!), but for every smiling athlete pounding the pavement, bowing their arrows or splashing their way to record after record, there were literally dozens of paid or voluntary staff there to make it all happen.

The logistics of it all were finally brought home to me the night before the opening ceremony, when a senior official appeared on the telly to off handedly ask if we might 'beef up the transport a bit more'. What did he want? Oh, only another 500 bus crews. Yes, the Olympics was that big.

● Fig. 1: The communications set-up for the Olympic Games was massive but as Chris VK3CE explains it brought with several problems for Aussie Amateurs.

AN RF SWAMP

Let's just change the subject a little by telling you that Sydney is an r.f. swamp, a real sewer. Where most major cities of this world have a nearby decent-sized mountain range where all manner of radio masts can be mounted, Sydney doesn't.

To make matters worse, it's annoyingly hilly. No big hills, but a lot of ups and downs. In fact, the nearest mountains of any worth from an r.f. point of view are a substantial distance away.

A few months before the Games, I was chatting to the chief radio technician of a major emergency service in Sydney. He quietly told me that his organisation's request for one single channel to use at the Olympics' venues had been declined. There was not one single vacant commercial channel to be had! **Not one!**

Melbourne, with a population of about 3.5 million, is about the same in geographical size as Sydney. Commercial radio service operators can blanket cover the whole town with two or three well-sited communications towers.

The TV stations run 100kW e.r.p. from the nearby Dandenong Ranges, and achieve excellent range. A single 70cm (430MHz) repeater in the middle of the city covers almost the entire place, out to a radius of, about 80km. Put the same repeater in Sydney, and you may have trouble hearing it only 5km away!

So what am I getting at here? Simple. A commercial operator who covers all of Melbourne with three or four base stations would probably use 15 or 20 to cover the same area in Sydney. Aha! Well done, You just figured it.

Of course. The Olympics needed a 'zillion' channels for everything, but with the commercial spectrum clogged to complete uselessness, where could the authorities find a big enough chunk of... oh, hang on!

What's this? A handy 30MHz in the middle of the prime u.h.f. commercial band with virtually no occupancy? Who owns it? Amateur what? Uh huh. They 'borrowed' just a snippet from our 70cm band. A 12MHz snippet, to be precise.

A sophisticated digital trunked network was set-up just to serve the many venues, and Amateurs were completely excluded from that part of the band within 150km (almost 100 miles) of Sydney. I understand the whole thing went like a dream. What's more, Amateur operators were employed to keep track of the official camera-toting vehicles and helicopters... all using APRS!

Long before the Games started, they decided the 12MHz wasn't going to be enough. So, having taken 420 to 432MHz from our Sydney 70cm users, the organising committee folk came back a few months later, cap in hand, and ended up borrowing the top few 'megs' of the band as well!

All right. We're good sports. We're a generous bunch, us Amateurs and they promised faithfully we'd get it all back, pristine, cleaned and scrubbed, as soon as the Games finished. Fine, but do you remember that bloke I mentioned earlier from the unnamed emergency service who couldn't even get **one** channel for his fellows to do their work at the Olympics headquarters?

As an active Amateur, he rang in a panic a while back to tell me there was more trouble on the horizon for Aussie 70cm fans. This is what he told me: "The West Australian Police have just signed a contract to put all their new Tetra digital communications on the 70cm band."

"You know, there's simply **no way** we'll be getting that bottom 10MHz back. I need hardly

add there's no way it will stop with Perth, either. We'll be doing the same thing in NSW as quick as you can say **Spectrum Anarchy**! Once we're there, **all** States will jump in boots first. The band is as good as gone..."

My next call was to our equivalent of your RA, the Australian Communications Authority (ACA). An ACA spokesperson quite openly told me that the Olympics were originally looking to use a defence segment at 380MHz, but the ACA rejected that because the spectrum would have to be given back after the Games.

The Amateurs don't really use it, do they, and certainly don't pay what it's worth? So, while we expected we'd get it back, it seems there may have been bigger wheels turning in Canberra.

Then came reports that a new spread spectrum service is planned, running up to 2kW from 410 to 460MHz. Really, I just don't think I want to know any more about all this... which is perhaps as well. We've not been told a thing about this one!

LOW INTERFERENCE

Back in 1997 the ACA decided to launch a new band for Low Interference Potential Devices (LIPD). You know the sort of thing, garage door openers, remote entry systems for car doors. They had quite a few bands of their own, and basically kept to themselves.

Anyway, all of a sudden up had jumped a number of importers with a 'bee in the bonnet' about all sorts of new European gizmos. When we checked the band they wanted (and were granted unlimited access to subject to a 20mW upper power limit), we discovered to our dismay that the new band was slap bang in the middle of our 70cm repeater inputs.

The problem with that is that the quarter-second data bursts we expected turned out to be cordless headphones, crane controllers and — wait for it — low-powered multi-channel f.m. voice transceivers! We quickly discovered that a 20mW signal can carry for a very long way.

The data from the crane controllers was bad enough (and imagine what disasters we could inadvertently wreak by innocently keying up a repeater near one of these cranes!) but we then had the completely incredible situation of non-amateurs using two-way radios which could 'key-up' Amateur repeaters! It wasn't long before the situation started to happen, too.

It seems the ACA, in writing its rather liberal rules for LIPDs, had failed to consider that manufacturers could put other than data on the band. Frankly, I think it's quite irrelevant that 70cm is, in this country, a secondary allocation. Surely, the ACA **knew** that it had put the LIPDs right onto the input frequencies for the Amateur service repeaters, yet failed utterly to protect these legitimate users of the spectrum?

By definition, a repeater uses a receiver as sensitive as possible. These, as I've mentioned already, 20mW signals can carry for a very, very long way! We did some tests using a 20mW transmitter at my home, which is, admittedly, in a very good u.h.f. site atop a mountain.

For the tests we set up a beacon station, comprising a simplex repeater which received GPS co-ordinate data from a number of mobile stations, then transmitted the signals back to the originating stations, also at less than 20mW. The signals were Q5 more than 100km away!

Perhaps this is an extreme example — but **is** it? Wouldn't you want to make sure your repeaters were located at the best possible sites? We have more than 100 u.h.f. repeaters here and every last one of them is sited in the best possible position available.

Fig. 2: The opening ceremony of the Sydney Olympic Games.

I need hardly add that the Amateurs raised an unholy din with the ACA. A source there unofficially admitted that they'd 'goofed badly' when writing the rules. It seemed that nobody had anticipated anyone actually sourcing voice gear for the band, even though it was clearly within the scope of the regulation.

A couple of months later, the ACA announced that it would revisit the entire issue. Great, we thought, they'll outlaw these stupid radios! Er, no. Where the Amateur service originally had protection from any 'harmful interference' caused by these devices, that provision was removed, the ACA reasoning that it would be far easier for the Amateur service to completely redesign its 70cm band plan than to outlaw equipment bought in good faith that it would be legal to operate.

The latest threat, as the complaints have continued, is that the Amateurs may be excluded altogether from the spectrum in question! Can you imagine the expense, apart from anything else?

All those cavities and antennas rendered just about useless because we'd have to move them several MHz, not just a small amount. And who's to say the spectrum grab won't continue?

Would we then have to move them again or close them altogether with more band losses? After all, Guatemalan amateurs no longer have any access whatever to the 70cm band. I wonder if we could claim compensation for millions of dollars worth of transceiver equipment?

Fig. 3: The main ARPS control screen. Amateurs were used to keep track of all the mobile TV units, helicopters and 'chase' vehicles during the Games. All tracking was done by APRS.

Perhaps I should just add a few pictures from behind the scenes at the Olympics and go find myself a headache tablet...

I look forward to seeing you next time. In the meantime, feel free to contact me with your suggestions, comments and news.

73 Chris VK3CE

Fig. 4: The main APRS control station.

TUNE-IN

BY TOM WALTERS

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WALTON ESSEX CO14 8BX

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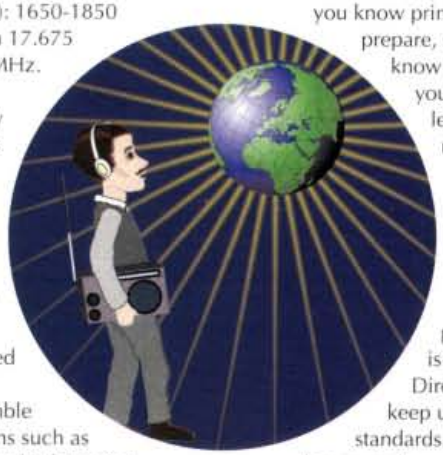
First off I'd like to say thank you for the correspondence received from you. Please write or E-mail me with any comments you've got, and of course any information, but do bear in mind that for publication this needs to be valid three months later due to long lead times.

OLD VERSUS NEW

A theme that will inevitably be cropping up all the time is that of old media versus new media. Print publication or E-zine? Pen-and-paper or E-mail? Shortwave or Internet?

It's really unavoidable, I'm afraid. But to cheer your hearts, I've had a letter from **Terence James** of Newport, South Wales, who says "hoping to see lots more info and schedules", and backs this up with a schedule for **Radio New Zealand International**, which goes like this for the period 1 October to 18 March (times UTC/GMT): 1650-1850 on 6.090, 1850-0705 on 17.675 and 0705-1205 15.175MHz.

Thanks for that, Terence. Reports on how well the RNZI schedules are heard would be interesting.



Bill Lewsey of St. Columb Major, Cornwall says "I have been an active s.w.l. for 33 years (I am now 40) and frankly I am disgusted at the rise of internet broadcasting. In my humble opinion broadcast stations such as **VOA** were meant to spread information over as wide an area as possible. The ideal way to do this is by using a radio, as not many homes in poorer countries have access to the internet."

Bill also notes that he gets a lot of enjoyment, as I'm sure many of you do, in trying to hear stations when they are not beaming in his direction. Bill communicated these thoughts via E-mail, incidentally, through Sky TV!

If it's any comfort, the Director of BBC World Service, Mark Byford, in a statement about the extra £64 million just awarded to the World Service for capital development said: "This financial settlement is not just about expanding f.m. and online. It's very much to ensure that traditional short wave listening is secured and improved for the future. In some areas, 80% of all listening is on short wave. Even in five years' time it will still be a very significant figure." Some of this windfall money will be spent on modernising shortwave transmitters at Cyprus and Singapore.

So there you are - the big dilemma of our time. Personally, I think that shortwave and all forms of radio have a long life ahead of them.

FASCINATING MONGOLIA

Well after all, let's get back to business. Do you ever hear **The Voice of Mongolia**? Mongolia is a fascinating, but really remote country, with a harsh climate, once under Soviet rule, but now independent.

TOM WALTERS HAS DETAILS OF WORLD-WIDE PROGRAMMES FOR YOU TO LISTEN OUT FOR THIS MONTH

Meanwhile, a small step backwards for international radio listeners, with an obituary notice - not for a person, but a programme. As you know printed words take time to prepare, so many of you will know about this long before you read this column. The leading communications radio programme, **Media Network**, ceased transmission in September, and is now an internet-only production.

Founder, Editor and presenter Jonathan Marks is too busy in his job as Director of Programmes to keep up Media Network's high standards. He commented "There has never been more response than we get now. It has been enormous fun but this seems a good point to hang up the headphones and step back from the microphone. I have hundreds of people out there to thank for the radio show's success over the last 20 years. I think we all worked hard to show that good international broadcasting comes from the heart".

So, where do we go from here? *Practical Wireless* states it's a magazine for people who enjoy radio listening, transmission and construction. But a lot of information **about** radio is available on the Internet, and for those who have access, I will continue to include addresses, and news of audio that can be heard on the world wide web.

The Voice of Mongolia is transmitted from Khonkhor, 25km east of Ulaanbaatar, Mongolia's capital, using Soviet-made 100, 250, and 500kW transmitters (one of each) and curtain antennas built in the 1960s. They transmit in Mongolian, English, Chinese, Russian and Japanese to East and South Asia, and their signals can be heard in Europe. Try these UTC times: 1030-1100, 1500-1530, 2000-2030 (this one should be heard in Europe) and frequencies 9.720, 12.015, 12.085MHz.

The Voice of Mongolia wants reception reports and promises QSL cards. Include UTC, date, frequencies, programme content, receiver and antenna details, and use SINPO code if you can. Cassettes (non-returnable) up to five minutes duration of each transmission heard are also asked for.

Send your reports to: **The Voice of Mongolia, PO Box 365, Ulaan Bataar, Mongolia.** The internet address is **http://www.mongol.net/vom/** where you can hear some really exotic and unusual audio. E-mail: **radiomongolia@magicnet.com** (for your reports, of course!).

Last month I mentioned the apparent demise of **Radio Yugoslavia**. Perhaps by now, Radio Yugoslavia will be back. Let me know if you've heard it again. The UTC schedule last summer was: 0000-0030 America (exc. Sun), 0430-0500 America, 1830-1900 Europe, 2100-2130 Europe and 2200-2230 Pacific (exc. Sat). Frequencies used were 6.100, 7.230, and 9.580.

Radio New Zealand International

Until next time happy listening and let me know if you tune in to anything unusual in the coming months.

Tom

To advertise on this page see the booking form below.

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Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

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THE RF-KIT CATALOGUE. send 2x 2nd class stamps or browse www.rf-kits.demon.co.uk Hands Electronics, Tegryn, Llanfyrnach, Pembs SA35 OBL. Tel 01239 698427.

QUARTZ CRYSTALS 1kHz-250-MHz, >20,000 stocked. 32.768kHz/£1.65, 38kHz/£1.65, 400kHz/£3.95, 455.2kHz/£1.50, 3.2768MHz/£1.95. 7.03MHz/£3.95, 10.106MHz/£3.50, 10.7MHz/£1.75, 11.0592MHz/£1.60, 21.06MHz/£3.95 etc. SPXO/TCXO/VCXO devices from £2.50. Ceramic filters & oscillators. 26 page list. Circuits & applications booklet/£5.00. IQ-Electonic Design. Tel: 020-8391 0545. Fax/Msge 020-8391 5258.

VINTAGE/VALVE transistor radio. Service data also self buid crystal radio circuit, etc. Call/fax Jeff 01294 277308 or Dave 01294 311484. Write J D Radio, 34 Ranken Drive, Irvine, Ayshire KA12 0QX, Scotland, UK.

Exchange

ICOM IC-Q7E Unused exchange for good condition Icom IC-2SET. Telephone Peter, Leamington Spa 01926 421028.

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VALVES:- OVER 50000 STOCKED Ham, Vintage, Military, Audio. SAE for FREE list to: Wilson Valves, (Jim Fish G4MH), 28 Banks Ave., Golcar, Huddersfield, West Yorks HD7 4LZ. Tel: 01484 654650/650725. Mobile:- 07733 283084. Fax: 01484 655699. E-mail: wilsonvalves@surflink.co.uk Visa etc. Fast & personal service.

VALVES WANTED - NEW AND BOXED!!! KT66 GEC £35. KT88 GEC £60. EL34 & EL37 Mullard £27. EL84 Mullard £4. DA30; DO30; PX25 all at £120 each. PX4 globe shape £70.

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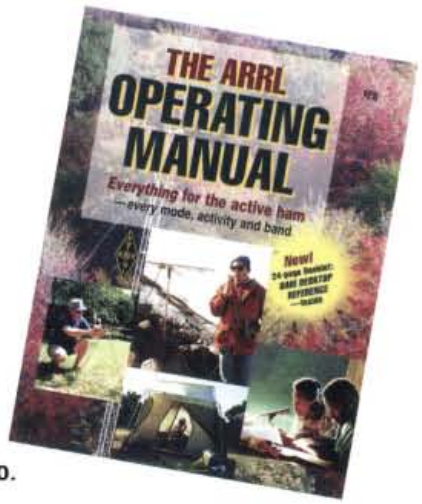

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Our Rob is never lost for words, this time he has news of a special maritime operation

rob mannion signs-off

Rob G3XFD rounds off this month's issue and provides a sneak preview of what's in store and coming soon!

It's been a hectic month for the *PW* team and this is one issue we're pleased to have completed safely. However, the next two will keep us busier because we've got the Christmas publishing schedules to keep us on our toes. Hasn't 2000 rushed by quickly? -and in publishing we're always ahead of the rest of the world!

As I write this there's a possibility of a very special 'Maritime Mobile' operation taking place in a joint venture between members of the **Irish Radio Transmitters' Society** and *PW*. What's it all about? Well, it all stems from the fact that

John Corless EI7IQ, Vice President of the Irish Radio Transmitters' Society.

Irish Ferries, the Dublin based Irish 'national carrier' - who operate ferries between Dublin and Rosslare in Ireland to either Holyhead in North Wales or Pembroke Dock in West Wales - are expecting delivery of a new giant ferry - the MV *Ulysses*.

Under construction in Finland at the moment the MV *Ulysses* is claimed to be the largest roll-on roll-off ferry in the world (she's huge - I can vouch for that!). So, as frequent users of the ferries, the IRTS Vice President **John Corless EI7IQ** and I came up with the idea of running a very special Amateur Radio maritime mobile operation on board the vessel as she makes her maiden voyage from Finland to Ireland.

If the operation takes place John suggested that we make it a joint EI/GW and G event as the ship will spend her life working between Ireland and Wales. At the moment planning is at an early stage but we're planning that John himself, **Carl Mason GW0VSW**, *PW*'s 'HF Highlights' author (and a former Royal Navy man), hopefully myself and (again hopefully) others will take part.

What we'd like to do is to have a least two stations on the air from the ship - covering h.f. and v.h.f. In this way as the *Ulysses* makes her way round the coast of the UK heading towards Ireland we could end up with hundreds of QSOs - and clearly demonstrating the goodwill that Amateur Radio promotes between the separate sovereign nations within our group of Islands. In other words - we could all have a whale of a time!

I'll bring you more news as soon as we have it - but let's hope we can organise this special event. It could bring an enormous amount of publicity for our hobby - helped by the fact that Carl GW0VSW is a professional television cameraman! Watch this space!

What Is A? Ends

The long running series entitled 'What is A? - written by **Ian Poole G3YWX** finishes with this issue. We all feel that the series has reached a natural finishing point but its my fervent hope that this series and Ian's (which was also very popular and long running) 'Specifications' series of articles will eventually appear in book form.

As a team the *PW* Editorial staff are always looking for new ideas to publish on your behalf, and the response (from your letters, E-mails, etc.) always help us. The 'It's A Classic' articles are a good example of this feedback. Keep it coming!

Constructional Articles

To keep the practical element going in *PW* we need more constructional articles. There's a real shortage of these - so how about having a go? We need all categories (from simple weekend constructional ideas to larger more involved prjoects) we'll help you prepare the article and if you write in we can send you an *Author's Guide*.

Armed with your constructional article we can enter 2001 knowing that 'Practical Radio' is still alive and kicking. So, with that I'll leave you to do the writing and look forward to hearing from you soon. Cheerio for now.

Rob G3XFD

next month

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

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***John Goodall G0SKR** puts the the Philips Pronto - a wireless remote control system to the test.

* **Rob Mannion G3XFD** gets to grips with the SGC SG-237 auto-antenna tuner unit which can be installed into your own rig!

SCENE USA

* **Ed Taylor N0ED** 'post' us his quarterly 'letter from America'

HISTORICAL

***Brian Kendal G3GDU** takes a look at the prelude to RADAR

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* **David Butler G3ASR** our v.h.f./u.h.f. author takes his turn in the workshop to bring you his antenna offering

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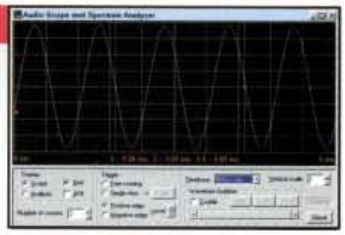

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Construction of externals	WR-1000e/WR-1550e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning resolution	100 Hz (5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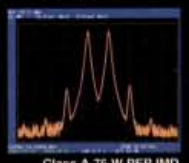

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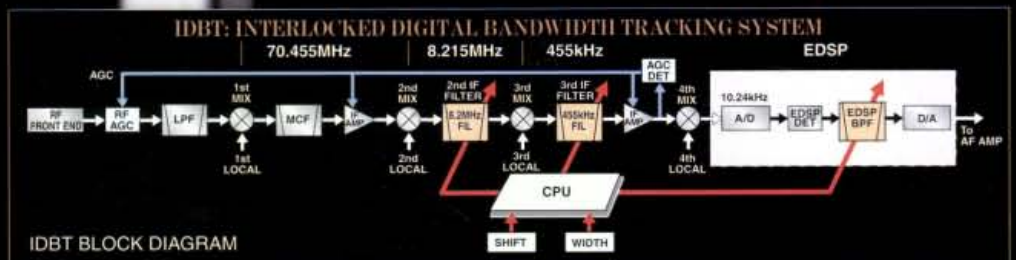

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