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NUMBER ONE SYSTEMS
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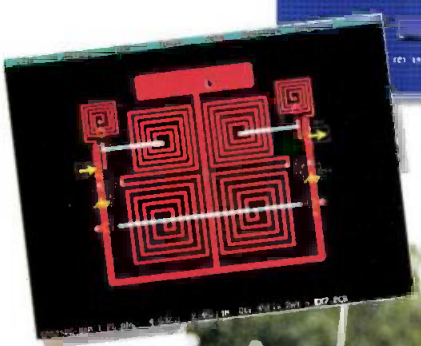

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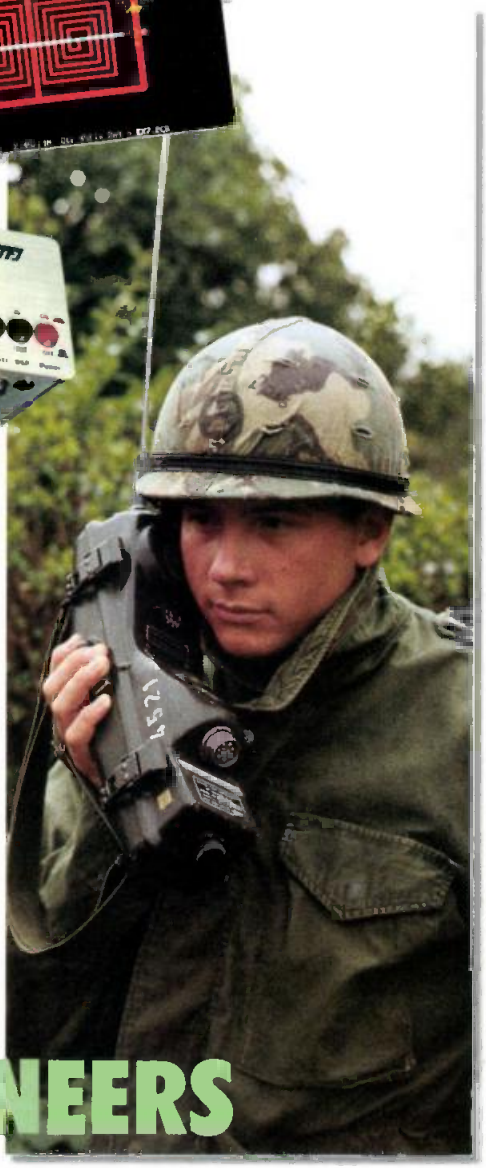

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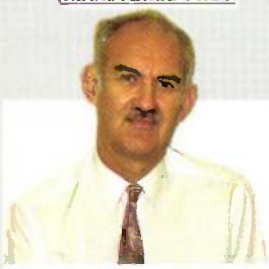

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TOP HF Seller

ICOM IC-706 MK II

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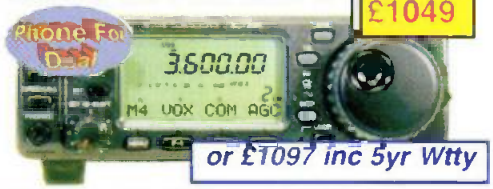

or £1097 inc 5yr Wtty

160-6m 100W 2m 25W + + +

We are pleased to endorse the performance and design of the IC-706 Mk II transceiver as the best compact hf mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

TOP 2m/70cm Mobile

Yaesu FT-8100R

£449

or £467 inc 3yr Wtty.

Yaesu's new dual band mobile makes the competition look old and out-dated. Now you can buy a rig ready equipped with 12.5kHz and 25kHz filtering. You get a detachable head, 300 memories, true dual same band rx, CTCSS encode and the best display in the business.

TOP 2m/70cm Handy

ADI AT-600

W&S £279

or £314 inc 3yr Wtty.

Reviewed PW August

PW says: *"an incredibly well priced radio - amazingly sensitive - audio - worked very well with 12.5kHz channel spacing - An Absolute Cracker"*

- CTCSS encode/decode
- Full DTMF + 1750Hz tone
- Alphanumeric memories
- Full duplex
- CTCSS tone reader
- 29 programmable features
- AM airband receiver
- Rx up to 990MHz
- Nicads and charger

ADI AR-146 2m 50W FM

FULL CTCSS

W&S £249

ADI mobiles are outselling all others we stock. You won't find better value or a better engineered product. Take our advice - buy an ADI mobile and keep the change!!

2 Years Warranty

- *3 Power levels - Wideband receive*
- *40 Memories plus call channel*
- *7 Programmable steps*
- *Channel or frequency display*
- *The best sensitivity in the business*
- *Keypad mic and mounting kit*
- *CTCSS Encode and Decode!*

AR-446 70cm 35W

W&S £269

3W Novice version available

ADI AT-201 2m FM Handy

NEW W&S £149

- *40 Channels*
- *CTCSS Encode*
- *CTCSS Decode*
- *DTMF*
- *Channel Reasout or*
- *Frequency Readout*
- *Set to Set Cloning*

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Compare the Price

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Value W&S £169

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- *5W on 13.8v*
- *1750Hz tone*
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- *Ultra sensitive*
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- *20 memories*
- *Keypad entry*
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Yaesu FT-50R 2m/70cms

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Kachina 505DSP HF Rig

The 506DSP transceiver is remotely controlled (up to 23m away - so no noise problem!) from your computer. Includes 100W transceiver module, operator control head and software. This has taken the USA by storm

* 100W all modes * Runs under Windows 3.1 or 95 * Gen. cov. receiver * Variable bandpass filters * 1Hz tuning steps * Antenna impedance chart * RF speech processor * SWR alarm * Full DSP * Full CW break-in * Electronic keyer * 100 memories * Auto notch filter * control head mounts in PC or on desk.

We hope to have the first UK demonstrator early in September - Phone for full gen.

We are pleased to announce that we have been appointed exclusive distributors for the new Kachina 505DSP transceiver. What you get is a complete control consol on your computer, operating under Windows. The parameters and data is all controlled remotely from the main transceiver - just like professional installations. No nasty plug-in computer boards - the rig can sit up stairs or down stairs, well away from your computer. This means more money goes into the electronics of the transceiver rather than being spent on elaborate front panels, displays and tuning dials. You get the luxury of S-meter display in volts, S-units of dB plus ALC, plus forward and effected power and VSWR. A temperature controlled crystal reference with built-in test unit ensures amazing frequency accuracy, whilst a Smith chart tells you your antenna impedance. CW operators will love the 60 character memory and the ability to adjust the keying waveform. OH yes - you even get an electronic log book! There's' lots more in the brochure - phone today for details.

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ICOM IC-207H 2m/70cm Mobile

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* 50W / 30W
* Detachable head
* Packet 9600 bps ready
* 180 Memory channels
* CTCSS & 1750Hz tone

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Discount Price

W&S £499

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* 144 & 430MHz 50/35W
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* Large clear display

Kenwood 2m All Mode

Discount Price

W&S £749

TM-255E

WATSON QS-400Handy Mount

W&S £9.95

* Clips on to dash vent (no sticking!)
* Adjustable angle
* Sprung fingers grip handy
* Single handed quick release
* Accomodates all modern handys.
* Ideal for portable phone / GPS

Yaesu FT-840 HF Rig

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We've purchased a quantity at this special price. You won't get a base station rig any cheaper!

W-MM1 Multimode Modem

WATSON

W&S £69.95

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* NAVTEX, SYNOP
* Transmit and receive
* Needs PC 286 or better
* Includes software
* No external power required
* Connects to RS-232

MFJ-784 DSP Audio Filter

Featured PW This Month

£239

Many would claim this to be the best filter in the business - we wouldn't argue! Totally programmable, it will transform your reception and you can store your favourite settings in its memory.

MFJ-781 DSP

If data and CW are your main interests, the MFJ-781 shown to the right, is ideal.

£139

Kenwood TS-50 HF Mobile

Discount Price

W&S £769

Kenwood TS-950SDXT

Discount Price

W&S £2999

Kenwood's "Flag Ship" rig, as used by top DXers. Now at a great price!

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Price Match

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Yaesu FT-1000MP

Price Match

£1999

5 Year Warranty on FT-1000MPs £115

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Price Match

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* 100W of pure Magic
* 160 - 6M
* SSB - CW - AM -FM
* Spectrum display
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* Superb DSP built-in
* CW Memory keyer
* 100% duty cycle
* Keypad entry option
* DXers choice in the USA

KENWOOD HF RIGS

NEW TS-570

Price Match

£1199

Kenwoods new transceiver that is earning a reputation for offering one of the best receivers in the business. If you are looking for a hot little number that is not too expensive (Radio we mean!), send for brochure.

TOP VHF Base Station

ICOM IC-821H 2m/70cm

Price Match

£1395

* 2m/70cm All Mode
* 45/40W adjustable
* Full duplex
* Satellite features
* 160 Memories
* 9600bps capability
* Electronic keyer
* IF shift, noise blanker

Yaesu FT-736R 2m/70cm

Price Match

Special £1429

Offers even better value.

The classic 2m/70cm base station that just goes on and on - plus the options of additional band modules.

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Available in versions to match all models. Just tell us which transceiver you have.

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Superb audio quality. Can be powered from most modern rigs 8 pin mic plug or use internal battery. Full connection details inc.

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NEW

Clip onto dash grill and simply push handheld or GPS in between sprung fingers. Another great idea from Watson!

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Price Down 50%!

Dash mount for handys.

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W-420 118-530MHz 5/20/200W £69.95
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WATSON Base Antennas

Fibre Glass casing and pre-tuned. Fit and forget.

Watson - Unbeatable

Watson sell more VHF base antennas in the UK than any other manufacturer. Famous world-wide, they are sold in USA and all major European countries. Buy the best from the UK dealer you can trust for honest service and friendly advice. We recommend Watson because we know they work - rugged, long lasting and low VSWR! No other range can beat these well engineered antennas.

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W-30 2m/70cm £39.95 (3/6dB 1.15m long)
W-50 2m/70cm £54.95 (4.5/7.2dB 1.8m long)
W-300 2m/70cm £69.95 (6.5/9dB 3.1m long)

All aerials have SO-239 sockets, mounting hardware for masts up to 62cm diameter and three radials. All tuned for UK bands.

WATSON Mobile Whips

Stainless Steel Mobile Whips with hinged base. Pre-tuned.

W-285 2m whip £15.95
W-770HB 2m/70cm Whip £24.95

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A 5m long mobile cable kit using 5D-BD cable

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£14.95

Matching hatch mount with adjustable angle and thumb wheel

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Cushcraft R-7000 Vertical

R-7000
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RadCom: "Ideally suited to the small garden - an investment which lasts"

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* 7 x 49 inch radials
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A-3S

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A3WS	3 El 12 & 17m 2kW Gain 8dB F/B 25dB El. 7.66m Boom 4.27	£299
10-3CD	3 El 10m 2kW Gain 8dB F/B 30dB El. 5.38m Boom 3.05m	£189
15-3CD	3 El 15m 2Kw Gain 8dB F/B 30dB El. 7.08m Boom 4.27m	£249
20-3CD	3 El. 20m 2Kw Gain 8dB F/B 30dB El 10.96m Boom 6.1m	£369
20-4CD	4 El. 20m 2Kw Gain 10dB F/B 30dB El 11m Boom 9.75m	£499
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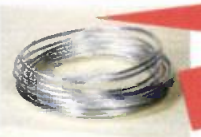

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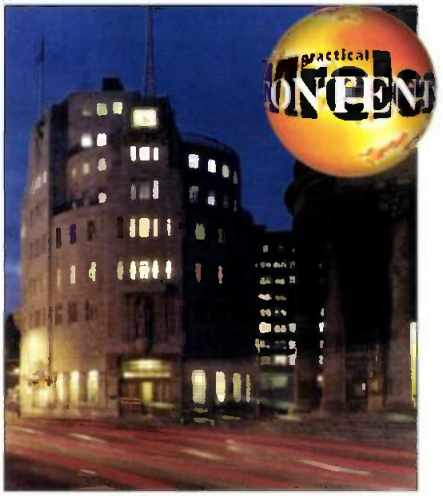

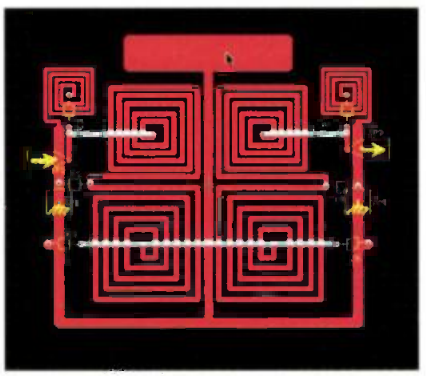

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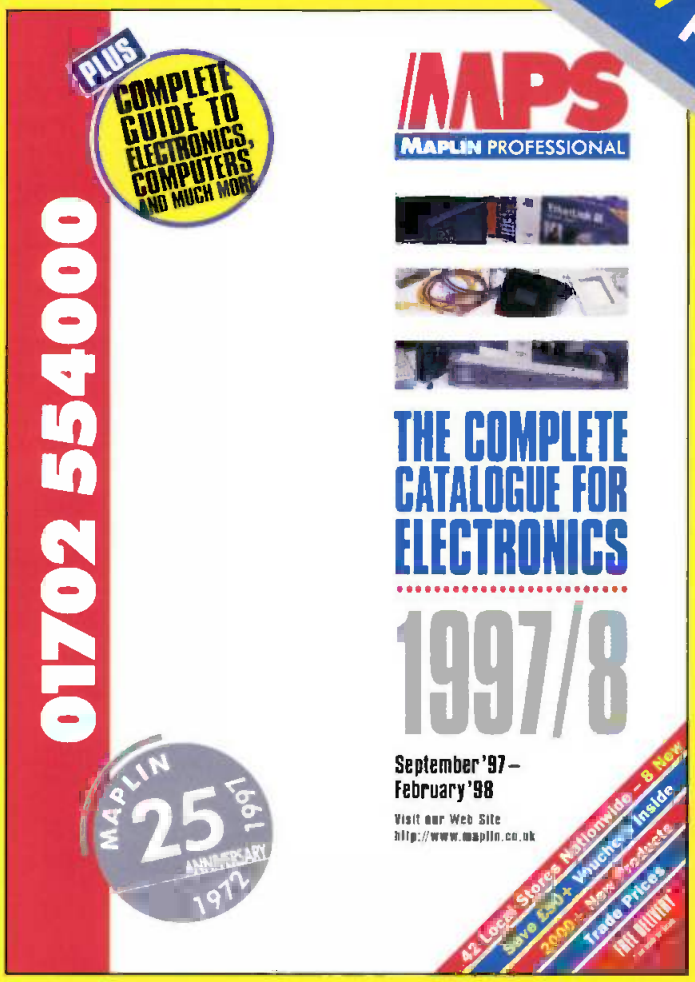

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EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio

Personally, I'm always sorry when a good specialised Amateur Radio publication closes down. However, having heard that the RSGB's excellent little '*DIY Radio*' subscription only magazine has ceased publication...I was very disappointed indeed.

The RSGB have their reasons of course - and they've told subscribers what they are (economics, not enough people subscribing) - but in reality I think the RSGB has made a long term mistake. With continued promotion and 'mentions' I feel sure that *DIY Radio* would have succeeded. And in fact my own Publishers had made an offer to assist.

Although I have no 'axe to grind' with the RSGB (I am a member!) unlike *Radio Communications* magazine where this magazine is **very rarely mentioned or acknowledged editorially** (It's an extension of the RSGB's 'Not Invented Here' syndrome I've mentioned before), *PW* frequently mentions *Radio Communications*, the Society's efforts on our behalf, and their publications.

So, we've 'done our bit' in *PW* to assist our hobby by informing our readers about RSGB books and services - **and we will continue to do so with vigour to assist everyone in the hobby**. I also hope that in the near future we'll get the chance to announce and promote the RSGB's newly-relaunched *DIY Radio*...because for our hobby to survive, it needs magazines of such calibre for the beginner, relatively inexperienced and Novice alike.

Club Spotlight Magazine Competition

As you'll see in 'Club Spotlight' both **Zoë Crabb** and I (and the other judges) are delighted at the response to the second 'Club Spotlight Club Magazine' competition sponsored by Kenwood and *PW*. This year has brought a dramatic increase in entries - 10 in 1996 and 26 for 1997!

However, we've now come across a problem because of the entries and the type of 'club' entering. I say this because this year has attracted entries from 'National' specialist clubs **who have far better resources than even the largest local club**. So, with that in mind - **and to be fair to everyone concerned** (and not wishing to discourage anyone from entering) I'm planning a special interim award this year and we're aiming to introduce a second category for 1998.

The 1998 competition will have a category for the 'National' clubs who cater for specialist interests and who in most cases produce almost professional magazines for their members. The winner of this category will receive a special award and I plan to announce what this will be as soon as we've decided what it will be!

In the meantime I plan to make a 'one-off' special 'Editor's Prize' this year to the winning 'National' or 'Specialist' club scoring the highest marks, once the judges have finished their work. This award will be made at the same time as the main 'Club Spotlight' trophy is awarded.

I hope that everyone will agree with our decision that it's only fair to introduce a second category. And I also hope that my interim decision will prove satisfactory to all concerned. **After all...both categories efforts will be fully recognised**.

Woburn Rally

For those of you who missed me at the Woburn Rally this year on Sunday 3rd August, I have to apologise for my non appearance. And (despite what some of you were told) I wasn't ill - it was just that as I had been busy visiting the **Hoover Club** (Merthyr Tydfil in Wales) and was due to visit the **South Downs ARS** in Eastbourne on the Monday...I couldn't manage to be everywhere!

I met many 'Woburn Regulars' among the 400 or people attending **Bert Newman G2FIX**'s funeral on Monday 4th August (see Obituary in 'News 1997') and they asked after my health! So, your friendly enquiries were appreciated, and I'm sorry I couldn't make it this year. I look forward to seeing some of you at Leicester instead!

'Missing' GW8 Found!

If you read my appeal for help to re-establish contact with a Welsh reader (in connection with the 'Locking The Robin To Droitwich' article) in the August issue: rest assured I've found him. He hadn't really disappeared but was busy with urgent house renovations!

Ron Harris GW8DUP has had other things on his mind lately (he says "house renovations must be the euphemism of the year" in his case!). But now things are sorted out and the builders have almost finished, his article will soon be ready.

In the forthcoming article (we'll publish it as soon as possible), Ron will explain how he overcame the problems with the 'Robin' and discuss his own modifications and up-rating on this otherwise excellent project.

One Valved Challenge

The response to my 'One Valved Challenge' in the August 'Keylines' took me by surprise. And even though I realised that many of us are still very keen on 'home-brewing' of course...the level of interest for simple valved receivers did surprise me!

I have received many enquiries on 'The Rules' (see **Graeme Wormald G3GGL's** letter in Receiving You') and basically there's only one rule: And that's there's no rules! However, to keep in the spirit of the thing, I'd be pleased if anyone having a go builds the unit themselves, and that it only uses a single valve unit (whether or not that valve is a double triode or a double diode triode or triode pentode doesn't really matter in this context).

Just build, enjoy yourselves and let other readers know how you get on! In the meantime, I'm looking for the special base for the r.f. pentode-double triode valve I've got (I joke of course!). But whatever you do with the one valve base equipped receiver - share your success with others. Whether you use the EF91, the marvellous EF50 (what a lot of 'bottle' that is!) 1.8, 3.5, 7, 10 or 14MHz is doesn't matter. Just try your hand!

We've even got one reader who is experimenting with a single valved reflexed design). Now that does bring back memories!

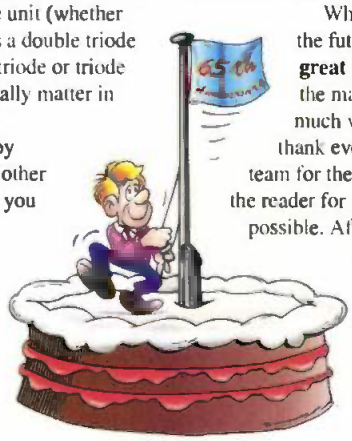
The G3XFD Top Three

My recently introduced 'G3XFD Top Three' choice for reviewed h.f. equipment is proving very popular with readers. And I really believe that readers **now believe** I mean what I say! (At least I have achieved something at last!).

So, in my attempts to bring you the best practical tried and honestly tested review, the successful new policy will continue **with equipment I review**. We know that readers appreciate the new policy because of the much increased requests for back numbers of *PW* carrying reviews mentioning any of the 'Top Three'. But please be patient as **Michael** and **Shelagh** in the Book Department are very busy preparing your requested photocopies and getting back issues off to you as quickly as possible!

Celebrating 65 Years

This issue of *PW* sees the magazine celebrating 65 years of service to the 'wireless' enthusiast and the Radio Amateur. September 1932 saw the first magazine on the bookshelves and I plan that we'll be very much with you as the new century and much vaunted new Millenium approaches.



Whatever happens in the future, it's been a **great privilege** to share the magazine I love so much with you all. So I thank everyone on the *PW* team for their support and you the reader for making it all possible. After all...readers are part of the magazine aren't they? Here's to the future!

Rob Mannion
G3XFD

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.

RECEIVING You

PW's Postbag. If your letter is published you'll win a prize.

Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and callsign along with your E-Mail hieroglyphics! **Editor**

This Month's Star Letter

One Valve Challenge

Dear Sir

I read your 'Keylines' in the August issue and the 'One Valve Challenge' caught my eye. A few days later my copy of the G-QRP Club's newsletter *Sprat* landed on the doormat and the enclosed valved transmitter-receiver feature reminded me of it. I think the author **Peter DJ0GD** has also got the message with valves!

The first question is: would a twin triode count as one valve for your Challenge? The second is: please send me a copy of your EF91 circuit and ideas.

Last November's *Radio Communications* carried an interesting feature. It was by **Bob King G3ASE** about his activities as a 'Voluntary Interceptor' in 1940 using an Eddystone 'All World Two Receiver' and a picture of its mains version, the 'Short Wave Two', as described in the *Eddystone Short Wave Manual No. 4 of 1939*. This fired my interest and earlier this year I built an SW2 with p.s.u. (also described in the manual). It worked like a dream and I entered it into the Concourse D'elegance at the Shifnal *Radiophile* Exposition in April. It won the class for Best Performance! It's quite happy on the speaker and will read c.w. down to an incredibly weak signal (about 1μV).

I haven't been a regular user of 7mc/s (see, I even use the old terminology!) since they took two thirds of it away from us in 1952 or thereabouts. But all my first year of compulsory Morse was done on '40' using 10W input to a pair of TT11s in push-pull and a dipole fed with flat twin plastic mains lead! I must admit I've got more crystals for 7 than 3.5MHz (my usual band) in my junk box, so how about it? A one valve RX, a one valve TX and a *PW* marathon! I'm game...

Graeme Wormald G3GGL
Worcestershire

Editor's comment: Congratulations on the 'Wormald's Winner' Graeme! Your success is bound to encourage others. (For further information and comments on the 'One Valve Challenge' please see the Editor's 'Keylines').

Wormald's Winner!

A Hobby For Life

Dear Sir

I was fascinated to read the article 'Amateur Radio - A Hobby For Life' by **Steve Appleyard G3PND**. My experiences are very similar to those of G3PND. I too went to school in Grimsby and was an s.w.l. member of the **Grimsby Amateur Radio Club**. I think I was probably three to five years ahead of G3PND in the education system, and finished in the sixth form in 1960. I don't recall knowing Steve.

I too received my licence in 1961, and operated initially with an R107 (followed by a BC348) and Panda Cub. I too had a break of many years from amateur radio, being QRT from 1967 to 1985. When I became QRV again in 1985, I found many changes, both operationally and technologically.

Of Steve's friends that were mentioned in the article, I know **Peter Chadwick G3RZP** extremely well, after leaving Grimsby in 1960, I moved to North Nottinghamshire, where Peter and I were both members of the **North Nottinghamshire Amateur Radio Club** and Peter's father **G8ON** (sadly now a silent key) was very much an 'Elmer' to me. I'm still in touch with Peter from time-to-time and we are both members of The **Chiltern DX Club** as is **Dave Mason G3RXP**, another of Steve's friends mentioned in the article.

Amateur Radio certainly helped shape my career and was entirely responsible for me taking an Electronics Engineering degree, making a career in the electronics industry. I fully agree with Steve's closing paragraph that Amateur Radio is unique, providing both career opportunities and numerous leisure time technical and operational challenges. Also, of course, it's a wonderful way to meet people and form long term friendships on an international basis.

Thank you again for such an intriguing article.

Alan Jubb G3PMR
Bedfordshire

Editor's comment: Steve G3PND's article was fascinating wasn't it Alan and it certainly drew much comment from readers. Looking back at the 1963 article of G3PND's (Which actually sparked off the idea of the recent article) I think the Editorial staff of *PW* at the time either did not know he was so young or overlooked the fact! Incidentally, the G3PND 'Four Valve Transmitter For 3.5 & 7MHz' (using an EF91, EF80, 6L6 and 807) became a popular design and I've worked many stations (recently) still using them, particularly in the so called 'Third World' countries because

Dismayed Of Zambia

Dear Sir

I was dismayed to read another letter in the August issue regarding the December 1996 RAE and how difficult it was. I too sat the exam.

Living in Zambia, my resources are very limited to say the least. I only had one source of information - *How To Pass The RAE* (RSGB) supplied by my friend **G3ARU**. I simply read it before the exam.

After sitting the exam, I then had to wait for three months for the results to be returned. I was successful. The exam was neither difficult nor easy, it was simply an exam. Those who failed, did so because they gave the wrong answers.

To pass, one just needs to know their subject and answer the questions correctly (at least the minimum percentage). Please can the valuable 'Receiving You' pages be used for more relevant comments?

Jeremy Thomas 9J2JT
Zambia

it can use many different combinations of valves. (If readers are interested, I would be prepared to republish the project).

My Experiences - 51 Years Ago

Dear Sir
I wonder if some would-be amateur who seem to be 'crying into their beer' about the difficulties they face trying to get on the air, may be interested in a brief account of my experience?

I received my licence in 1946 following my demobilisation from the RAF after five years as an HF/DF Radio Operator. The place where we lived had no electricity and only a short back yard in which to erect an antenna (about eight metres long).

I made a simple Crystal Oscillator Power Amplifier (C)-PA) battery operated transmitter (described in the June 1948 issue of *Short Wave Magazine*) and together with a simple 1-V-1 battery receiver started my Amateur Radio activities.

I well remember my first 'CQ' - with the gear still under construction, and laid out on the kitchen table. I didn't expect any reply, so didn't have anything with which to write details of any call. I sent out my c.w. CQ at 1900 hours on the 12 November 1946, and was almost scared when **G3ACC** came back with a 579 report. Many old timers will remember with affection **Margaret Mills** G3ACC (now a Silent Key) and I still have her QSL card.

I remember too, the thrill of my first QSO with **G3SZ** on February 22 1947 using my battery transmitter. Arthur was in charge of the HF/DF Station at Watton to which I was sent in 1941 and it was he who whetted my appetite for Amateur Radio. We have recently established contact again through our membership of the **World Association of Christian Radio Amateurs And Listeners** (WACRAL).

So, I say to those who are hesitant because of lack of money to buy the sophisticated 'black boxes', etc., or who have other problems to 'have a go'! Simple and inexpensive equipment will still get you going and you will find fellow amateurs are almost always willing to advise and lend a hand. And I wish you good luck.
Cyril W. Finch G3AHO
Bedfordshire

USA Licence Classes

Dear Sir
I really enjoy my subscription to *Practical Wireless*. It's interesting to get the point of view from across the ocean. However, in your August issue ('Ham Radio Ticket - USA Style') in the side panel on page 45, a slight error was made about licence classes in the US.

We actually have **six licence classes**, Novice (5w.p.m.), Technician (no-code/no h.f. privileges), Technician + (5w.p.m.), General (13w.p.m.), Advanced (13w.p.m.) and Extra Class (20w.p.m.). In addition to the extra privileges on the bands that are earned by upgrades, only Extra Class operators can have 1×2 and 2×1 callsign formats and only Extra Class callsigns can begin with the letter A.

Advanced Class operators can have 2×2 format callsigns (beginning with K, N or W). Of course, you may keep your old callsign when you upgrade, that is your choice.

PW is a fine quality magazine and I look forward to getting it. Thanks for a job well done!
Bruce A. Taylor AEOT
Missouri
USA

Editor's comment: Sorry...OUR mistake Bruce (trying to be extra helpful). Thanks for the comments and for writing and the *PW* team are always delighted to hear from our International friends!

Amateur Radio Expensive?

Dear Sir
Some people say that amateur radio is an expensive hobby. The letter from **G4YVM** ('Receiving You', August issue, page 9) suggested buying "the more basic radios" in order to reduce the cost of the hobby. I agree with G4YVM's suggestions, but I also have an alternative solution, I buy second-hand whenever possible (pre-QSOd equipment, perhaps?).

I also upgrade as rarely as possible, like G4YVM, I am happy to use equipment that is not state-of-the-art so long as it meets my needs. My current h.f. station is an elderly Yaesu FT-757GX (bought new and it will be replaced only when it becomes unrepairable) coupled to a second-hand FT-757AT a.t.u.

The v.h.f./u.h.f. station consists of Yaesu FTX90 radios, all bought second-hand and all in good working order. Personally, I like buying second-hand because I get the equipment which I want...at reasonable prices.

I have been involved in Amateur Radio long enough to remember the time when radios such as those I now own were state-of-the-art and were very popular with amateurs at that time. I am happy to own and use them even though their day, at the forefront of Amateur Radio design, has now passed.
Ian Brothwell G4EAN
Nottingham

Ken Evan's Mystery Object

Dear Sir
In the August issue 'News' section, **Ken Evans** asks for information on the RadioVet type 211 'radio' given to him. Rather than a direct contact with Ken, the answer may be of interest to other readers as this and similar instruments may occasionally be spotted at radio rallies.

Firstly, the unit is **not a radio**, but a combination test instrument introduced in the mid 1950s by Airmec as the answer to every technician's prayer for a compact instrument to replace the mass of often ex-Second World War test equipment on their workbench.

The RadioVet 211 contains a c.w., a.m. and f.m. signal generator covering 0-15 and 85-100MHz (Mc/s of course in those days), crystal calibrator, wobbulator, oscilloscope, audio oscillator and a.c./d.c. voltmeter. Unfortunately, its price (around £70 I believe) represented several weeks' wages in those days and put it beyond the pocket of most Radio Amateurs. A similar model, the TeleVet 877 was for TV maintenance and additionally contained a 405 line pattern generator and an extra high tension (EHT) voltmeter.

The instruments use mains driven valve circuitry, but as far as I remember, the valve types are still available while the 2.5in cathode ray tube (CRT) was possibly a VCR139 or similar which may still be found in the junkbox. Some of the old capacitors and/or resistors may need changing - as in a lot of old valve equipment - but it's still a useful instrument if repaired. Beware though, of the 1000V or so EHT supply!
N. L. Smith
Staffs

Editor's reply: Thanks Mr Smith, the 'RadioVet' sounds as if it could still be a boon on the test bench. A fascinating story and I wonder just how many other unusual items of test equipment there are floating about at rallies and 'junk sales'? (Someone even advertised a Dental X-ray machine vin 'Bargain Basement' recently!).

It's A Small World!

Dear Sir
We all realise that with the event of radio the world has become a much smaller place, this is of course due to the modern methods of transport and to the great advantages in radio techniques, but now I am digressing from the purpose of this letter.

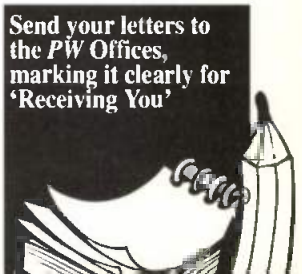
I'm reading the current issue of *PW* (August) and in 'Receiving You', there appears a letter from **Frank Meredith VE6CB** (ex GW3NAM). When I read this I thought 'that callsign rings a bell'. I dug out my early logbook and on the first page, two days after receiving my licence, there was the entry:- 19.08.60 @ 2105hrs on Top Band (1.880 Mc/s 59 both ways). Frank, in those days, lived in Barry in South Wales, and we had many QSOs after that, until he emigrated to Canada.

I have, on the strength of your article, written to Frank in Calgary hoping that he might remember those early days prior to the import of the little black boxes when a trip to Lisle Street was a necessity if you wanted a bit of government surplus radio equipment (at a sensible price, Hi)

Thank you once again *Practical Wireless*. It's a pity the price is not as good as it was in 1960, remember?
John Taylor G3OHV
E. Sussex

Editor's reply: Well, they say all good things increase in value as the years go by John! The *PW* team are pleased you've found your old friend but I warn you...take care if you venture down Lisle Street nowadays. The radio shops have been replaced by a rather different type of establishment!

Send your letters to the *PW* Offices, marking it clearly for 'Receiving You'



NEWS 1997

Compiled by Donna Vincent G7TZB

Silent Bells - Bert Newman G2FIX

'Silent Bells' rather than 'Silent Key' seems far more appropriate a fashion to acknowledge the passing of internationally well-known Radio Amateur and Bellringer **Bert Newman G2FIX** who died on 24th July aged 79. Bert was a Campanologist (Bellringer) and Radio Amateur 'extraordinaire'.

To say Bert Newman G2FIX had many friends was an understatement. He was greatly respected by everyone whether it be in Amateur Radio itself, the Salisbury Club, Bellringing, helping and supporting the RAIBC, Talking Books for the Blind, Animal Sanctuaries, Scouting or Ballroom Dancing (he was a Gold Award winning dancer). And when acting as 'controller' of the Royal Airforce Amateur Radio Society Net on '80' metres his soft Wiltshire accent and gentle manner endeared him to many more.

Born and brought up in beautiful south Wiltshire, and following his service as an RAF radio specialist in the Second World War, Bert ran his own Radio & TV (TV came later of course!) repair business. Needless to say his customers also became friends!'

I had known Bert for approaching 45 years and the last time I saw him (and my last chance to jokingly polish his bald plate - a joke we both enjoyed) was at the Longleat rally. Bert came to the *PW* stand in June to chat and to say he was looking forward to the Flight Refuelling (Wimborne) rally. Sadly it wasn't to be.

A measure of the respect for Bert G2FIX was clearly demonstrated on the day of his funeral. The very large, beautiful 'Italianate' style (appropriately enough with a silent bell tower awaiting restoration) Wilton Parish Church was packed for the service on Monday 4th of August. I stopped counting at 350 mourners in the church but reliable sources later told me the figure was over 450. Such a man was Bert Newman G2FIX, and although unmarried he had an extended 'family' of friends. We'll cherish his memory and the photographs of the ever-smiling face and the legacy he's left us....whether it be on the bands or 'on the bells'.

Our sincere wishes go to Bert's sister **Hilda**, her family and of course Bert's nieces and nephews.

Rob Mannion G3XFD

Open All Hours!

Jaycee Electronics of **20 Woodside Way, Glenrothes, Fife, Tel: (01592) 756962** are now open **seven** days a week! Their revised opening hours are Monday to Friday from 9am to 5pm, Saturdays 9am to 4pm and Sundays 12pm to 4pm. Jaycee can supply a variety of new and second-hand equipment and are approved Kenwood, Yaesu and Icom dealers.

Dial Haydon

If you have a telephone with an alpha numeric keypad (letters under the numbers) you can now call **Haydon Communications** simply by dialling **07000 HAYDON** (the letters correspond to the numbers 429366). It's that simple!

So, go on call Mike Haydon and his team today! You never know you might discover that bargain you've been looking for.

Microset Catalogue

Waters & Stanton Electronics can supply, free of charge, the new product catalogue from the Italian Manufacturer **Microset Electronics**. This A5 size catalogue contains the full Microset range of power supplies and linear amplifiers. To get your copy call **(01702) 206835** or write to **22 Main Road, Hockley, Essex SS5 4QS.**

New Look Kits

Maplin Electronics has recently re-designed the packaging for their range of electronic project kits and modules. The new design is intended to reflect the quality and diversity of the projects and make them more 'eye-catching' and easier to spot on the Maplin shelves.

Rob Ball, Maplin's product group Manager, commented that the packaging had been made more colourful and informative in a bid to explain that the project range can open up a whole new world for the electronics enthusiast. The current best sellers in the Maplin projects range are those associated with home automation, computing and communications.

So, next time you're visiting one of the 40 Maplin stores throughout the country keep an eye out for those re-designed project packages!

Reciprocal Licences

The **Radiocommunications Agency** (RA) have informed the 'Newsdesk' that reciprocal licensing arrangements have been made with the following:

Japanese Class 1	UK Class A
Japanese Class 2	UK Class A
Namibian General	UK Class A
USA Technician Class	UK Class B

The UK will issue reciprocal Licences for up to 6 months where the applicant cannot supply a contact address or a full UK licence and callsign where permanent residence in the UK is established or where the applicant is a frequent visitor to the UK. The same conditions will apply of course to visitors on holiday to these countries.

For more information please contact the RA on **0171-215 2171** or via their new E-mail address: **AMACB@ra.gtnet.gov.uk**

RAE Courses

Here are some more RAE course details. If you wish to enrol on any of the following you'd better be quick!

An **RAE** course will be held at **Strood Adult Education Centre** on **Tuesday** evenings. The course, run by **Ray Petri G0OAT**, will commence late **September** and no previous knowledge of the RAE is required. More details can be obtained from **Medway ARC** on **(01634) 845359** or Ray Petri on **(01474) 812682**.

The **Glenrothes and District ARC** are running an **RAE** course on **Monday** evenings from **7 - 9pm** begining in late September. They will also be running a Morse course on Tuesday evenings during the same times. Both courses will be held at **Balwearie High School** in **Kirkcaldy**. Contact **Ken Horne GM3YBQ** on **(01592) 265789** (evenings) or **Evelyn Hamilton** on **(01592) 640335.**

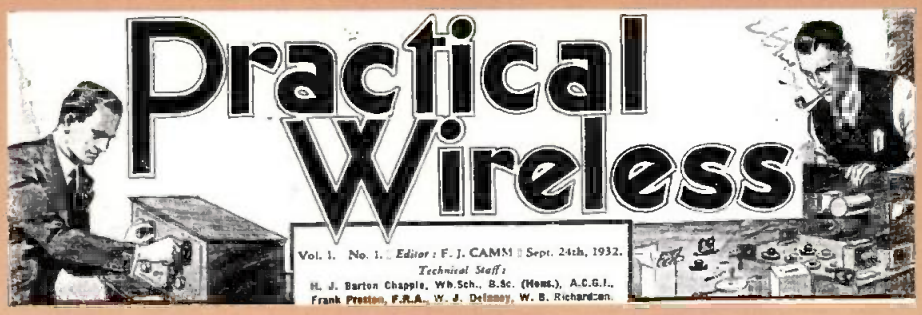
Enrolment is taking place now for candidates interested in the **RAE** course which is running at **Avondale School, Stockport, Cheshire** on **Tuesdays** at **7pm.** More information is available from the course tutor **Eric Chantler G0ORD** on **0161-427 1027** or the class administrator on **0161-477 2382.**

The **North Cheshire Radio Club** are running both **RAE** and **NRAE** courses starting late **September** on Sunday evenings. The courses will take place at the **Morley Club, Morley Green, Wilmslow, Cheshire** and candidates can join the course until the end of November. Further details can be obtained from **Gordon Adams G3LEQ** on **(01565) 652652** or **FAX: (01565) 634560.**

Warrington Collegiate Institute are running an **RAE** course starting late **September** on Thursday evenings at **North Campus, Winwick Road, Warrington, Cheshire**. Candidates can join the course until the end of November. Further details can be obtained from **Gordon Adams G3LEQ** on **(01565) 652652** or **FAX: (01565) 634560.**

PLEASE SEND YOUR NEWS TO DONNA VINCENT G7TZB AT THE EDITORIAL ADDRESS

1932



1997

Round The World of Wireless

As this issue marks the 65th Anniversary of the first issue of *Practical Wireless* (published on 24th September 1932) we are taking a nostalgic step back-in-time with a selection of news and extracts (reproduced as they first appeared) from those very first issues. The team hope you enjoy reading them and that it helps to show just how much our hobby has progressed in its 65 years.

Introducing Ourselves

PRACTICAL WIRELESS makes its debut in the confident belief that it will receive a hearty welcome from the large and ever-growing circle of wireless enthusiasts, more particularly those interested in home construction and the experimental side of wireless. Although in the brief space of a very few years the knowledge of this fascinating new world of the ether has grown to large proportions, we are still little more than on the threshold of the intriguing possibilities the future holds forth. Rapid as the advances have been, the near future will bring forth new discoveries, new ideas and new techniques just as certain as day follows night and every wireless enthusiast, if he is to derive full pleasure and interest from his hobby will require as an absolute necessity that his knowledge be kept right up to date.

24th September 1932

A Real Portable

This portable radio set is an important part of the back pack of this member of the United States Forest Service. It is used in quick reporting and communication during fire emergencies in national forests. The two types of portable sets weigh 10 and 35 pounds and have average radii of 10 and 50 miles respectively.

8th October 1932

Checking Radio Piracy in Canada

THE Canadian authorities are taking stern measures to deal with radio pirates. No dealer is permitted to effect the sale of a wireless receiver to any customer unless the latter can prove his possession of a licence for the current year. The penalty for using a radio set without authority is a fine of fifty dollars or, at the discretion of the judge, three months imprisonment.

5th November 1932

Ladies Only!

CONTARY to the principle adopted by other Continental countries, with the exception of one male official at Milan, the Italian broadcasting studios only employ women announcers. With the opening of Bari, they now number a round dozen.

24th September 1932

Sky Police Control The Waves

THERE is an official laboratory in Berlin on the roof of the Reichspost-Zentralamt at Tempelhof, where officials carefully watch to ensure that radio transmitters all over the world transmit on the wavelength as stipulated for them at international conferences.

26th November 1932

Radio Luxembourg

THE official opening of the Radio Luxembourg station has been delayed, owing to complaints received by the authorities from official aerodromes in respect to the interference caused to the services by adoption of a 1,200 metre wavelength. In the meantime the station is testing on 1,275 metres daily between 12.30 and 1.30pm.

26th November 1932

A Short-Wave Manual

ALL short-wave enthusiasts will be interested in a Short Wave Manual which has just been published by Messrs. Strattton and Co., makers of Eddystone short-wave components. This manual which is priced at 1s 6d, gives full and illustrated constructional details of a range of S-W wireless receivers, adaptors and wavemeters. Each description is accompanied by a clear wiring plan draw to scale, and the exact cost of the various instruments is stated in all cases. In addition to the constructional articles there are others on "Logging Short-Wave Stations", "Trouble Locating", "The Short-Wave Variable Condenser", etc. On the last three pages are given the circuits of two S.-W transmitters and a list of short-wave stations accompanied by details of their working schedules. Altogether a refreshingly interesting publication. If you want a copy of this manual the address of Messrs. Stratton and Co. is Eddystone Works, Bromsgrove Street, Brimingham.

15th October 1932

A Note For DX Fans

BROADCASTS from WKAQ, San Juan, the new 1KW transmitter operated by the Radio Corporation of Porto Rico have been heard on several occasions during the past fortnight. The station works on the 241.8 metres (1,240 kilocycles), and its concerts are tuned in between midnight and 2am GMT. The station is already on the air at 6pm GMT.

31st December 1932

Break-Through

IF you are troubled by nearby medium wave stations breaking through when receiving Daventry and Radio Paris, you should insert an Aniti-Break-through Choke in series with the aerial lead. It must be remembered that the choke must be short-circuited when medium-wave reception is required; a simple push-pull switch can be employed for this purpose. Incidentally, a suitable choke is made by Messrs. Lissen and costs only 4s.

19th November 1932

A New Idea In Radiogram Cabinets

A cleverly designed Radio-Gram cabinet is shown above, in the open and closed positions. The cabinet is of ordinary small table type, and the the top portion houses a turntable and pick-up. This lets down after the manner of a flap, permitting the gramophone to be used. The receiver is mains operated and fitted with a Magnavox moving coil loud-speaker.

24th September 1932

What is said to be one of the largest wireless frame aerials in Europe is situated on the roof of the Bush House, Aldwych, W.C. It was erected by the United States Shipping Board to conduct the business between London and the United States. It is 8ft by 6ft and is wound with fourty-eight turns of aerial wire. Mounted on ball bearings, it can be made directional from the interior of Bush House by a wheel similar to the steering-wheel of a motor-car. Messages can be received from places 8,000 miles distant.

22nd October 1932

RADIO Diary

Compiled by Zoë Crabb

1997

If you wish to have your Rally featured in Radio Diary, all you have to do is to put together as much information about the Rally as possible, ie. date, location, time, who to contact, etc., and send it to Zoë Crabb at the *PW* Editorial Office.

September 13: The Hastings Computer Fair will be held at the White Rock Theatre (opposite the pier). The event is open from 1000 to 1600. Admission is £2 for adults, £1 OAPs and under 16s. **Steve Bealch** on **(01342) 842966.**

September 13: The Reddish Rally is to be held at St Mary's Parish Hall, Reddish Road, Stockport, Cheshire. Doors open at 1000, and there is parking. Talk-in on S22. Further details on **0161-477 6702.**

September 14: The Bury Radio Society's Annual Rally will take place at the Castle Armoury, Castle St., Bury, Lancashire. This is close to the M66/M62 motorway network and is near to the town centre Metrolink and bus stations. Morse tests will be held on the day. Doors open at 1030 (1000 for disabled visitors). Admission is £1 at the door. Talk-in on S22. **0161-761 5083.**

September 14: The BARTG will be holding their rally at Sandown Park Racecourse, Esher, Surrey. BARTG '97 will follow the proven and popular format of previous BARTG rallies, however, there is one major difference - this is DataStream '97 - a series of lectures covering various aspects of data comms in amateur radio. General enquiries from **Ian Brothwell G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ. Tel: 0115-926 2360.**

September 20: The Worthing Computer Fair will be held at the Assembly Hall, Stoke Abbott Road, in the centre of Worthing. All manner of computer bargains for sale by a wide range of exhibitors. Doors open 1000 to 1600. Admission is £2 for adults, £1 for OAPs and under 16s. **Steve Bealch** on **(01342) 842966.**

***September 21:** This year's Scottish Amateur Radio Convention (SARCON) takes place at the Royal Highland Exhibition Hall, Ingliston, Edinburgh. The rally is full supported by the RSGB, and there will be a large Bring & Buy, large trade presence, full lecure programme, Morse test on demands and lots more. Admission is £3 for adults, £2 for disabled visitors and OAPs and children under 14 go free. Doors open 1030 to 1700. **Tom Menzies GM1GEQ** on **0131-445 3928** or FAX on **0131-229 3111.**

September 21: The Peterborough Radio & Electronics Society East of England Rally will be held at the Peterborough Showground; easy access from A1, A605, A47. There will be trade stands, radio car boot plus other local attractions, acres of free parking, catering and bar, etc. Doors open 1030 (1000 for disabled visitors). Admission £1.50. Talk-in on S22 via G3DQW. For booking details contact **Ted G0REM** on **(01733) 766471,** QTHR, **tmelnyczuk@compuserve.com** or for rally enquiries contact **Vince G8NGZ** on **(01733) 331211,** QTHR, **G8NGZ@compuserve.com**

September 21: The Central Lancaster Radio Rally will be held at the Central Lancaster High School, Crag Road, Lancaster. The show will be signposted from J34 M6 motoroway (five minutes). Doors open 1030 and admission is £1. There will be three halls a Bring & Buy, refreshments, plus all the usual traders. **Sue Griffin** on **(01524) 64239.**

September 21: The Kidderminster Radio & Electronics Fair is to be held at the Kidderminster College, Hoo Road, Kidderminster, Worcestershire. Doors open at 1000 until 1500 and admission is £1.50. There will be the usual traders along with a Bring & Buy, Flea Market, food and drinks and talk-in on S22. **John G8MGK** on **(01527) 545823** or mobile on **(0860) 147954** or alternatively contact **Tony G4ALT** on **(01562) 69652** or mobile on **(0860) 902165.**

September 27: The Crawley Computer Fair, this time in Crawley Leisure Centre, Haslett Avenue, Crawley, West Sussex. There will be a large range of new and used computer equipment on offer at bargain prices. Doors open 1000 to 1600. Admission is £2 for adults, £1 for OAPs and under 16s. **Steve Bealch** on **(01342) 842966.**

September 28: The Eastbourne Computer Fair is to be held at the Cavendish School Sports Centre, Eldon Road. Doors open 1000 to 1400. Admission is £2 for adults, £1 for OAPs and under 16s. **Steve Bealch** on **(01342) 842966.**

September 28: The Harlow and District Amateur Radio Club Rally is to be held at the Sports Centre, Harlow, in Essex. Doors open at 1030 (1000 for disabled visitors). Talk-in by G6UT on S22 and SU22. The large ground floor main hall will feature a selection of traders, both old and new with products ranging from complete radio/computer systems through software, electronic components and second-hand equipment. There will also be a special interest area and a large club room, Bring & Buy stall. Morse tests on demand will be available (two passport photos required). Refreshments will also be available. All car parking is free, plus there is disabled parking near the entrance. **Len G7UFF** on **(01279) 832700** or the Rally Manager **Mike G7BNF** on **(01279) 865092.**

October 5: The Blackwood & District Amateur Radio, Computer & Electronics Rally is to be held at the Community College, Oakdale, near Blackwood, Gwent, South Wales. Doors open at 1000. There will be traders, a Bring & Buy sale and a talk-in on S22. **Norman GW0MAW** on **(01495) 227550.**

***October 5:** The 21st Annual Lumley Rally will be held at the Community Centre, Great Lumley, Co. Durham. Doors open at 1100, (1030 for disabled visitors). There will be a good mix of traders inc. PW & SWM, Bring & Buy and refreshments available. Talk in on S22, SU22. **Paul Moss** on **0191-5121360** or E-mail: **paul.moss1@virgin.net** or check the website at **http://freespace.virgin.net/paul.moss1/**

October 12: Computercations 97 Computer/Radio Rally is to be held at Hillhear Camping, Kingswear Road, Hillhead, Brixham, Devon. There is overnight camping, trade stands, car boot sale, Bring & Buy, refreshments, unlimited free parking, talk-in on S22 by G7FDC, Special Events Station GB2CPU. **Bill G6ZRM** on **(01803) 522216,** E-mail: **106445.2574@compuserve.com**

**Practical Wireless & SWM* in attendance

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

The Editorial staff of *PW* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. Editor

Zener Diode?

This time Ian Poole G3YWX sets about answering the question What Is A ... Zener Diode.

Zener diodes are widely used in today's electronic equipment. Without them, power supply designs would be totally different, requiring another means of generating a stable reference voltage. These diodes are now very cheap and widely available, making them ideal for use in a host of circuits.

Diode Characteristics

Zener or voltage reference diodes have a characteristic like that shown in **Fig. 1**. It can be seen that they conduct like a normal diode in the forward direction.

However, in the reverse direction diodes do not conduct any current until a certain voltage is reached. At this point the diode 'breaks down' and current is carried.

From the curve in Fig. 1 it can be seen that virtually the same voltage is present across the diode regardless of the amount of current flowing, giving a known stable voltage. It also means that when designing the circuit a series resistor must be placed in the circuit to limit the current as shown in **Fig. 2**.

Although voltage reference diodes are usually called Zener diodes, there are two processes which can give the same effect. The first is called 'Zener breakdown', and the second is 'impact ionisation'.

The Zener effect is the predominant one above about 5.5V whereas impact ionisation is the major effect below this value.The two

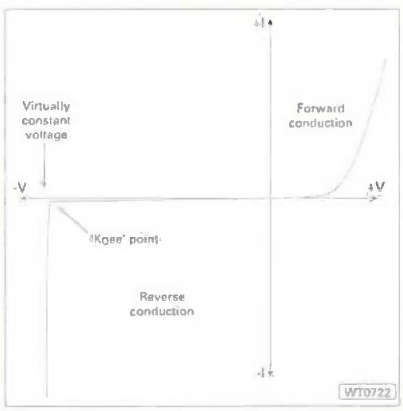


Fig. 1: Characteristics of a Zener or 'reference' diode.

effects operate in totally different ways.

Impact ionisation occurs when a high electric field is present in a semiconductor. This causes the electrons to be attracted strongly towards the positive voltage, and in view of the field strength their velocity increases rapidly.

When a high energy electron collides with the lattice of the semiconductor it can cause an existing atom to generate an electron hole pair. The electron and hole then migrate in opposite directions because of the field, and the electron may generate further electron hole pairs as the result of another collision.

If the field is sufficiently strong the number of collisions means that a large number of new hole electron pairs are generated and what is called 'avalanche' break down occurs. This happens only when a specific field is exceeded, i.e. when a certain reverse voltage is exceeded for that diode, making it conduct in the reverse direction for a given voltage. This is what is required for a voltage reference diode.

The Zener effect operates in a different way to impact ionisation. Normally electrons are contained within atoms in the crystal lattice. In this state they are in what is called the 'valence band'.

If a large electric field is placed across the semiconductor this may be sufficient to pull the electrons out of the atom into what is called the 'conduction band'. When they are free from the atom they are able to conduct electricity, hence the name conduction band.

However, for the electrons to pass from the valence band into the conduction band there must be a certain force to pull them free. It's found that once a certain level of electric field is present a large number of electrons are pulled free allowing current to suddenly start to flow once a certain reverse voltage is reached.

Voltage Reference

Voltage reference diodes are widely used in electronic circuits. Although seldom used in the basic circuit as shown in Fig. 2, this configuration is used as part of a larger circuit to ensure the current to the diode remains almost constant and the best stability is maintained.

Temperature variations must also be

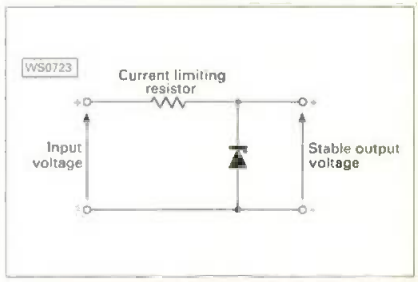


Fig. 2: A basic circuit for use with a Zener or reference diode.

borne in mind if a constant voltage is required. Like many other components, and particularly semiconductors the parameters change with temperature.

However, it's found that diodes with a voltage of about 5.5V are most stable. The reason for this is that the temperature coefficients for the two breakdown methods are opposite to one another. At a voltage of around 5.5V, the coefficients tend to balance one another out, giving the optimum temperature stability.

When designing a circuit, sufficient current needs to be allowed to flow through the diode. For the standard 400mW types currents of a few milliamps are best.

If too little current is allowed to flow, the diode will not stabilise properly and an incorrect voltage may result. This has been the cause of many design engineers scratching their heads because the wrong voltage came out of otherwise correctly built circuits!

Easy To Use

Zener diodes (or more correctly reference diodes) are cheap and very easy to use. They come in a variety of sizes.

The most common types are capable of dissipating 400mW. However, much larger versions are available which can dissipate powers of several watts.

Reference diodes are normally used for more specialised applications, often in protection circuits. However, for the average home constructor a selection of the 400mW versions can be a great advantage in the same way that a good selection of resistors and capacitors can be. **PW**

Next Time

I'll be looking at the varactor diode.

Zoë says:
"keep the News and those Club magazines coming!"

CLUB Spotlight

Compiled by Zoë Crabb

Rob and myself would like to say a BIG thank you to those local clubs, and some national clubs, who sent in their entries for the Club Spotlight Club Magazine Competition. We received a total of 26 in all, 16 more entries than last year - what an improvement! The entries are currently being judged, so watch this space to see who the winner will be this year!

GB2MIL Millennium

Run by members of the **Tenby ARC** and the **Cleddeu ARS**, **GB2MIL Millennium (Pembrokeshire 2000)** will be operating from 1 April 1997 and will run up to the year 2001. Each operating member will hold the callsign for 28 days and is limited to 100 contacts per month up to the year 1999, when the limit will be lifted.

A special QSL card has been designed and there is also a certificate available to help raise money to fund the 50MHz repeater GB3AE and the TCP/IP BBS GB7RQT. Any money left over will be used to purchase equipment to help with the Novice RAE.

The certificates cost £3, or 10 IRCs or $5 US Dollars and is available from **John Rees GW0JRF, Caerleon, Picton Road, Tenby, Pembs SA70 7DP**. You must return the QSL card as proof as contact, which will then be returned with the certificate. All cheques should be payable to GB2MIL.

Police Radio

The **West Yorkshire Police Amateur Radio Club** was formed in 1980/81 when **Mr M. Fox G8EWH**, who was then an officer with the Post Office Radio Investigation Service, suggested to a Radio Amateur friend **G4IEJ**, who was also a serving Police Officer in West Yorkshire, that the callsign **G8WYP** was due to be issued shortly and suggested that it might be a good idea for the West Yorkshire Police to start a radio club.

After some consideration, the club was eventually started and its first Chairman was **Brian Midgley G4MNW**, a Superintendent in the Force. The first shack was set-up in the Training School at Bishopgarth, Wakefield, where it still is, but not in the same room.

The room was changed in the late 1980s, when the force wanted a larger room and shack, but to the club's advantage an offer was made that could not be refused. This offer was to completly re-wire and fit cupboards, which would be done at no expense to the club.

The callsigns **G3WYP** and **G4WYP** were later added to the G8. However, the club was then informed that it was not allowed to hold more than two callsigns, so one of the club members took on the G4WYP, as he had just been successful in his Morse test.

It is believed that the club was the first official Radio Club, which was part of any Police Force in the UK and members were very active in participating in the International Police Association Radio Club (IPARC), of which there are 1600 members world-wide, contest. Over the years, membership has ebbed and flowed, but the club has continued to exist.

In 1994, **Ron Grove GU4XGG**, the President of the IPARC, suggested that it might be a good idea to have a UK award similar to those already in existence in other countries throughout the world. It was at this time that the club in West Yorkshire lost a dear friend, Brian Midgley G4MNW, who became a silent key after a long illness.

Brian had retired from the force after reaching the rank of Chief Superintendent. The club members discussed the possibility of sponsoring an award in Brian's name and after receiving permission from his widow, the proposal was put to GBIPA RC, who accepted the offer.

The award would be available to any Radio Amateur who had made contact with 10 IPARC members or any short wave listener who had heard 10 IPARC members after 1 January 1995. This award has been very popular and many applications were received for it.

In 1996, it was agreed that a further award would be offered. But this time applicants had to make contact/hear IPARC members from 10 countries.

The cost of each of the awards is £2.50 or the equivalent in IRCs. Any surplus monies received for the award are donated to GBIPA RC and none is retained by the West Yorkshire Police or its Amateur Radio Club. The only deductions made are for the cost of postage that the club bears for the cost of the certificates.

All the certifications are individually numbered and are designed by the Force Graphic artist **Bob Foster**. After the awards first started, members approached the Chief Constable **Keith Hellawell**, who had been a friend of Brian's for many years, to ask if he would be willing to have his signature (a computer facsimile is used) on the certificates instead of G0RZP's, the Awards Manager, and he agreed to this request.

As far as can be ascertained, the award is the only one currently available that is sponsored by an individual Police Force Radio Club in the world.

Back on the 25th February 1997, Chief Constable Keith Hellawell attended at Dewsbury, West Yorkshire, Police Station

where a number of the club members and friends of Brian's gathered together to witness the presentation of a Trophy inscribed 'The B. Midgley Memorial Trophy' to the club by Brian's widow Kathleen.

The Trophy was accepted by Mr Hellawell on the club's behalf. The Trophy, which will never be presented to any individual but will be kept at the club shack, (certificates will only be presented), is insured for £3000!

A radio station was set-up at the presentation and it had been hoped to get the IPARC Net on 80m (3.5MHz) when Mr Hellawell was hoping to give greetings messages under the club callsign, but, unfortunately, conditions were very poor and whilst stations like **ON4IPA** and **G3PGA** could be heard at Dewsbury, they could not hear the Dewsbury station.

However, all was not lost. A Packet station had been set-up and many stations had sent greetings messages to G3WYP, including one from **Bill Spriggs G3PFE**, who was in fact the latest applicant for the awards and his certificates were on display for the visitors to see. Best of all, Mr Hellawell personally signed one for Bill, which, so far, is the only personally signed certificate!

Bill explained in his message that he had been a serving officer in the Lincolnshire Police and had attended a driving course at the West Riding Constabulary driving school at Wakefield in 1955. The force has had many names throughout the years, but was originally the West Riding Constabulary.

(L to R) Chief Constable Keith Hellawell, PC Derek Allan G0RZP and Mrs Kathleen Midgley.

Swindon's AGM

Swindon & District Amateur Radio Club's AGM held back in June acted as the springboard for the new year's activities and a membership drive. As the new committee, under the continued chairmanship of **Ian G3YBY**, begin the task of planning the coming year's club activities, the membership paused to remember with fondness two of the stalwarts of the Swindon Amateur fraternity who passed away during the year.

A past chairman and equipment constructor par excellence, **Maurice G3LTZ**, whose last public act within amateur radio was to provide the club with an excellent talk just days before he passed away last November. And **Gray G4KBN** who, despite serious long term health difficulties, was so active on h.f. that he won the SDARC HF SSB Contest for 1996.Gray was an incredible cheerful contributor to amateur radio on both packet and 'phone, until he also suddenly died at the beginning on June. The club mourn both members passing, but cherish their contribution and memory.

Anyone wanting further details of the club or wishing to visit, please contact **Den M0ACM** on **(01793) 822705**.

Poldhu Amateur Radio Club

Two meetings during the summer at **Poldhu Amateur Radio Club** told the history of marine radio from 'Spark To Satellite'. Three former Merchant Navy Radio Officers told of their experiences at sea and the job they did on board ship.

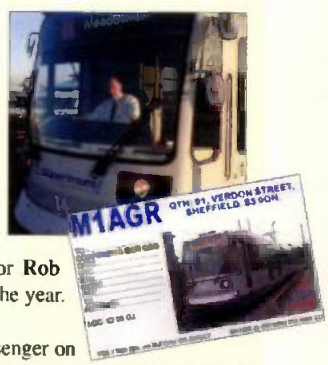
George Banner G3AHX recalled going to sea as a Wireless Operator in the early 1930s using spark transmitters. He explained the animosity that existed between deck and engine room and how he would have to plead with the engineers for power when time came to transmit. In those days he could get messages from Hong Kong and back in two hours - the bands were less crowded!

David Barlow G3PLE explained the importance of sending regular weather reports and how they formed the basis of weather forecasting in the 1960s. The R/O was also the ship's librarian and the projectionist. Radar was improving, although it was not helped when deck hands tipped buckets of soapy water on the display unit and had to be repaired in a matter of hours!

Paul Enrico jumped another 30 years and to the time the Radio Officer became an electronics engineer. Telephones and v.h.f. came on board and satellites were used extensively.

Television, FAX and E-mail have become prime methods of communications. From the days of CQD through SOS on spark emitters, emergency calls have moved to the automatic GMDSS system with Morse no longer required, although a Russian ship in trouble recently reverted to the key when all else failed and was received by a Belgian amateur who passed the message on and effectively helped.

Mike's A Supertram Man!



Mike Skinner M1AGR glides effortlessly about his business in Sheffield. Why? because he's one of the rare (at the moment) breed of new 'Supertram' drivers to be found in the UK. Proud of his job Mike displays a photograph of his sleek new German made 3-car articulated vehicle on his QSL card.

A member of the very active Sheffield club, Mike arranged to present a 'Supertram' driver's tie to *PW*'s Editor **Rob Mannion G3XFD** when the Editor visited the club earlier in the year. But they have yet to risk letting Rob drive one!

However, Mike will always pleased to have you as a passenger on his tram if you ever visit the huge Meadowhall complex. All you have to do is to look out for M1AGR/TM (Tram Mobile!). And once you've ridden on a Supertram you'll never want to travel on a dirty, noisy and rough-riding diesel bus again!

Club Reminders

The **Echelford Amateur Radio Society** meet on the 2nd and 4th Thursdays of each month at **The Hall, St Martin's Court, Kingstone Crescent, Ashford, Middlesex** at 7.30 for an 8pm start.

Up and coming events in 1997 are: September 11 - Wireless Before Radio by Steve Cook G8CYE. 25th - RF Building Blocks by Robin Hewes G3TDR. October 9 - Global Positioning Systems by Lyn Dutton.

Further information about the Society is available from the Secretary **Robin Hewes**, QTHR, on **(01784) 456513**.

Members of the **Hoddesdon Radio Club** meet on alternate Thursdays at 8pm at the **Conservative Club, Rye Road, Hoddesdon.** Just a few up and coming events this year are: September 11 - Talk on First Aid by Tony Sargent, 13th - Hoddesdon Carnival, callsign GB2HCD, and the 25th - Slide Show & Talk on IOTA by Neville Cheadle G3NUG.

Further information from **Don G3JNJ** on **0181-292 3678**.

The **Liverpool & District Amateur Radio Society** meet at 8.30pm (course begins at 7.30pm) every Tuesday evening. Meetings are held at the **Churchill Club, Church Road, Wavertree, Liverpool.**

Just a few of the events happening this year are: September 16 - Liverpool History, 23rd - Construction Contest, 30th - Surplus Sale, October 7 - pre-AGM.

More information about the club can be obtained from **Ian Mant G4WWX** on **0151-722 1178**.

The **Mid-Warwickshire Amateur Radio Society** meet on the 2nd and 4th Tuesday in the month at 8pm at the **Club HQ, 61 Emscote Road, Warwick.** All members and visitors are welcome.

On the 23 September there is a meeting on book reviews by club members. Find out more from **G8XDL** on **(01926) 498115**.

Members of the **Strathmore & District Radio Club** meet every Tuesday in the **ATC Hut, Forfar**, at 7.30pm. New Novice classes will be available from the beginning of September.

Further information from **Bill GM0VIT** at QTHR, or 'phone on **(01250) 886324**, FAX on **(01250) 886314** or E-mail **bill.henderson@zetnet.co.uk**

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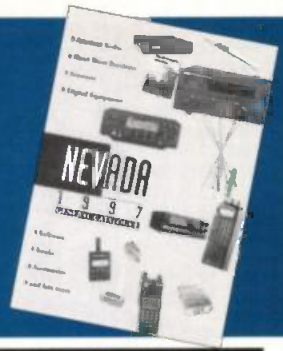

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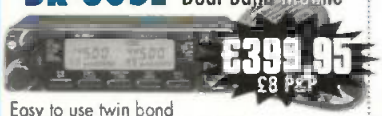

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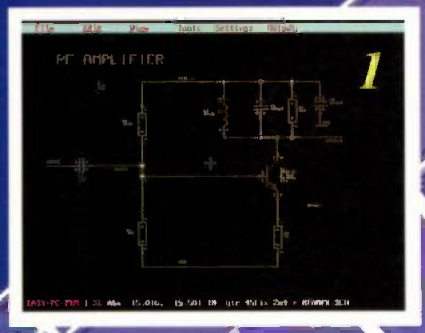
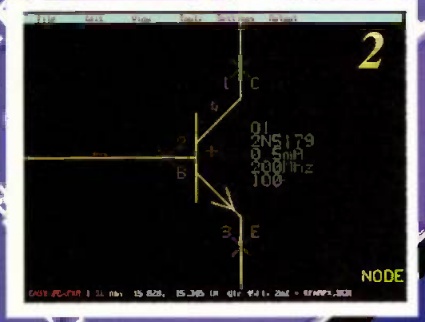
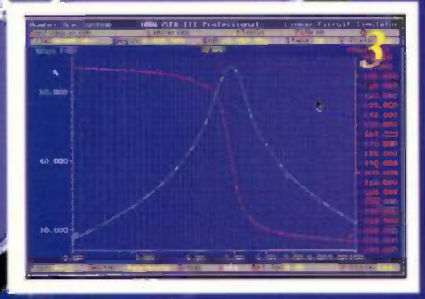
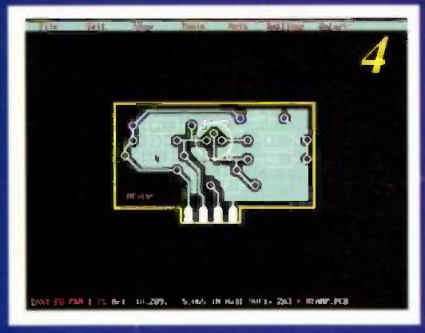
COMPUTER A
From Nu

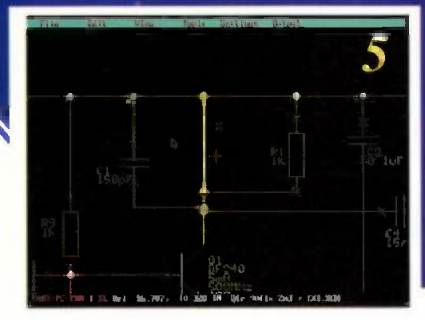
Number One Systems produce several computer software packages for computer aided design (CAD) of electronic circuits. So, Tex Swann G1TEX - PW's resident computer enthusiast, got the job of looking at just three of them and how they interlink to make the design task faster and more productive.











The three packages I've been able to have a look at together are: *EASY-PC Professional XM*, *ANALYSER III* and *LAYAN*. So what can these three packages do for any electronics enthusiast? To answer let's look at each one individually first.

EASY-PC Professional XM is a schematics and printed circuit board (p.c.b.) drawing package. These two tasks are actually very much related; each deals with a library of pre-drawn symbols and connects them together with a variety of lines.

As a starting point EPC, as I'll call it from now on, comes with a large number of symbols to get you going. When designing a new circuit I like to deal with a circuit diagram first. So, what has *EASY-PC* to offer in this line?

On offer here are symbols for transistors, f.e.t.s, resistors, capacitors, coils, integrated circuits, both linear and digital. Each type has many variants, each one linked to a particular p.c.b. layout symbol. More of this later.

When starting with a new program, it's often very instructive to have a look at some existant circuits. And that's just what I did, as EPC comes with around twenty circuits to have a look at and play with before beginning your own.

The provided circuit also forms part of an extensive learning guide that features in the 320+ paged book that accompanies the program. As EPC has a large number of keyboard related features, it's better to curb your natural desire to 'get stuck in' and work your way though the very good tutorial within the book.

Along with all the programs EPC is best driven by mouse until you have become familiar with the many keyboard shortcuts. Of course, being interested in radio related electronics I chose a circuit called 'RFAMP.SCH' the '.SCH' suffix setting it out as a circuit diagram. On loading it a single transistor amplifier was presented (**Figs. 1** and **2**).

I was able to easily reposition and change and move the various circuit elements. A nice feature was that all connecting links were 'rubber-banded' and remained fixed at both ends. So, a quickly drawn out circuit could be soon tidied up for presentation.

Now comes the second part of the story. Under the 'Tools' drop-down menu is the ability to pass this circuit of to either an analogue (*ANALYSER III*) or a digital (*PULSAR*) simulator.

On letting *ANALYSER III* look at the circuit it decided that as it was presented it had a resonant frequency of 5MHz and a peak amplification of about 18dB (**Fig. 3**). Changing the coil L1 to be only 5µH gave a new resonant point of about 7MHz.

Although I'll describe it in more detail later, further changes allowed me very quickly to create a pre-amplifier for 10 or 14MHz and see the effects of component values. This has been almost too easy up to now, so now what?

Well! normally a printed circuit board is the next item on the agenda and again on the 'Tools' drop-down menu was the option to 'Translate to PCB'. Once more the screen cleared and this time a square was presented with what looked like a long slanted 'smear' on it.

On looking closer with one of the eight preset zoom levels, I identified the various components that had been in the circuit diagram only this time they were as p.c.b. pad layouts. The various pads were connected together with straight lines. This was the 'Rat's-nest'.

From the rat's-nest you may move and rotate components until you get a layout shape that makes sense. Each connecting track may be picked up and moved, bent and manipulated to get the components on the designated p.c.b. area.

Instead of starting from the rat's nest, where you knew all connections in the circuit diagram had been made in the p.c.b., you could of course do it the hard way. You could have printed out your circuit on plotter, laser or dot-matrix printer and lay the thing out yourself. But I know which I prefer!

To make things even easier when you've given up on the layout of the board you can ask the autorouter, an additional program, to have a go at laying out the p.c.b. for you.

Second Part

But let me now turn to the second part of the trilogy although I've already touched on it. This is the *ANALYSER III Professional* program which I'll call AN3-Pro after this. So what is this AN3-Pro? What does it do?

In simple terms AN3-Pro takes a list of components and connections and attempts to calculate the way the circuit would seem to test equipment in terms of Input and output impedance, gain, bandwidth, phase 'Y' and 'S' parameters and v.s.w.r. Along with the parameters mentioned above, there are two other parameters that I'm not familiar with: Linvill/Stern, and MAG/Rollett. But let me explain how it would be used.

If you are beginning a new circuit, then you have to draw it first. It makes sense to use EPC and pass the circuit over to AN3-Pro when its drawn. But let me assume that you cannot do this. Within AN3-Pro the

IDEO DESIGN
mber One

values of any of the components may be changed without having to return to EPC. This makes circuit design easy.

A circuit is defined, as far as AN3-Pro is concerned as a series of interlinked nodes. A node being a point at which two or more components join. Each node is given a number or name to identify it. This list of components and the nodes to which each is attached is known as a net-list and An3-Pro works from such a list.

As in the case with EPC, AN3-Pro comes with a comprehensive library of linear passive and semiconductors models as supplied. There are coils, capacitors, resistors, named transistors and integrated circuit amplifiers. Although the list isn't very large, the library models are more than adequate to evaluate most analogue circuits, for many of the given parameters are editable.

Third Part

Now for the third of the three programs I'm looking at, and the only one that is not 'stand-alone'. However, it is in many ways the most interesting of the three and the first time I've come across such a function.

The program *LAYAN* is a p.c.b. layout analytical engine that can take an area of p.c.b. layout (including the real components) and create a model that *ANALYSER III* can do its work on.

Even a section of track has inductance, implied resistance and capacitance to both itself and other sections of track around it. What *Layan* does is to take a layout and break it down into its physical components (L, C, R and active components) and into 'implied' components.

The implied components, more usually known as 'strays', can have devastating effects on the working of the real components. As we move up in frequency, and down in size of layout, these stray components becomes even more important.

One of the examples offered is an r.f. amplifier circuit that has no coil and even shows a shorting link across the capacitor (**Fig. 5**). Now conventional theory says the circuit is wide-band but unfortunately has no output.

So, the next step in the chain of events is to create a p.c.b. and I've shown the supplied layout in **Fig. 6**. The short circuit has been translated into a length of track that wriggles (with 90° corners) its way between the supply point and the collector of the transistor.

Now let *LAYAN* analyse the section of track that wanders along the board (**Fig. 7**) and adds in the real components and when it calls up AN3-Pro the result is an r.f. amplifier with a well defined peak at 45MHz (**Fig. 8**). More importantly there's no setting up needed for this amplifier - it's on tune!

For microwave enthusiasts, there is a small p.c.b. (**Fig. 9**) that looks like a curve of short lines without any direct connections between input and output. After *LYAN* has done its work the output graphs from AN3-Pro show it to be a 10-12.5GHz pass-band filter with commendably steep skirts (**Fig. 10**).

Short wave enthusiasts haven't been forgotten either as there is a pass-band filter shown as a p.c.b. layout in **Fig. 11**. After *LAYAN* has worked on it and passed the results over to AN3-Pro for analysis, the resulting filter shape is shown in **Fig. 12.** (A repeatable 'brick wall' filter I think).

Without a doubt *LYAN* is the star of this trilogy that hides behind, but greatly enhances the design possibilities of both *EASY-PC Professional* and *ANALYSER III Professional* (Both of which are superb in their own rights as stand-alone development programs).

Combine *EASY-PC Professional* and *ANALYSER III Professional* with *LAYAN* and they become an extremely powerful combination that would be at home in any level of design. They may be rather costly for the individual, but some of the larger clubs should be tempted.

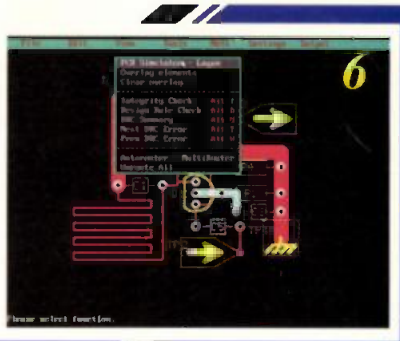
Machine Needs

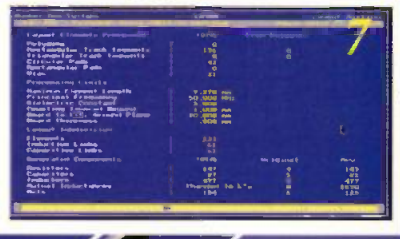
The machine needs of such a group of computational intense programs is, as you would expect, quite high. But it is certainly within the reach of almost anyone. The programs are all DOS-based but will run under either Windows 3.1 or '95. I ran the programs on a '486DX/2-66 and they performed well.

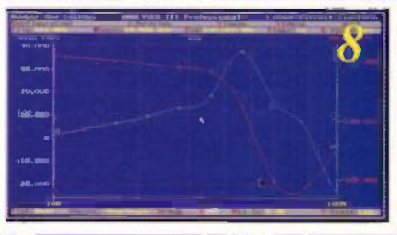
On a Cyrix '686-150' based machine the results were very commendably quick. The general rule seems to be if the machine will run Windows 95, then it's more than adequate for these three programs.

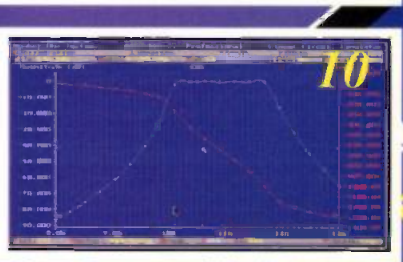
My thanks go to **Number One Systems Ltd, of Harding Way, St. Ives, Cambridgeshire PE17 4WR. Tel: (01480) 461778, FAX: (01480) 494942, E-mail: sales@numberone. com** for supplying the three programs which are available from them for the following prices: *EASY-PC Professional XM* costs **£245**, *ANALYSER III* **£195** and *LAYAN* **£495.** The additional autorouter programs range in price from **£295 - £950** and the library additions are **£48.** Postage and packing on all the above is a one-off charge of **£7.50** and please remember to add VAT to all prices.

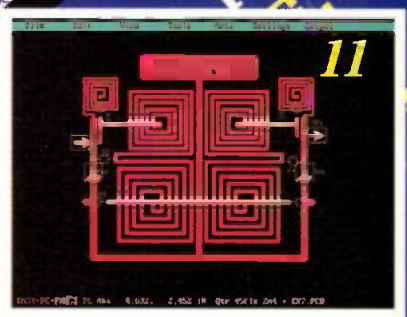
PW

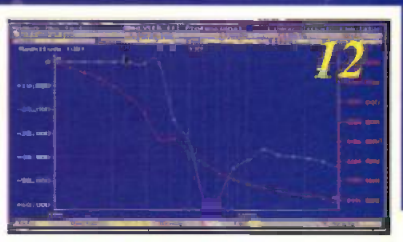












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IF YOU'VE READ AND ENJOYED TEX SWANN G1TEX'S REVIEW ON PAGES 18 & 19 OF THIS ISSUE ON THE SOFTWARE PACKAGES EASY-PC PROFESSIONAL XM, ANALYSER III AND LAYAN FROM NUMBER ONE SYSTEMS LTD. AND WOULD LIKE TO HAVE THE CHANCE TO TRY THEM FOR YOURSELF, HERE'S SOME GOOD NEWS!

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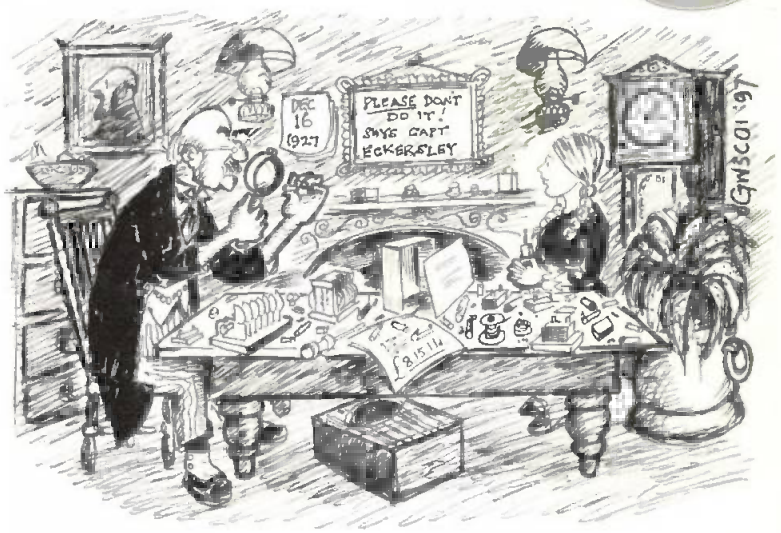
Early Wireless Days

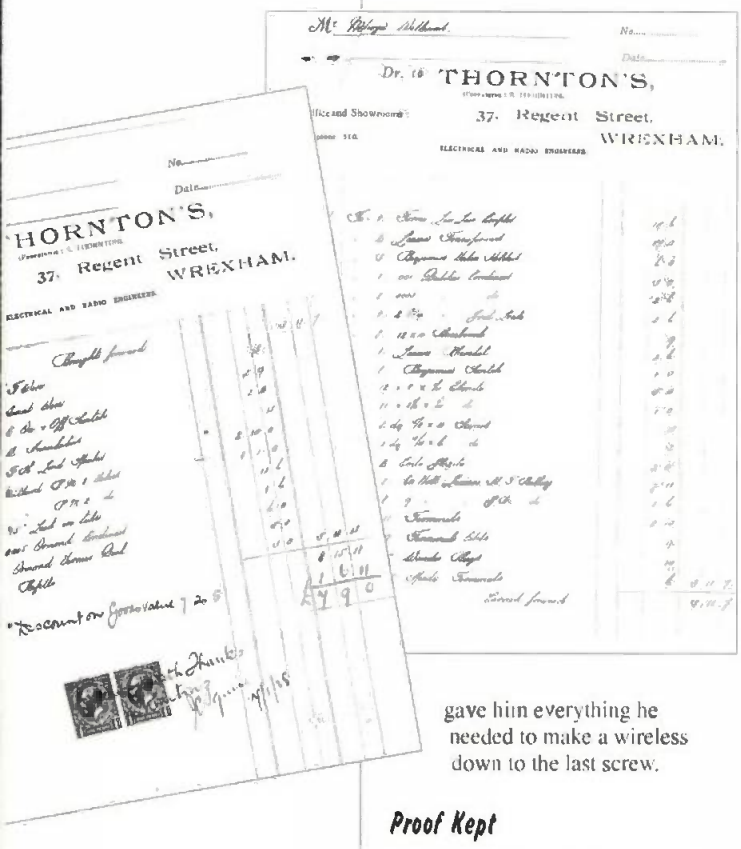
By Brenda Belcher

Brenda Belcher recalls how her father built a home wireless set 70 years ago in the days when things were in a much slower moving age.



Practical Wireless wasn't even published in 1927 when my father decided to make a wireless set. Even without such guidance as the magazine could have provided, apparently constructing a wireless was quite possible even then and with a minimum of basic knowledge. It would be just the thing, he thought, right up to the minute enjoyment for my mother and him on their first Christmas together as a married couple.

He knew where to buy the materials, not from a warehouse or multiple store as today, but from the much grander sounding Offices and Showroom of an Electrical and Radio Engineer in the nearest town. So, on 16 December he visited this emporium and purchased 31 items - with a value of £8-15s-11d. This gave him everything he needed to make a wireless down to the last screw.



A work of art in itself, the bill (a photocopy from the now delicate original) is a tribute to a more slower moving age.

Proof Kept

Like many in the 1920s, my parents were so in dread of being in debt, so they kept every bit of proof that they had paid for what they bought. Seventy years later, that bill with the date and receipt attached is still legible, as exact and careful as the wireless making craft itself.

Details list the most expensive item as the loud speaker which cost £2-10s with the cheapest being 2d worth of screws, counted out by hand, of course. Exotic items like an Ormond vernier dial jostle with technical mysteries of transformer, condenser, insulator against more recognisable things like valves and valve holders, plugs, battery, switches and leads.

Wrapped Separately

I suspect all the components were all wrapped separately in paper bags or screwed in tissue paper, boxed and wrapped in a strong brown paper parcel and then tied with string for him to take home. No money apparently changed hands at the time. The way the bill is folded suggests it was placed in a small envelope and perhaps sent by post later.

The bill is written in ink in painstaking copperplate hand writing without a single correction on two sheets of quarto sized ruled billhead. A work of art in itself, it is a tribute to a more slower moving age.

Discount Allowed

When my father paid the bill in full on 7 January 1928, he was allowed a discount of £1-6s-11d, which brought the total cost of these materials to £7-9s. The bill is signed with thanks over two bright red one penny stamps to make it legal.

Settling the bill must have almost broken the bank, leaving nothing to spare for a cabinet to house the wireless in its place of honour in the sitting room. But this wireless is a significant memory of my childhood and I know it did eventually have a cabinet, which my young fingers were forbidden to touch.

Much Admired

I suspect it was much admired though I never thought much of it, satisfied only that the wireless should be tuned in for me to listen to the 'Ovaltinies', 'Romany' or 'Uncle Mac'. My father had got hold of some wooden boxes that had been packed with Outspan oranges on their long journey from 'abroad'.

In their original state these packing cases were rough, splintery and stamped in black lettering with evidence of their purpose. Yet, with the ingenuity that characterised his time, my father saw their potential.

In our sitting room, cut to size, planed, glued, screwed and varnished, mahogany couldn't have been treated with more respect. Besides, in 1927, no one else my parents knew had a wireless at all.

I doubt if faded screwed up computer slips, proof of purchase with a 'plastic card', will have such a fascination or tell such a story 70 years from now, in the same way as bills of sale from those 'early wireless days'.

PW

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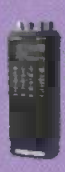

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Safety..... In The Red Zone

By Mike Rowe G8JVE

Most of us don't feel safe 'in the red zone' with our bank accounts. But when you're operating mobile it's another matter and Mike Rowe G8JVE says you'll be much safer operating 'in the red' with his remote control push-to-talk unit.

Operating hand-held car telephones and radio telephone systems while mobile has been in the news a great deal recently because of the safety problems. And to help, I've designed a unit to overcome the obvious disadvantage when operating mobile - you need both hands on the wheel for safety - leaving no hands left to hold the microphone!

The unit operates using infra-red to control the p.t.t., with the microphone being wired into the receiver unit. Once installed, it should greatly improve the safety aspect when you're on the air and on the move.

The Transmitter

First, let's look at the infra-red transmitter circuit, shown in **Fig. 1**, which operates at 38kHz. The required frequency is generated by IC1, a 4093 quad NAND Schmitt trigger. However, only two gates are used, the remaining inputs are earthed to prevent damage to the IC.

The oscillator's output is amplified by Tr3 and drives three infra-red light-emitting diodes (i.e.d.s). D2, 3 and 4. These are arranged at 45° to each other to ensure that the receiver gets a good signal when the steering wheel is turned during driving.

The mounting screws for the printed circuit board (p.c.b.) are connected to the battery contacts so that the battery condition may be checked without dismantling the unit.

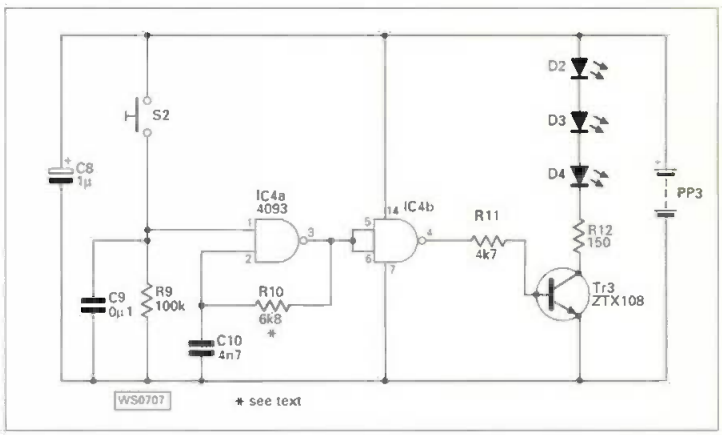


Fig. 1: The infra-red transmitter circuit (see text).

Heart Is Sharp

The heart of the receiver, shown in **Fig. 2**, is the Sharp IU1SU60 infra-red receiver. This device is a complete infra-red receiver, tuned to 38kHz, containing the necessary amplification, limiting and demodulation.

The IU1SU60 is primarily designed for TV type remote controls. It would normally receive a binary coded signal, which would then be decoded in the i.c. and give logic level output. In our case, the transmitter simply transmits a steady signal, so the output will simply go low when a signal is received.

The output from IC1 is capacitively coupled to a 'flip-flop' (4013). And each time a signal is received, the input of the flip-flop receives a negative going pulse.

The pulses are divided by two in the 4013, i.e., one signal received turns the 'Q' (at pin 13) output high, where it remains. The second signal gives another input pulse, this in turn switches 'Q' low. (The i.c. has a reset circuit, C5 and R6 to make sure that the output always comes on with the mobile rig in the receive mode).

The 'Q' output drives a single transistor, Tr2, which operates a reed relay to provide p.t.t. operation for the transceiver. At the same time, D1 illuminates to give visual

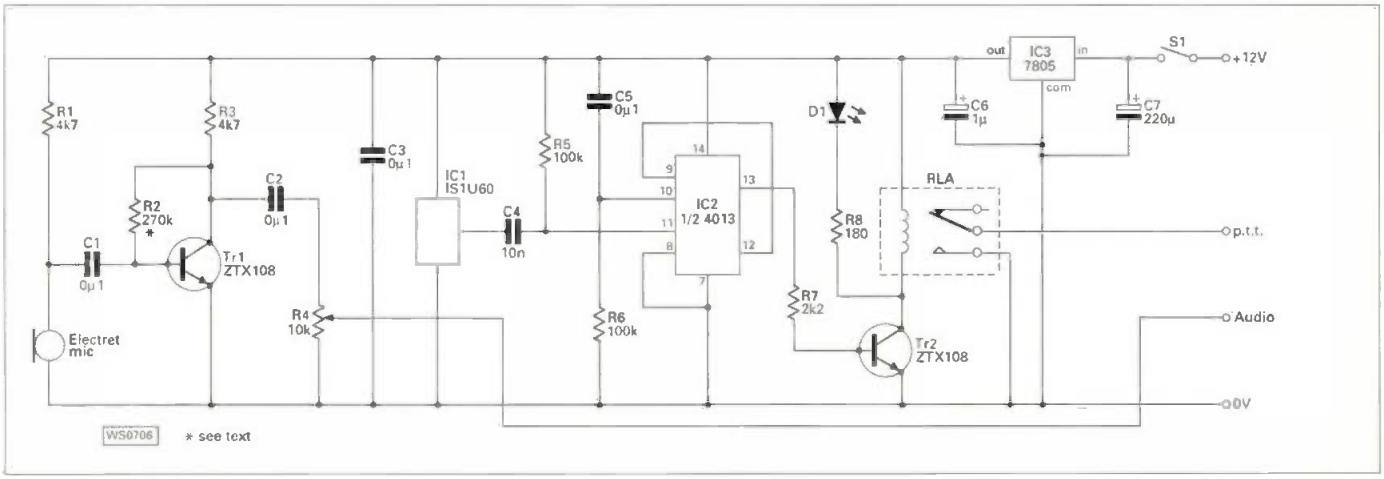


Fig. 2: The infra-red receiver circuit (see text).

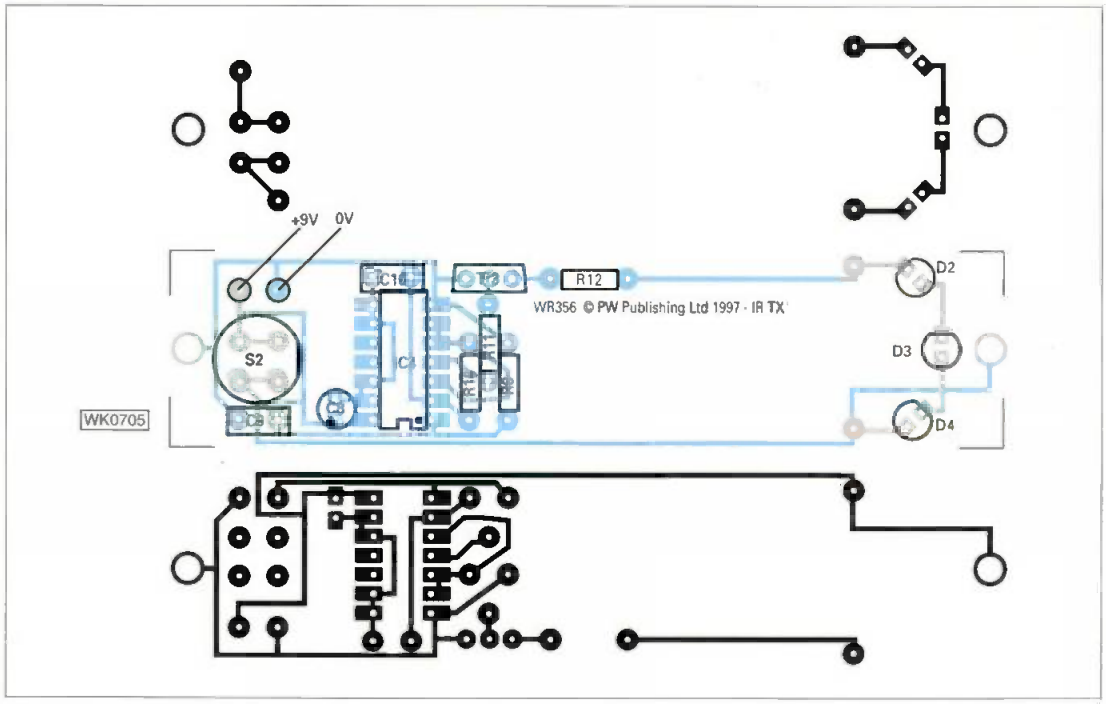


Fig. 3: Printed circuit board and associated component overlay for the infra-red transmitter.

indication of the operation.

By using a flip-flop, the receiver needs only a short burst of signal to operate. a single press of the p.t.t. button on the transmitter alternatively turns the mobile rig on and off.

In addition to p.t.t. operation, the receiver unit also contains a microphone head amplifier and gain control to enable a hands free microphone to be used. I've included a photograph of a simple home-made microphone, although one may be purchased (they're often obtainable at rallies, being sold for cellular 'phone use).

Photo 1: The prototype infra-red transmitter. Note the spacing of the three diodes (see text).

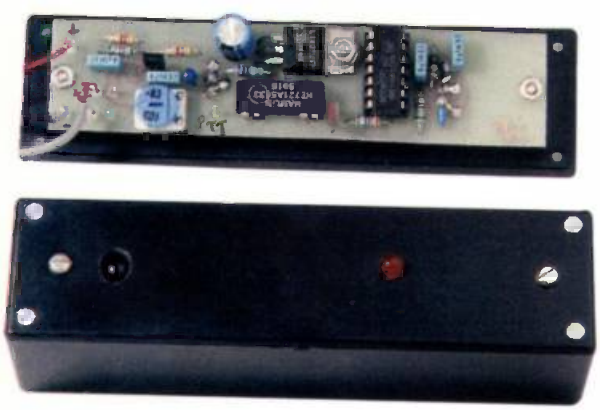


Photo 2: The remote receiver. The inset diode is the infra-red detector and the 'proud' diode on the right is the operating indicator (see text).

Not Complex

Construction is not complex as both units are built on double-sided p.c.b., as in **Figs. 3 and 4**. On both boards there are some through links to fit to connect the printed track on either side of the board together...so make sure you solder both sides!

I suggest you start by building the transmitter. in Fig 3. first. Mount all the resistors, capacitors and the i.c. (using an i.c. holder is recommended).

Next drill the top of the box using the p.c.b. layout as a template. When drilling the holes for the l.e.d.s, don't forget these should be angled at about 45° to give coverage of the beams as the wheel is turned.

Mount the switch on the **opposite side to the components**. i.e., the switch is soldered on the track side of the p.c.b. Next, mount the infra-red l.e.d.s on the same side as the switch making sure that the polarity is correct. **Photo 1** shows the prototype transmitter.

Connect up a PP3 battery, press the switch and using an oscilloscope or counter check that the frequency is in the region of 38kHz. (This is not particularly critical as the receiver has a bandwidth of 36 to 41kHz).

The output should switch on and off with the press button. The current when off is much less that 1mA. and approximately 20mA when activated.

The Receiver

The receiver, shown in Fig. 4, is built in the same order as the transmitter. However, this time, the infra-red receiver i.c. and **Transmit** indicating l.e.d. (D1) are both mounted from the copper foil side. (Make sure the l.e.d. is correctly orientated, the 'flat' on the diode body normally indicates the 'cathode').

The regulator i.c. 7805 is bolted through the p.c.b. as the negative connection to this device is by the tab. **So it's essential to use a regulator with a metal tab in this application.**

There's no alignment necessary on the receiver board. When powered up, the l.e.d. should be out, pressing the button on the transmitter should change the state, and another press of the p.t.t. should put the **Transmit** l.e.d. out again.

Mounted On Wheel

I recommend that the transmitter is mounted on one of the steering wheel spokes using self adhesive 'Velcro' strips. The receiver mounted on the roof interior near the door again using Velcro with the lead to the rig going down the door pillar.

The microphone is simply made using a modified crocodile clip and

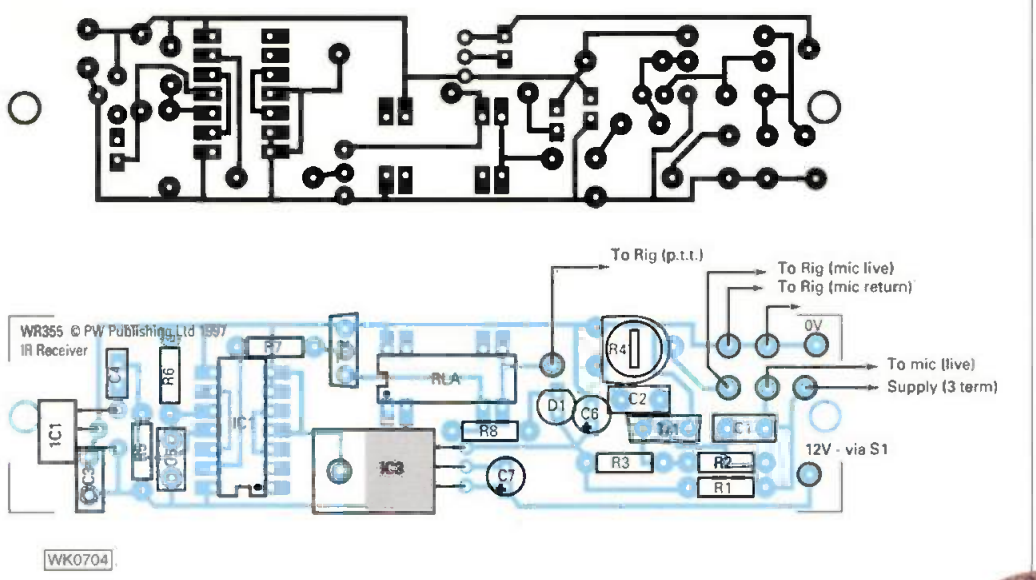


Fig. 4: Printed circuit board and associated overlay for the infra-red receiver.

a small piece of heatshrink sleeving. The 'crocodile clip' is modified by carefully reversing the wire clamp so that it points to the outside of the body. The complete unit is shown in **Photo 3**.

Solder the leads to the rear of the microphone capsule and leaving about 10mm space between the clip and the microphone and secure the cable under the clamp. Then you should cover the microphone capsule and the crocodile clip up to the hinge with heatshrink and shrink into place. (This short length of heatshrink provides some acoustic isolation between the car body and the microphone).

The microphone may then be clipped on to a suitable part of the car near to the driver's mouth and the gain control in the infra-red receiver adjusted for best audio. And there it is....mobile safety in the red zone.

Happy driving and safe mobile operating! **PW**

Photo 3: A suitable simple microphone.

WARNING

Please bear in mind that this simple unit uses uncoded infra-red transmissions and is unlikely to cause any problems to car security devices. **However it will respond to coded transmissions,** and the rig should be switched off when left unattended, as it could well be triggered by other transmissions.

Shopping List

Resistors

Miniature Metal (or Carbon) film

150Ω	1	R12
180Ω	1	R8
2.2kΩ	1	R7
4.7kΩ	3	R1, 3, 11
6.8kΩ	1	R10
100kΩ	3	R5, 6, 9
270kΩ	1	R2

Preset (Min. horizontal mount)

10kΩ	1	R4

Capacitors

Miniature Polyester

4.7nF	1	C10
100nF	4	C1, 2, 3, 5, 9

Miniature disc ceramic

10nF	1	C4

Miniature Electrolytic

220µ F	1	C7

Miniature tantalum bead

1µ F	2	C6, 8

Semiconductors

4013	1	IC2
4093	1	IC4
7805	1	IC3
IS1U60	1	IC1
ZTX108	3	Tr1, 2, 3

Miscellaneous

Two Maplin FT31J type boxes, one Maplin type DC90X type d.i.l. relay, three miniature infra-red l.e.d.s (Maplin type YY65V or similar), one 5mm l.e.d. (colour to suit) to show transmitting status (D1), a battery connector for a 9V battery, a single pole 'on/off' type switch (S1), a momentary push-to-make type switch (S2), an electret microphone capsule (optional), interconnecting wire and plugs to suit the rig.

Safety In The Red Zone

Hand-Held Pioneers - The BC-611 & PRC-6

By Ben Nock G4BXD

Ben Nock G4BXD takes a look at the pioneering BC-611 and PRC-6 valved hand-held transceivers.

There have been many hand-held transceivers used in the military. There were several British 'hand-helds' in use during the Second World War and these versions included sets like the 38, 46, 88 set, and possibly just scraping through in the class, the 18 Set.

Yes, **I know** the 18 Set had to be strapped to the back and hardly held in the hand! But it **was one man operable**, and could be carried!

The true hand-held breakthrough though must go to the American Army. And I'd like to mention one of the first, probably **THE first**, military hand-held ever made, the BC-611, and then its replacement, the newer PRC-6.

Replaced An Icon

The PRC-6 replaced an icon in the field of radio communication, namely the BC-611. The 611 was probably the world's first hand-held transceiver and was designed to be carried by the foot solder into battle.

The 611 is just 13in long by 3.25in square. Weighing only 5.5lbs, it employs five valves that operate both on receive and transmit. Self contained batteries of 1.5 and 103.5V provded the set a quoted life of 15 plus hours.

The BC-611, development starting around 1939, saw service in the Second World War, and the smaller altercations, the Korean Policing action and the Vietnam War. Apparently many were taken by the opposing side in Vietnam and were used by them until the final whistle blew, they never gave them back !

On the home side, the BC-611 was eventually replaced by several developments, including the PRC-6. This, unlike the amplitude modulated (a.m.) 3.5 to 6MHz coverage 611 set, used v.h.f. and employed frequency modulation (f.m.).

The power amplifier (p.a.) valve of the 611 is rated at 1 to 4W. But the short whip antenna used on the set (39in) meant that something like 10% of that was radiated.

The quoted range for the 611 was a mile over land and 3 miles over salt water (for beach landings?). The set was for single channel operation but by having several next to each other, could they be used to monitor more than one frequency.

The compact PRC-6/6 with accessories.

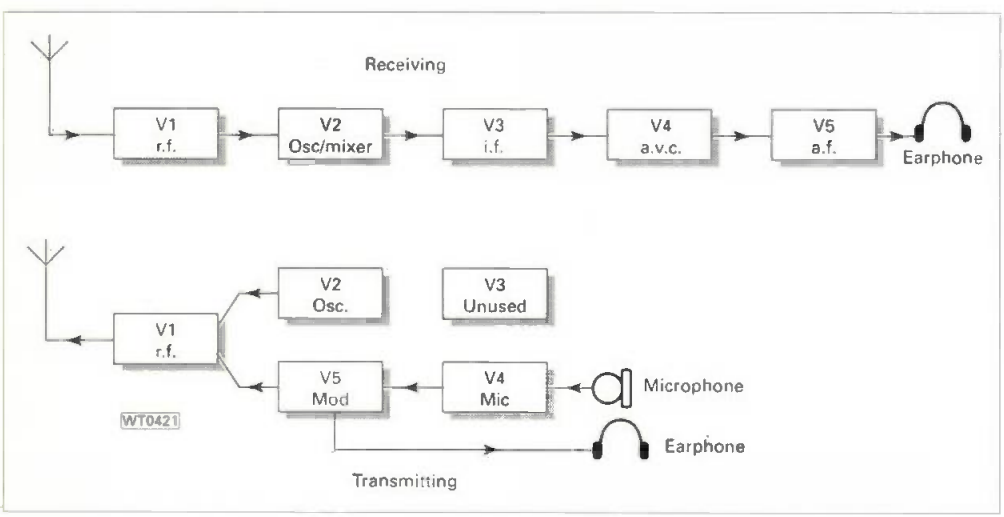


Fig. 1: Block diagram of the BC-611 valved hand-held transceiver (see text).

Lifting The Lid

On lifting the lid, I found that on the receive side the five valves are used as the r.f amplifier, crystal oscillator and mixer, i.f. amplifier, automatic volume control (a.v.c.) and detector

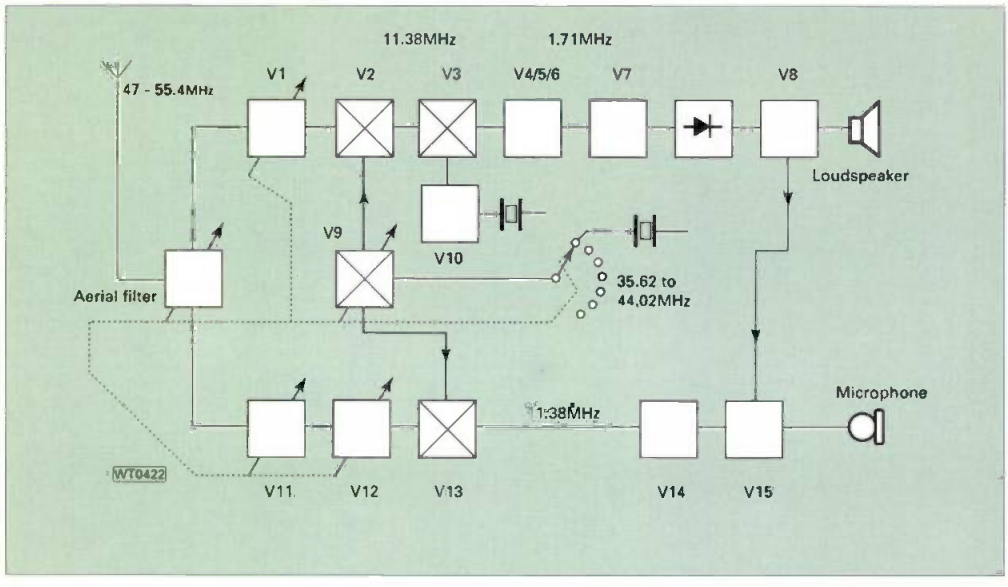


Fig. 2: Block diagram of the PRC-6/6 f.m. transceiver (see text).

and audio output.

On transmit, the r.f. amplifier acts as the p.a. stage and the mixer/oscillator acts as the transmitter oscillator. Following through, the a.v.c./detector acts as the microphone preamplifier and the audio output acts as the modulator valve. (I've provided a block diagram in **Fig. 1**).

The unit utilises two crystals, one for transmit and one for receive. The receive crystal is 455kHz higher in frequency than the transmit crystal, which is on the actual frequency in use.

It appears that the set was well liked by the troops as it was simple to operate. There were no controls other than an On/Off switch connected to the antenna.

Pulling the antenna up turned the set on, pushing it in turns the set off. The only other control was the side mounted **Transmit/Receive** switch.

Full receive volume was obtained with the aentenna fully extended. And if a reduction in volume was required the aerial had to be retracted slightly.

All operations like changing of channel and tuning had to be done in the workshop, though the batteries could be changed in the field by opening the bottom cover. Like the PRC-6 which follows, there were test equipment boxes that plugged into the set and allowed for alignment and other other maintenance.

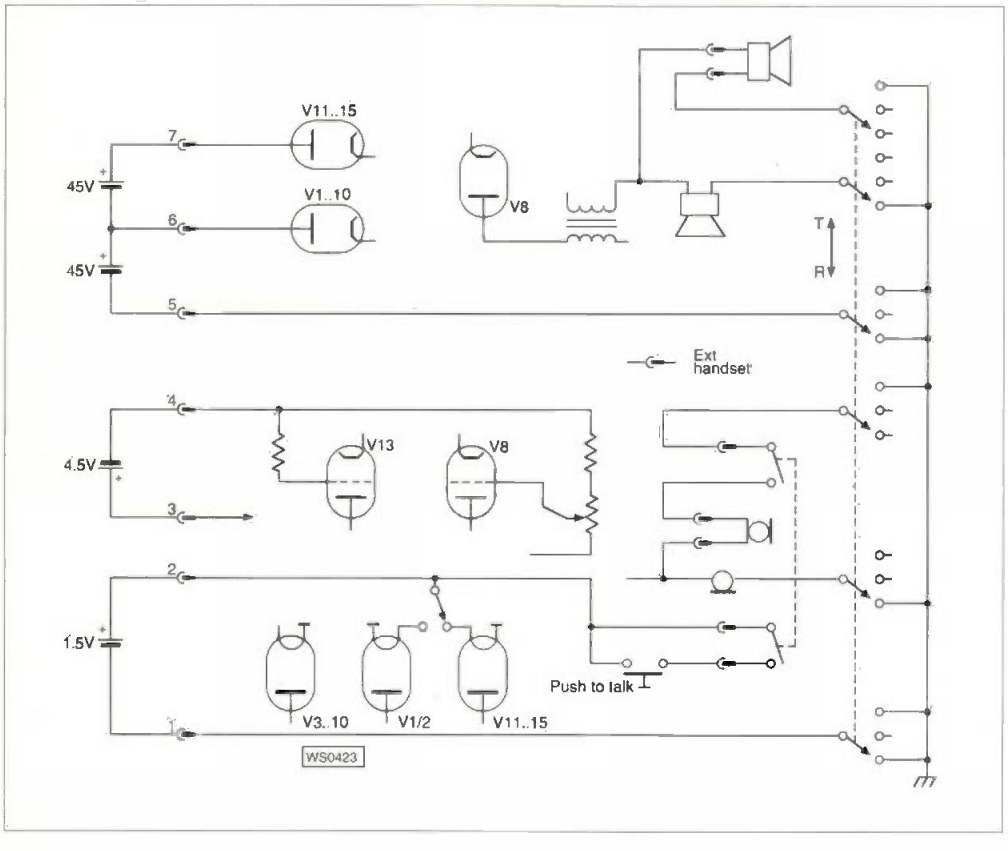


Fig. 3: Battery supply details for the PRC-6/6 (see text for possible modern alternatives to original h.t. batteries).

The sets were supposed to be waterproof but the seals suffered a little from continual compression. The last model, the BC-611-F, had a replacement base which allowed external headphones and a microphone to be used.

Evolved From American

The particular transceiver I've illustrated (the 6/6) evolved from the American designation AN/PRC-6. It's a 250mW output, f.m., six channel radio employing some 15 miniature valves.

The transceiver is of a compact, hand-held design running on internal batteries. It utilises either a built-in

Fig. 4: War breaks out in Kidderminster! Ashley Hull models the transceiver, illustrating the compact size of the valve unit.

Fig. 5: Not much room! An inside view.

microphone and speaker on the case or an external handset which can be plugged into the base of the unit.

The set uses a 24inch 'flexi-whip' antenna of the metal tape measure type which was very flexible! When not in use this is stored around the outside of the set.

Frequency coverage is any of six channels between 47 and 55.4MHz. Only one crystal per channel was required to provide both the receive and transmit frequency.

The PRC-6, issued around 1952, was a single channel version, the PRC-6/6 designation presumably referring to the 6 channel modification. The block diagram of this set is shown in **Fig. 2**.

The Circuit

The circuit is based around a common oscillator (V9), with the six channels operating between 35.62 and 44.02MHz. On receive this signal is mixed with the amplified aerial frequency (in V1) in V2 to give a first i.f. of 11.38MHz. A second crystal oscillator (V10) then mixes again (in V3) with this signal to give a second i.f. of 1.71MHz.

A limiter and discriminator follow the second i.f. amplifiers, three in all (V4, 5 and 6), feeding the audio output stage (V8). The receiver has a quoted sensitivity of 1µV for 20dB S/N at 15kHz deviation and a 1kHz tone.

On transmit the frequency modulator (V15) operates on a variable oscillator (V14) running at 11.38MHz. This f.m. signal is then mixed with the common oscillator in V13, amplified by the buffer (V12) and finally by the p.a. stage (V11). A quoted output of 250mW can be expected from the transmitter with an expected range of around 1 mile.

Batteries Everywhere!

There were batteries everywhere! The battery pack consists of four separate supplies: a 1.5V cell for the heaters, a 4.5V battery for biasing and two 45V h.t. batteries connected in series to give both a 45 and a 90V output.

The handbook states that the batteries give a duration of some 20 to 30 hours use with a 10% transmit cycle. The battery connections, based on a B7G plug and socket, are detailed in **Fig. 3**.

Integrated Network

The PRC-6/6 is designed to fit into an integrated communications network, being able to communicate with several other transceiver types. Other models that have frequency ranges compatible with the PRC-6/6 (for example) include the GRC 3/4/5/6/7 and 8, the PRC-10, the VRC 7/10/15 and 18 and the VRQ-3 radio.

The PRC-6/6 handbook gives some good illustrations as to where and where not to use the set. For instance "Don't use the set whilst sitting on the side of an embankment, stand on top of the bank and operate it" (Perhaps not advisable if there are snipers around!). Alternative instructions were: "Try not to operate the set whilst in the middle of a steel structured bridge, wait till you are across the bridge" (into enemy territory presumably!).

Controls on the PRC-6/6 set are simple. They include the channel switch mounted on the top of the set next to the aerial connection and a volume control. There's also a function switch that selects between internal microphone/speaker and external handset and a push-to-talk (p.t.t.) button on the side of the casing. The channel selected, 1 to 6, shows through a small window mounted on the rear casing.

The unit measures approximately 15in long by 5in and 4in deep and weighs in at around 7lb with the battery fitted. A canvas strap on the rear of the set can be adjusted to allow the set to be carried securely in the hand or slung over the shoulder.

Test Set

A small test set facilitates the alignment of the transceiver on the required channels. The test set includes a switched metering circuit that plugs into a 7-pin socket on the rear of the main chassis once the main cover is removed.

The test set also houses a set of trimming tools with which to perform the alignment. When not in use the socket on the transceiver has a shorting link inserted between pin 1 and 7 to enable the p.a .stage to function.

With the frequency coverage of the PRC-6/6 there is the possibility of operating it on the 50MHz amateur allocation in the f.m. section of the band. However, although these sets are available on the second-hand market the batteries may present a problem. Fortunately though, there is a large space available though that should lend itself to some form of NiCad pack of cells, or even a small inverter operating from a couple of D cells.

Timely Innovation

I think the BC-611 was something of a timely innovation. Especially when you consider that the replacement, the PRC-6, used 15 valves in place of five! It also had a more complicated battery requirement, still only had a quoted range of 1 mile, and weighs two pound more!

Both the 611, and the PRC-6, show an insight into miniaturisation, clever design, and an extremely useful end product. One of the better things to come out of war funding. Finally, my thanks go to **Paul Thekan N6FEG**, and **Bob Warner** for information and photographs of the BC-611 and PRC-6 **PW**

References: Teil I-3, Der Funkgeratesatz PRC-6/6, Der Bundesminister fur Verteidigung, Bonn. (20th January 1962). Description of Radio Sets SCR-536-A, B, C, D, E, F. Technical Manual, US Army Radio Service, 1945.

Valves Used

PRC-6/6

DF61	V1, 2, 3, 4, 5, 6, 7, 10, 15
1AD4	V9, 12, 13
5672	V8
5678	V14
6397	V11

BC-611

3S4	r.f. amplifier/ p.a.
1R5	receive mixer/ oscillator & transmit oscillator
1T4	receiver i.f. amplifier
1S5	a.v.c./ detector/ transmit microphone amplifier
3S5	Receive a.f./ transmitter modulator

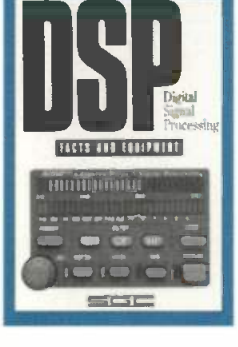
Digital Signal Process

By Rob Mannion G3XFD

Consider DSP as an optional 'add-on' - Equipment such as the MFJ-784 provides you with the choice.

Rob Mannion G3XFD has gained much experience with equipment fitted with digital signal processing during the last three years. And following questions from readers, Rob sets out to answer the often asked question 'Is digital signal processing an option for me'?

Waters & Stanton kindly loaned me the DSP unit I tried with my Alinco DX-70. The **MFJ-784B costs £239 plus postage.** Details of this unit and others can be obtained direct from W&S. Additionally, readers who did not see the offer of a free booklet from the **SGC Corporation** in the USA entitled *DSP Facts & Equipment* (see page 11, September issue) can obtain one free by contacting **Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835, FAX: (01702) 205843.**



Readers often write to me, or ask during QSOs or shows and rallies whether or not I think that digital signal processing (DSP) is "all it's made out to be"? However, the question that's most often directed to me is: 'I'm very satisfied with my present rig...is it worth 'trading-up' to a transceiver with DSP fitted'?

So, it's with the various questions 'ringing in my ears' and for my own benefit (I wanted to see just how useful DSP would be when it was used in conjunction with my Alinco DX-70) I got busy. And I must say that my excellent little transceiver is part of the argument I'm going to lay before you! (or debate depending on your stance!).

This article is not a review as such. Instead, it's my attempt to answer the questions asked by readers I've met, spoken to on the radio, etc. Despite this, I will mention one particular unit I specifically tried. It was manufactured by MFJ and is the 784B unit I'd seen (and heard) working in Dayton in 1996 (and reviewed in *PW* January 1995 by Ed Taylor G3SQX/N0ED).

At the moment in my opinion no Amateur Radio equipment comes available with true **radio frequency** digital signal processing. The DSP we're being offered at the moment is done at high audio frequencies, in other words it's still **audio processing** (albeit very effective).

Mind you, r.f. DSP has been around for many years now although it has been well out of our reach for just as long! And in fact my colleagues and I in broadcasting were using true r.f. DSP specialised TV field strength measuring receivers in the late 1970s and 1980s. They were far ahead of their time, quite temperamental (built by the BBC for use by them and the Independent Broadcasting Authority).

Eventually true and indisputably r.f. DSP will become available to the non-professional user. Then the incoming analogue r.f. signal will be converted via an A-to-D converter, the i.f. will be truly digital - with the many benefits the 'treatment' can bestowe via complex processing, before it eventually appears as audio for communications purposes. Until then, manufacturers will continue to provide what is in effect digital audio processing tacked onto a conventional receiver.

Several years ago I disagreed with Kenwood's claim that the DSP stage (at high a.f. of course) was an intermediate frequency. However, I'm slowly beginning to come round to the realisation that their claim is arguably right. Especially as I've now seen a full circuit of the TS-870 and the DSP does appear to be treated as an 'intermediate frequency'. So, perhaps Kenwood have started the process off with their effective transceiver.

However, this article is aimed at helping you to decide (like me) whether or not adding-on DSP to your receiver is a worthwhile option - not to get involved in interminable technical designation dissertations (how's that for 'techno-speak'?).

Good RF Filtering

One of the reasons why I have commented so frequently recently in reviews regarding DSP is that in my opinion manufacturers are tending to include DSP as 'standard' in equipment in particular price ranges, while still making (in most cases) narrow r.f. filtering and (in some case) electro-mechanical r.f. filtering an option. In effect I think they're going for the cheaper option, leaving the end-user 'the choice' of adding traditional high quality filtering ourselves - at a price.

In my opinion, good r.f. filtering (via crystal and/or electro-mechanical filtering) is very necessary. Once this is fitted, I think that the advantages of audio DSP can then be used to full advantage. And that's why I used my Alinco DX-70 for the tests...because the manufacturers have in my opinion done the right thing and provided what's needed in the first place...and all I have to do is to add DSP and that's just what I did!

The Idea Works!

Before going any further, I should make it very plain that the audio frequency DSP in common use does work and works very well. On the various transceivers I've tried (not all fitted with full DSP of course) the level of processing fitted has always been useful and often proved spectacularly successful.

However, there are limitations to audio filtering and to cite an example I'll hark back to the days when I - along with most keen Amateur Radio operators - only had what were in effect very basic receivers. And nobody would claim that a simple direct conversion receiver (where the i.f. is in effect at audio frequencies) is made **a better receiver** when used with a specialised audio filter. All the filter can do is help to narrow the audio bandwidth to such an extent that (with a bit of luck!) the wanted signal can be heard (albeit it often severely distorted and very often limited to reception of c.w. only).

Of course, I used audio filters in conjunction with more sophisticated receivers too - including those that used the extremely useful 'Electroniques' factory-built 'front-ends'. The various designs published using the pioneering units usually incorporated basic crystal filtering and when used with simple audio filtering and i.f. 'off-setting' techniques proved very helpful.

Nowadays things have progressed and there are some excellent factory-made transceivers around. I know...I have the privilege of trying them out. But when complete 'modularised' r.f. DSP unit become

ing - An Option?

available...perhaps we'll see a dramatic resurgence of 'home brewed' receiver building incorporating them...just in the same way the 'Electroniques' ready-built front-ends did 30 years ago?

But until ready-made r.f. DSP units are available, you can use an a.f. DSP to advantage. And in some instances just one benefit makes the expense worthwhile! (See separate panel).

Static & Noise

Incidentally, the Dayton HamVention always seems to be a good location to test equipment 'on air'. This is because not only is there an enormous amount of static and general QRN on the h.f. bands during the summer (because of summer storms) there's also a lot of activities locally on the bands!

Without exception, all the DSP units I have tried (both at home and in the USA) provided a good degree of DSP 'treated' spectral noise reduction. They all also proved to be effective at noise blanking with ignition type interference although unless you got a keen gardener next door (using one of those infernal, very irritating two-stroke engines which radiate ignition noise extremely well!) this is not so much of a problem nowadays.

Auto-Notch

Perhaps the most useful function (and this is where the debate comes in with me) provided on many 'add-on' DSP today, is the 'Auto-Notch', 'Beat Cancel' 'QRM Killer' or whatever the manufacturer wishes to call the facility. In essence as far as the operator is concerned all that happens is that when the control is selected the interfering signal disappears! (and so will the c.w. station you're listening to if you accidentally select Auto-Notch...**so be warned,** it's **very** effective!).

The Auto Notch or whatever the facility is called, can often handle up to five interfering 'heterodyners', 'Microphone Whistlers' or 'Scratchers' at the same time. **Most effective and very helpful.**

And even on the occasions I've been plagued with strange people joining in with any of the highlighted problems - plus the occasional c.w. version who sits on your ('phone) frequency trying to break up the conversation - cease to be a problem. (You'd have to be really unlucky to attract more than five!).

Obviously, when 'Auto-Notch' is selected, there's bound to be some effect on the final audio quality. But in all honesty the only noticeable effect I have experienced is a very (almost un-noticeable) drop in the audio output level on the various units I've tried.

Swings & Roundabouts

As with any form of filtering - r.f. or audio - there's always a price to pay and it's the old story of 'swings & roundabouts' I'm afraid. And if you've never experienced the effects of narrow band filtering - please don't be surprised at the effects produced. **You don't get something for nothing** with filtering processes, and a narrow bandwidth means just that - you cannot expect broadcast quality sound after the filtering.

Our hobby means we have to use often crowded and extremely busy frequencies under multiple occupancy (just listen to 3.7MHz to understand what I mean). Reducing the bandwidth of your receiver will often minimise the problems - but there's a price to pay with the resultant limited audio bandwidth making the speech less pleasant and more difficult to understand.

However, if you're a keen c.w. operator, you'll really appreciate the benfits of the extremely narrow audio bandwidths available. But again, there's often a price to be paid in that the resultant audio tones can very very tiring to listen after a relatively short time).

Obviously, tunable audio DSP will help a great deal on the crowded bands and if your receiver is already fitted with good quality r.f. filtering... an add-on DSP will help a great deal.

Viable Option

So, to sum up my opinions on the audio DSP units - as an 'add on' I can honestly say the system is certainly a viable option for most of us. The 'add-on' units will help any receiver under modern conditions, but obviously **the better your receiver** the better the results will be with the a.f. 'add-on' DSP unit available at the moment.

Think hard before you part with your high quality (but DSP-less) transceiver. You could find that the external DSP unit could be your answer. They're simple to fit and very easy to use as they can often be plugged straight into the headphone socket (or loudspeaker output) of your existing rig.

In practice I've only come across one problem when using 'add-on' and that was simply cured. The problem was caused by the fact I was using an end-fed antenna ands the r.f. 'broke through' in the audio (after the filter) stages of the DSP unit. The problem only occurred with the end fed antennas and was only noticeable as I was 'listening through' the unit on headphones. A couple of ferrite beads soon stopped the breakthrough.

So, there it is...and I hope I've answered some of your questions regarding audio DSP. But in the end, you have to decide whether it's an option for you, and I can only say once again you've got to hear it in action to believe how effective it can be on your existing rig. You don't have to part with your favourite rig just yet, you can 'add on' to get DSP if you wish....the choice is yours! **PW**

Biggest Benefit?

Which is the biggest benefit offered by the various 'add-on' DSP units I've tried, is debatable. Not because the usefulness is debatable mind you, but because the two most useful facilities provided by most units, namely 'Auto Notch' and DSP noise reductions, both vie for 'top choice.

I've recently written an article for our sister publication *Short Wave Magazine* aimed at helping listeners decide on whether or not 'add-on' DSP was ideal for them. And in the article, aimed at *PW* readers I have similar advice and comments.

For the *SWM* article I tried the American made SGC Inc.'s 'Power Talk' add-on DSP unit. It was very effective...but if you want to read the full account you'll have to see *SWM*!

But joking apart, the reason why I have mentioned the *SWM* article is to convey the correct impression that I have had experience in working with 'add-on' units. And the model I tried out (in my own search for a possible DSP 'add-on') and already mentioned briefly, was the MFJ-784B tunable unit.

I've also tried the American Timewave DSP filter and several others (I'm afraid I cannot remember all the various designations... except they were all American-made!) at the Dayton HamVention.

Antenna Workshop

By Dick Pascoe G0BPS

Dick Pascoe G0BPS 'fishes' around for an explanation of an end-fed half-wave antenna for 50MHz working.

There's a huge number of antennas available for the home station and many many more for attachment to cars and vans. But there are very few for the backpacker or the amateurs who love to take their rig out into the wilds. This particular idea is based on a design by **Peter PE1MHO,** a good friend who visits me quite often.

My own version of the backpacker's antenna is based upon an end-fed half-wave that can be packed away when not in use. The photographs will say much but the main difficulty with any antenna is getting it to resonate. Especially when out in the wilds where an a.t.u. is just unwanted weight.

Fig. 2: The coil and fixed capacitor resonate at about 50.125MHz. The capacitor has its 'legs' insulated.

The antenna shown built here is based around a very cheap glass fibre reinforced (g.r.p.) fishing pole bought on a day trip to France. While in France I was so taken with the idea that I actually bought two to experiment with. These fishing rods, often called 'Roach-poles', have no rings for the line to run through. And many of them are telescopic, the smaller sections collapsing to fit inside the larger elements for storage.

The 3m Roach-pole I bought cost the Franc equivalent of about £3 and the 4m one cost the equivalent of £4.50. The wire I used for the antenna element and the coil, was surplus stuff found at a rally for a pound or so. So, here we have a very cheap antenna that can be used as a walking stick, and even at a push, when the bands are 'dead', to catch a few fish for the evening barbecue!

Fig. 3: Checking for resonance and a 50Ω feed-point at about 50.125MHz.

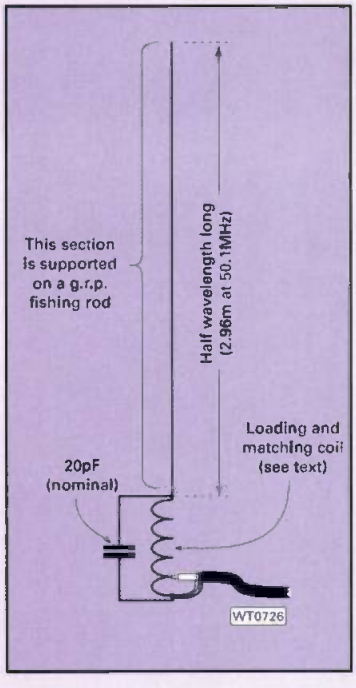


Fig. 1: A simple idea for a portable antenna.

Words Of Warning

But first a few words of warning. During my initial tests I used a longer 7m pole that I already had. But I forgot that it was made of a carbon fibre composite material. **This newer composite material is of course conductive**, and I've found this can be a problem.

Because the carbon fibre material is conductive, any coils wound around the body of the pole are less effective and lossy. Many of the more expensive modern Roach-poles are made up of this carbon fibre composite material and should not be used for antennas (or should be used with caution).

Another strong word of warning, **never use any long pole or mast near any overhead power or telephone lines.**

The end-fed half-wave must have some form of matching system to feed the antenna in the form of a tuned circuit. I used ordinary household mains wire for the coil and wound ten turns around the bottom of the pole. The overall idea is shown in **Fig. 1**.

The coil started out with ten turns of the single strand copper wire of about 1-2.5mm diameter. The coil has a diameter of about 15mm and each turn has about 3mm separation. You could try a coil with seven and a half turns at 20mm diameter, again spaced at 3mm, as well if it fits better.

The wire I used, I found in the heavy flat cable used for household wiring. Lightly tie the ends of the coil in place, but do not fix it in place, as you may have to make some slight changes later.

When made to either of the two 'recipes' I've given, I found that the coil will resonate on 50MHz with a capacitor of about 20pF. Take the 20pF capacitor and insulate the legs and solder it between the two outer ends of the coil.

The coil and capacitor combination is shown in **Fig. 2**, where the capacitor is to the right of the coil. Next take the feeder coaxial cable and cut back the outer insulation about 25mm and discard.

Unravel the screen and separate it from the inner. Twist the screen into a single 'leg' and lightly tin it. Trim back the inner insulator (about 5mm) a little to expose the inner conductor. Solder the screen leg to the corner of the first bend and the inner to the second coil next to the shield.

Now comes the difficult part, with either a dip meter or, if you have access to one, an MFJ Antenna Analyser (model number MFJ-259) check the 50Ω matching point and resonance. In our case it should be somewhere between 40 and 60MHz.

By moving up the coil a turn at a time, you should find a reasonable match to 50Ω at about 50.1MHz. To get an even closer match to 50Ω, try moving the inner

conductor around the coil a little until the exact resonance and match is found.

An alternative method is to try opening or closing the spacing of the coil. When this is achieved tape (whip) the end in place. Note at this point there is no need to be worried about the actual value of the s.w.r., you are only interested in finding the resonant frequency of the tuned circuit formed by the inductor and capacitor.

Hopefully the frequency of resonance will end up at about 50.125 or so. I've shown my set-up and the MFJ analyser in **Fig. 3**, where you can see the match of 50Ω but with an s.w.r. that's through the roof.

Fig. 4: Checking to see 'if it works' before committing yourself to buying an expensive fishing pole. (I've used the coaxial capacitor in this version).

Fig. 6: The final loading coil wrapped up in electrician's insulating tape. The coaxial capacitor runs up the pole under the tape.

Low Power Only

Most small ceramic capacitors will handle low power only. They cannot handle high power in these tuned circuits, but they should handle QRP levels well enough. For power levels above a few watts, up to 100W or so, then a much larger (physically) capacitor will be needed.

Happily such capacitors are also easy to make, especially if you have some spare lengths of any other thin 50Ω coaxial cable available. Coaxial cable of 50Ω characteristic impedance has a self capacitance of about 1pF per 10mm which we can use.

To make the required 20pF capacitor, take about 300mm of coaxial cable and trim one end back about 50mm with the outer shield and the inner separated. Trim the inner insulation about 5mm. Cut the other end back so that the shielded length of the cable is about 200mm. This length excludes the ends we have just trimmed. Now cut back the braid about 5mm leaving the inner plastic coating in place.

Next check the tuned circuit once more, it may have varied a little as you've changed the capacitor. If it is so, cut back the coaxial cable a little or squeeze (or open) the coil a little. We now have a capacitor and coil combination that will handle the high power. Solder this in place of the capacitor as shown in the photograph of **Fig. 4**.

The advantage of using coaxial cable instead of a heavy duty capacitor is that it can be taped along the pole out of the way. Once you have got the tuned circuit at feed-point to 50Ω you can add a little over a half wavelength of wire (the element) and trim its length back slowly until you get the lowest s.w.r.

When you have achieved the lowest s.w.r. then, by putting a small clip at either end of the wire, you can clip one end to the tuned circuit and the other to the top of the pole ready to use. The antenna element may be unclipped for stowing.

Fishing poles are easy to use, quick to set-up and do many jobs, I checked with my local fishing shop and found poles similar to the ones I bought in France. In my local fishing shop a 4m pole cost £7.99. I found various lengths and cost rising to an eight metre pole costing £25.99.

During the setting-up and testing of the bamboo model I tried first, **Fig. 4**. The photograph of **Fig. 5** shows a coil and coaxial capacitor setup without the pole in the way.

I listened on 50MHz, which at the time seemed to be wide open all over. But of course and typically, when I was ready to transmit the band died the moment I put the antenna on the air!

I did find a couple of beacons but as often occurs, no activity was apparent. Even at 100W the test model, and later the pole version worked very well with an s.w.r. of less than 2:1.

After testing I opened the base of the pole and wound the wire around the middle section and held it in place with some tape. It was out of sight and ready for use on my next holiday and I've shown this set-up in **Fig. 6**.

In use, the fishing pole antenna worked best when held about one metre above ground. Radials could be added to that base but they are not required. The bases of my poles were push-fit covers with a threaded cap on the bottom. Ideal for fitting a post after flipping the sections out. Closing the pole was just as easy, a quick rap of the base on the floor and it all collapsed inside itself.

My idea works not only for the 50MHz band, it can be made up for (almost) any band by changing the coil and capacitor. So, I'll leave you to work out the values for the coil and capacitor that are needed for say 70 or 144MHz. Then you just add wire to complete.

Your comments on this design are very welcome via either the magazine or direct to me.

PW

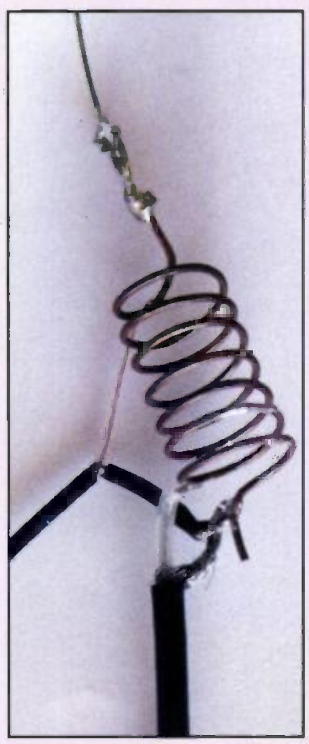


Fig. 5: A 'nude' version of the coil/capacitor for more detail.

Maths - No Real Problem!

Ray Fautley G3ASG, shows you there's no need to be frightened of the maths involved in matching networks. All you need is a calculator and one or two small formulae.

By Ray Fautley G3ASG

The theoretical part of matching antennas to transmitters to obtain the maximum radiated power comes under the general heading of impedance matching. Most modern transmitters require a load of 50Ω to be connected to the antenna, or output, socket.

Many manufacturers state that their antennas have a feed point impedance of 50Ω, matching that of a coaxial cable with a characteristic impedance of 50Ω. So, any 50Ω cable having an acceptably low loss at the frequency in use, may be connected directly between the transmitter output socket and the antenna.

What happens when you don't know the feed point impedance of an antenna? (Let alone what it looks like at the shack end of the feeder!). The practical answer is always use an antenna tuning unit between the feeder and the transmitter (as I've often said before).

However, this article is not intended to be completely practical, it's to show you how to do the maths to determine what 'bits' of inductance and capacitance are necessary to match your antenna feeder to your transmitter.

When you don't know what the impedance is at the shack end of the feeder, how do you determine the impedance at the shack end of the feeder? The best answer to this question is to use an antenna bridge, or a noise bridge, which can provide these important figures. But let me assume that part of the job has been done.

I've assumed that you have already measured the impedance, at the frequency to be used, with some sort of r.f. bridge. If several frequency bands are to be used with the same antenna system, the impedance should be measured at around the centre of each band so that the correct matching components are used for each band. Usually one frequency in the middle of each band will be good enough, although it'll only be absolutely correct at the design frequency.

There are two different cases to deal with. The first is when the resistive component of the antenna feeder impedance to be matched is greater than 50Ω and the other when it is less than 50Ω.

First Example

In the first example, where the resistive component of the impedance at the shack end of the feeder is greater than 50Ω, as shown in **Fig. 1**. Here the impedance to be matched is shown as R_A and X_A and the two matching reactances as X_1 and X_3. The required resistance of 50Ω is shown as R_L and the calculations will be carried out step-by-step.

If R_A and X_A are given as a series combination they must be changed to their parallel equivalents, R_P and X_P (see **Fig. 2**).

Let $p = R_P \div R_L$
Let $q = \sqrt{(p - 1)}$
Determine $X_1 = + (R_L * q)$
Determine $X_2 = - (R_P \div q)$
Determine $X_3 = (-X_P)(X_2) \div (X_2 - X_P)$

That completes the necessary calculations, so now we'll put our problem values in place of the algebra. All the arithmetic is done using a pocket calculator. And as an example, let's assume the impedance appearing at the shack end of the feeder has been measured as 350Ω resistance in series with +250Ω reactance {(300+j250)Ω}, you will now want to transform this impedance into a pure resistance of 50Ω.

So, following the procedure shown in Fig. 2, change 350Ω in series with +250Ω to parallel equivalent where $R_A = 350$ and $X_A = +250$

On the calculator I'm going to use the M+ key means enter into memory and the MR key means recover from memory.

So, the keys to press on the calculator are:
3 5 0 x² + 2 5 0 x²
=
185000
(this is $(350^2 + 250^2)$)
÷ 3 5 0 =
528.5714286
So $R_P = 528.6$ (or near enough!)

Now let's determine value of X_P, where $X_P = (350^2+250^2) \div 250$
MR
185000
÷ 2 5 0 =
740
So $X_P = +740$ (remember the + sign)

Determine p, where $p = (R_P \div R_L) = (528.6 \div 50)$
5 2 8 . 5 ÷ 5 0 =
10.572
(10.6 is near enough!)
So p = 10.6

Determine q as $\sqrt{(p - 1)}$
$q = \sqrt{(10.6 - 1)}$
1 0 . 6 - 1 =
3.098386677
So q = 3.1 (near enough)

Determine $X_1 = + (R_L * q) = +(50 * 3.1)$
5 0 × 3 . 1 =
155
So $X_1 = +155$ (remember the positive sign)

Now determine $X_2 = - (R_P \div q) = - (528.6 \div 3.1)$
5 2 8 . 6 ÷ 3 . 1 =
170.516129
(170.5 near enough)
So $X_2 = -170.5$ (remember the - sign)

Now to calculate the effective impedance of X_2 and X_P in parallel is shown in **Fig. 3**. So, putting in values gives: $(-740)*(-170.5) \div (-170.5 - 740)$

Now on the calculator again, **but do the right hand side** (r.h.s.) first
- 7 4 0 . 5 - 9 =
-910.5
M+ (will be needed later)
7 4 0 . 5 × 1 7 0 . 5 =
126170
+ MR =
-138.5722131
So X_3 is -138.6 (again near enough).

Those few calculations were enough to have determined the complete network for transforming the impedance at the shack end of the antenna feeder. This network matches the input of the coaxial cable {(300+j250)Ω} to the output (50Ω) of the transmitter.

Figures Right?

Can we be sure these figures are right? Has the arithmetic been done correctly? If the figures are correct, then calculating the impedance looking into the network from the antenna feeder end with the antenna feeder disconnected you should find that it is 350Ω

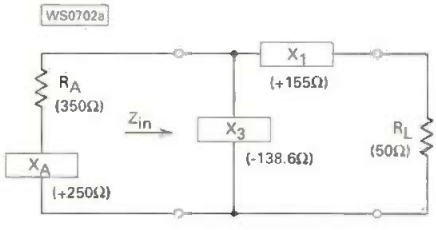


Fig. 1: Here the parallel equivalent of R_A and X_A (RP) is assumed to be greater than RL. (Figure in brackets are for example 1).

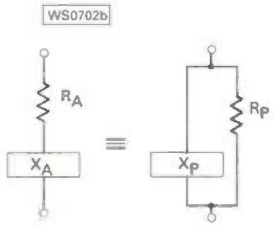


Fig. 2: Changing from series combination impedance to the parallel equivalent values

resistance and -250Ω reactance, or figures very close. Why minus 250Ω? Well, it's so that the antenna system reactance of +250Ω is resonated.

The arithmetical results may not be exactly the same as were expected, as our calculations were only accurate to one decimal place. So, how do you do the checking? It's as long-winded as were the original sums I'm afraid, but here goes.

Have another look at Fig. 1. If the antenna feeder is disconnected from the network, then looking into the network from the part marked Z_{in} the impedance should be (350-j250)Ω. The checking procedure is as follows:

Find the parallel equivalent of R_L and X_1 (call them Rp and Xp) where R_L is 50Ω and X_1 is +155Ω

So, $Rp = (R_L^2 + X_1^2) \div R_L = (50^2 + 155^2) \div 50$

50 x² + 155 x² = ÷ 50 =

26525

+ 5 0 =

530.5

So Rp is 530.5Ω

Now to find Xp, where $Xp = (R_L^2 + X_1^2) \div X_1 = (50^2 + 155^2) \div (+155)$

50 x² + 155 x² = ÷ (+155) =

26525

+ 1 5 5 =

171.1290323

So Xp = +171.1 (near enough)

Calculate the effective reactance of Xp and X_3 in parallel, where Xp = +171.1 and X_3 = -138.6 (similar to Fig. 3).

And on the calculator

1 3 8 . 6 +/- x 1 7 1 . 1 =

-23714.46

+/- 1 7 1 . 1 3 8 . 6 =

32.5 (it will be needed later)

+/- 3 2 . 5 =

-729.6756923 (say -729.7)

Effective reactance of Xp and X_3 in parallel is -729.7Ω

Determine the series equivalent (R_S and X_S) of Rp, Xp and X_3 all in parallel, where Rp = 530.5 and Xp with X_3 in parallel (call it X_4) = -729.7. First find numerical value for $(R_P^2 + X_4^2) = (530.5^2 + 729.7^2)$. We can ignore the negative sign in X_4 as when squared the number will be positive

5 3 0 . 5 x² + 7 2 9 . 7 x² =

281430.25

7 2 9 . 7 x² + key

813892.34

MR (needed later twice)

C Now clear the display

To find R_S, where $R_S = (Rp * X_4^2) \div (Rp^2 + X_4^2)$

$= (530.5 * (-)729.7^2) \div 813892.34$

5 3 0 . 5 x 7 2 9 . 7 +/- x² x 5 3 0 . 5 =

282471138.8

÷ MR =

347.0620436 (or 347.1 near enough)

So series resistance equivalent (R_S) is 347.1, nearly 350!

Now for the effective series reactance (X_S) where $X_S = X_4(R_S^2) \div (R_S^2 + X_4^2) = (-729.7)*(530.5^2) \div (530.5^2 + 729.7^2)$

7 2 9 . 7 +/- x 5 3 0 . 5 x² x 5 3 0 . 5 x² + 7 2 9 . 7 x² =

205359653.4

÷ MR =

-252.3179582

(or -252.3, remember that it's negative).

So, after all that you have the answer! R_S is 347.1Ω and X_S is -252.3Ω. Both figures near enough. (X_S is negative so as to resonate with the positive X_A) So after all that, we've got to the end of the arithmetic check!

Second Example

The second example is where the resistive components of the impedance at the shack end of the feeder is less than 50Ω. The matching network is shown in **Fig. 4** and the design procedure as follows.

If the resistance and reactance are given as a parallel combination they must be changed to the series equivalent. In our example R_A and X_A are already given in series form.

Let $p = R_L \div R_A$

Let $q = \sqrt{(p - 1)}$

determine $X_1 = + (R_A * q)$

determine $X_2 = -(R_L \div q)$

determine $X_3 = X_1 + (-X_A)$

Here's another worked example. The impedance at the shack end of the feeder connected to the antenna is measured as a series network of (18-j820)Ω impedance. This impedance is to be transformed to a pure resistance of 50Ω. We'll put these figures into the above procedure. Calculators at the ready!

R_A = 18Ω and X_A = 820Ω

determine $p = (R_L \div R_A) = (50 \div 18) = 2.777777778$

So p = 2.78 (is near enough)

Determine $q = \sqrt{(p - 1)}$ $q = \sqrt{(2.78 - 1)}$

$= \sqrt{(1.78)} = 1.334166406$

So q = 1.33 (is near enough)

Determine $X_1 = + (R_A * q) = +(18*1.33)$

X_1 = +23.94 (remember the + sign)

Determine $X_2 = \{-(R_L \div q)\} = \{-(50 \div 1.33)\}$

5 0 ÷ 1 . 3 3 =

-37.59398496

Then X_2 = -37.59 (near enough and remember the sign)

Determine X_3, where $X_3 = X_1 + (-X_A)$

X_3 = +23.94 + ({-}-820) = 23.94+820.

So X_3 = +844 (near enough)

In the drawing Fig. 4 you see the complete network to transform the feeder impedance of 18Ω resistance and -820 reactance to a resistance of 50Ω. Better just check the arithmetic!

Again you can check the impedance looking into the network from the feeder end. The sums should give us an input impedance of 18Ω resistance and +820Ω reactance. It'll be positive so as to tune out the -820Ω of X_A.

Find the series equivalent of R_L in parallel with X_2 (call them R_S and X_S)

R_L is 50Ω and X_2^2 is -37.59Ω

$R_S = (R_L * X_2^2) \div (R_L^2 + X_2^2)$ (we can ignore the negative sign in X_2 because when squared it will be positive)

$R_S = (50 * 37.59^2) \div (50^2 + 37.59^2)$

5 0 x 3 7 . 5 9 x² ÷ 5 0 x² + 3 7 . 5 9 x² =

18.05526674 (or 18 near enough)

So R_S = 18Ω

Now find $X_S = (R_L^2 * X_2) \div (R_L^2 + X_2^2)$

$X_S = (50^2 * (-37.59)) \div (50^2 + 37.59^2)$

5 0 x² x 3 7 . 5 9 +/- ÷ 5 0 x² + 3 7 . 5 9 x² =

-24.01605047 (24 is near enough)

Remember it's negative signs so, X_S = -24Ω

Calculate the effective reactance of X_S and X_3 in series (X_S+X_3) = (844+(-24))

8 4 4 + 2 4 +/- =

820

So, Z_{in} = 18Ω resistance and +820Ω reactance. The +820Ω resonates with the -820Ω (the reactance at the end of the feeder) leaving RS = 18Ω.

Now you know how to evaluate the values of reactance necessary to match whatever impedance your antenna system happens to provide you with to the 50Ω required by your transmitter. The only point left to clear is that positive reactances are provided by inductors and negative reactance by capacitors. But you knew that anyway, didn't you? **PW**

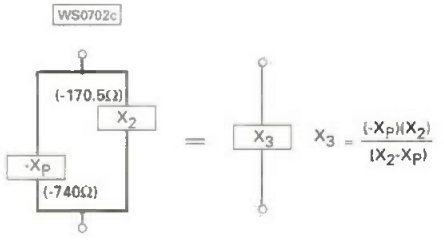


Fig. 3: Calculating the parallel combination of Xp and X_2 as the equivalent value X_3.

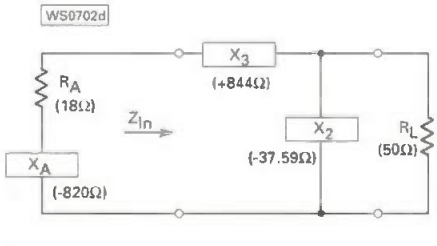


Fig. 4: Here the parallel equivalent of R_A and X_A (RP) is assumed to be less than RL. (Figure in brackets are for example 2).

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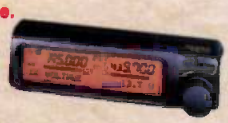

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Dear Martin
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The only HF 100 watt transceiver with 100W on SIX and 20W on 2M! Icom have invented a transceiver that's already two years ahead of the competition. The new mk11 addresses all the minor shortfalls that existed on the mk1. Don't mess about, just order one. CTCSS encode as standard.

RRP £1195

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Who says they are on back order! We have had a constant supply since their introduction. An HF plus Six metre transceiver for a very competitive price. Reviewed by Peter Hart, Rob Mannion and Henry Lewis and they all say the same - easy to use, good RF performance and good value for money. Place your order here...

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R7000 NEW!	Latest 10-40m vertical (80m optional)	£369.95
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AV-3	14-21-28MHz vertical 4.3m long	£94.95
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AP8A	8 Band Vertical	£229.95
APR18A	Radial Kit	£54.95
40-2CD	2-ele 40m Yagi	£489.95
A3S	14-21-28MHz Yagi	£389.95
A3WS	12/17m 3-ele Yagi	£289.95
A103	30m Extension A3WS	£119.95
204CD	4 ele 20m Yagi	£489.95
154CD	4 ele 15m Yagi	£239.95
D4	Dipole 10/15/20/40m	£249.95
D3W	Dipole 12/17/30m	£199.95
A4S	3-4 ele Yagi 10/15/20m	£439.95

MyDel antennas

MULTITRAP

Built exclusively for MARTIN LYNCH, the new wire antenna is trapped for 80 through to 10 metres, uses heavy gauge multi strand plastic-sheathed wire, heavy duty 1 kW traps and totals only 20 metres in length. It's very easy to install, takes minutes to tune, guaranteeing an SWR of less than 1:5:1 on spot frequencies throughout the entire 5 bands. A far better alternative to the old G5RV antenna. Impedeance: 52 Ohm. Overall length: 20m. Power Handling: 1kW. Max SWR: 1:5:1. Weight: 2.5Kg. Input socket: SO239.

£79.95 p&p £7.50

MEGATRAP 160M - 40M

£99.95 p&p £7.50

Microwave Modules

Sole UK Distributor, Martin Lynch & Son

MML144-100LS	2m, 3W in, 100W out Linear plus Pre-amp	£219.95
MML144-100S	2m, 10W in, 100W out Linear plus Pre-amp	£199.95
MML144-30LS	2m, 3W in, 30W out Linear plus Pre-amp	£99.95
MML70-100S	4m, 10W in, 100W out Linear plus Pre-amp	£199.95
MML50-100/3	6m, 3W in, 100W out Linear plus Pre-amp	£219.95
MML50-100S	6m, 10W in, 100W out Linear plus Pre-amp	£199.95
MML50-30LS	3m, 10W in, 30W out Linear plus Pre-amp	£99.95
MMT144-28HP	New High Performance 2m Transverter	£299.95
MMT70-28HP	New High Performance 2m Transverter	£239.95
MMT144-50	6m Drive, 2m 10W Linear Transverter	£199.95

Mobile Home 'Ham'

By Dennis Hartwell G0VOV

Now he's retired Dennis Hartwell G0VOV says that for him living in a 'mobile' home is the ideal site to operate his Amateur Radio station from... read on to find out more.

For most of my life I have lived in a semi-detached house. I had neighbours on one side, only a cavity brick wall away and my neighbours on the other side, although detached, were still only about 2m away.

I had a small garden, about 10 x 6m tapering to 2m wide at the end. No room for an antenna farm! This, I decided was not an ideal set-up for my planned retirement hobby of Amateur Radio.

My offspring had moved on, so a 3 bedroomed house was no longer required, the mortgage was mostly paid off, so I looked around for an affordable home in the country. After many visits to Mobile Home Park Estates around the Countryside, I found the ideal spot with a garden backing onto hillside woods.

Dennis G0VOV found the ideal spot for his 'mobile' home with a garden backing onto hillside woods.

The trees at the end of G0VOV's garden came in handy for stringing his G5RV half-wave dipole up while his vertical collinear sits comfortably on top of a scaffold pole.

I sold my house, paid up the mortgage and bought a home outright and even had a little over to buy a good radio later on. And I have now lived in my park home for over four years. I successfully run an Amateur Radio station without signing 'Mobile', as once the unit (home) is sited on its base with all services connected it then becomes a permanent address.

Mobile homes are pre-fabricated bungalows which are factory built on a rigid steel chassis. They are fitted with wheels to enable them to be moved about the factory and then onto their permanent base, hence they are 'mobile' within the meaning of the Mobile Home Act.

Once installed on site the homes are connected to all the mains services and then bricked up to the chassis. The homes are double glazed and centrally heated and are offered fully furnished. The insulation is often better than most conventional houses.

The price of mobile homes vary with the size and site location. However, they are generally on a par with a small sized flat in the outer London area.

Most homes are between 3 and 6m wide and 9 to 15m long. The sloping roof has metallic tiles, the rain gutters are plastic and are easily reached with a step-ladder.

Some even have lofts which stretch the length of the home and also room in the garden for a clothes line. So, there is plenty of scope for experimental antennas for the radio enthuiast!

Successful Operating

I currently operate on the h.f. and 144MHz bands successfully. My h.f. antenna is a G5RV half-wave dipole strung between two trees at the end of my garden.

The v.h.f. antenna is a vertical collinear on top of a scaffold pole about 20ft overall in height. It radiates approximately to a 80km radius with 30W of power.

My first QSO I had from my mobile home was with LX3UF (Bulgaria) who gave me a five and nine report. Since then I have had many QSOs around the world including VKs on 100W power.

The Neighbours

The neighbours are situated further away from me in my mobile home than when I lived in a semi-detached house. By law, the homes have to be 6m away from the next home either side.

Since the Mobile Home Act 1983 many changes and improvements have been made in the way that estates are run. They are now more 'user friendly' than they were once regarded.

Mobile home parks are held in high regard by local authorities who licence and regulate them. Some of the estates are privately owned and some are run by local authorities and housing associations.

Most estates are situated in country and coastal areas which minimise interference from industrial and domestic sources. A bonus for the Amateur Radio operator!

Ideal Radio Shacks

The larger homes usually have an office or study built-in which make ideal radio shacks. Of course, if you order your home from the factory, you can design your own layout with shack to suit to you.

There are several monthly magazines on the book stalls that specialise in Park Homes. They list prices and locations of estates with write-ups on the latest models, etc.

The Government have issued a booklet entitled *Mobile Homes* which is a good guide to regulations and your rights. It's available free from Council Offices, libraries and Housing Aid Centres.

Recommended Life

Moving and especially retiring to Mobile Home Parks is an option being taken by an increasing number of people nowadays. I can certainly recommend it as a way of life and can honestly say it is most certainly possible to operate and enjoy our wonderful hobby of Amateur Radio from a Park Home.

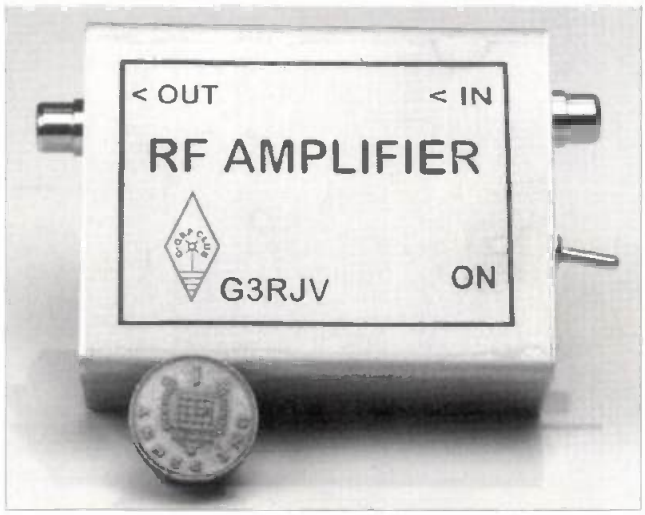
So, if this is an option you decide to go for, I wish you good hunting in your search for a good location to set-up home and station in.

PW

Carrying on the Practical Way

By George Dobbs G3RJV

This month's project...an r.f. amplifier built using the 'island' p.c.b. technique.



"Oh! What a snug little island, a right little, tight little island"
Thomas John Dibdin 1771- 1841

The Rev. George Dobbs has the ideal project for castaways, as this month he describes 'The Island RF Amplifier' using only seven components. And although it's your choice of records, you'll find a complete Amateur Radio library waiting on the 'desert island' for you!

Building on 'Islands' is the main topic this month. But you don't really need your choice of seven records!

Using islands has come up because it's a common misconception amongst many Radio Amateurs that they have to etch a printed circuit board in order to build a practical circuit. In fact, this column has usually featured circuits and projects which do not use etched boards, frequently the projects have been built using that version of point-to-point wiring called 'ugly' construction.

With the ugly method grounded components are wired direct to a base plate and the other parts of added to them. But I know that many constructors don't like this method because it really can be ugly and they want their projects to look better.

Several Methods

There are several methods of construction which look very much like a conventional p.c.b. and allow quick and easy construction of small one-off circuits. One method I sometimes use is Island Construction.

Using the island method a piece of un-etched p.c.b. material forms the groundplane of the board and small pieces of blank printed circuit board material are glued to this groundplane. These islands form the connection points for the components in the circuit.

A further advantage of using islands is that it's a form of surface mount construction: the connections are soldered on the top side of the board (see **Fig. 3**). This does away with the need to drill all those little holes, the really irksome part of making a conventional p.c.b.!

Surface mount boards are also more tolerant of lead spacing. Printed circuit boards have an annoying habit of requiring components with a lead spacings which do not match the available parts...and a surface mount board is very forgiving of component spacing.

Designing Easy

Designing an island board is very easy. My usual method is to take all the parts which are required for the circuit, a soft pencil, an eraser and a sheet of squared paper.

The actual parts to be used in the circuit can be laid on the paper and the proposed system of islands marked out in pencil. Usually with a little re-arrangement and some use of the eraser, the circuit can soon be translated into a practical layout.

Next, I then take a ruler and a pen and draw the pattern of islands in a neat form. This can form the basis for cutting the islands from the p.c.b. material. (I always use off-cuts of fibre glass printed circuit board which is easy to cut with a small hacksaw).

So, now I've described the method, let's use it! We're going look at a practical and very useful, circuit built using 'islands'.

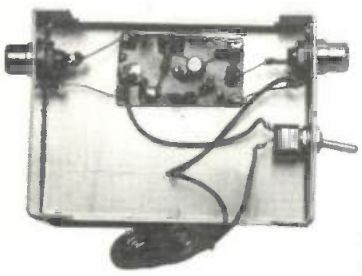
Practical Circuit

The practical circuit shown in **Fig. 1** is a simple broad-band radio frequency amplifier. The circuit originated (I think) with **George Jessop G6JP**, many years ago and I was reminded of it by **Frank Lee G3YCC**.

I've built several ugly construction versions of the amplifier and found it useful in a variety of applications. It uses only one transistor, three resistors and three capacitors.

The original version of the circuit used the BFY90 (but I used the equivalent 2N918 because I had several of that type). In essence, the circuit is two coupling capacitors linked through a resistor, R3. The transistor is connected across this resistor with its base to the input end and collector to the output end. The emitter is grounded.

The amplifier can be self contained and powered by a PP3



Overall view of the completed project. George G3RJV left room so he could add other items as projects like this tend to 'grow' into others!

battery or it may be run from an 12V supply. This can perhaps be from the piece of equipment for which it provides the amplification.

The amplifier should provide some 20dB of gain over the whole of h.f. and offers useful gain into the v.h.f. part of the spectrum. (The 2N918 is usable to 600MHz and the BFY90 to 1.2GHz). Both devices ought to provide worthwhile gain on 144MHz with relatively low noise.

Depending upon the supply voltage, R3 may require some adjustment. Ideally the amplifier needs to draw around 5mA of supply current. The value of 680Ω worked well with a 9V battery

The Lay-Out

As previously mentioned, the annotated photograph shows the layout of the island board. The size is not critical and my board was around 35 by 20mm. This provides more than enough room for the circuit.

Making the board much smaller will result in having to make very small islands for the component connections. My islands were either 5 by 10mm or 5 by 5mm according to their placement or number of connections they have to carry.

You should use good **quality glass composition** p.c.b. material and begin with the base board (or groundplane). A 'Junior' hacksaw makes a good cutting instrument.

Mark out the size with a pencil and cut from the copper clad side. (It's also useful to clean the copper at the beginning before any cuts are made as it's far more difficult to clean tiny pieces of p.c.b. material).

If you own a good quality (sharp) pair of 'tin snips' these can also be an effective cutter. The advantage of using tin snips is that it's easier to get a clean straight line. But remember that p.c.b. material can play havoc with cutting edges as many of us know from blunted and broken small drills.

After cutting the small islands, sand around their edges to remove any burrs of copper which could short the island to the groundplane. The islands are now glued into place following the pattern shown in the photograph.

If you are patient, I advise the use of 'Araldite' epoxy resin adhesive but this does mean the board has to stand until the next day before it can be used. However, you can use the Araldite Rapid version and Super Glue may be used and I have had success using Uhu Glue.

Editorial warning: Please take care when using epoxy resin adhesives and do not allow it to come into contact with your fingers. The same also applies with the 'Super glues'.

The next stage is to tin all the islands with solder. Heat the island with the soldering iron, apply the solder and wipe a clean layer right across the island. This is also a good test of the adhesive or glue that has been used!

The components are added by bending the leads at 90° to fit between the relevant islands. I also like to add a small flat portion of lead for soldering by bending out the end of the lead at 90° and cutting the surplus to about 1mm.

When you start building, my advice is to begin with the transistor and then add the resistors and capacitors. And bear in mind that both the emitter and the screen (scr) of the transistor are soldered directly to the groundplane as is one end of C3.

Checks Completed

After the usual checks are completed, you should apply power to the amplifier whilst measuring the supply current. If the current is in the order of 5mA, all is well. If not, adjust R3 to draw 5mA.

A simple test is to hook the amplifier to the front-end of a receiver and switch it in and out. It will probably overload the receiver front-end and cause all sorts of odd signals to be heard. But it will prove the amplifier works!

I built my island version of the amplifier into a small box. However, although I say "small"....it's really quite huge (75 x 55 x 25 -mm) as I intended to include a PP3 battery so the box is more a battery holder than a circuit board holder!

The battery takes up most of the space. The photograph shows the amplifier board with input and output sockets and an on-off switch mounted in the box. But for some applications the board could be fitted directly into an item of equipment requiring the amplification.

Many Applications

In practice the little r.f. amplifier has many applications. And for example, some time ago I used a version of this circuit to amplify a signal I wanted to measure on my frequency counter.

So, the amplifier can go ahead of a simple home-made receiver to provide front-end gain. One possible application is shown in **Fig. 2**. (Here the amplifier is used as a simple active antenna).

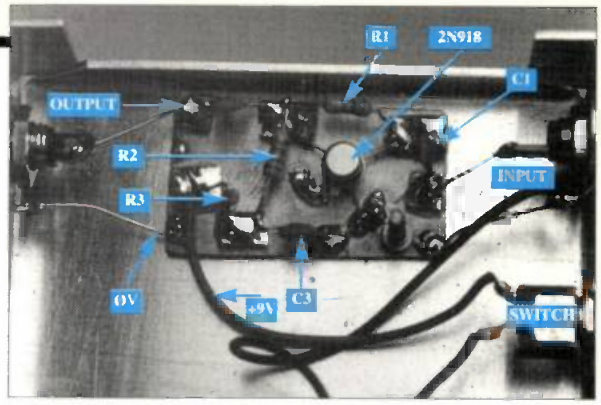


Fig.3: Annotated photograph showing the 'Island' p.c.b. material 'land' technique and component lay-out. The choice of adhesive is important for fixing the 'islands' (see text).

I played about with this application using several cheap and cheerful broadcast receivers. These were solid state (not valved!) receivers with short wave bands and in trying to increase their sensitivity it soon became obvious that some attenuation is required after the amplifier.

Adding a 1kΩ linear potentiometer on the output, with a relatively small coupling capacitor, helped a great deal. In theory, I expected better results by adding an r.f. load to the antenna and I tried several values of r.f. choke on the input but they appeared to make little difference.

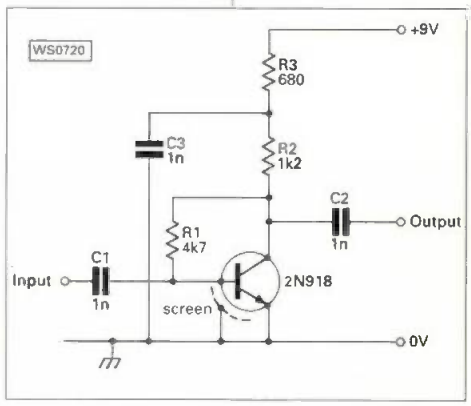


Fig. 1: Circuit of the simple r.f. amplifier (see text).

Useful Addition

Using about a metre of wire as an antenna and with careful use of the output potentiometer, the amplifier proved to be a useful addition to the front-end of the simpler short wave receivers. The suggested circuit is shown in **Fig. 2**.

So, why don't you give this application a try? If you do build the little circuit you will soon find other uses and you may even have to make more of them!

PW

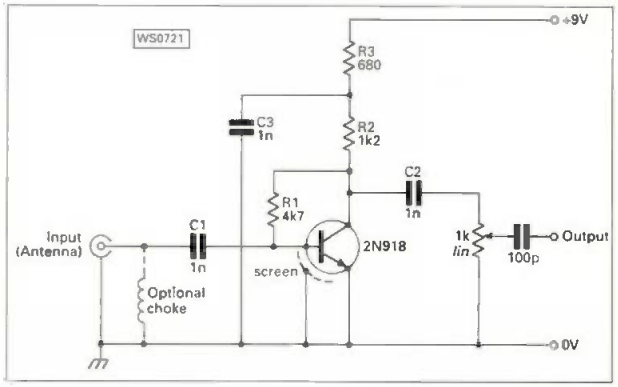


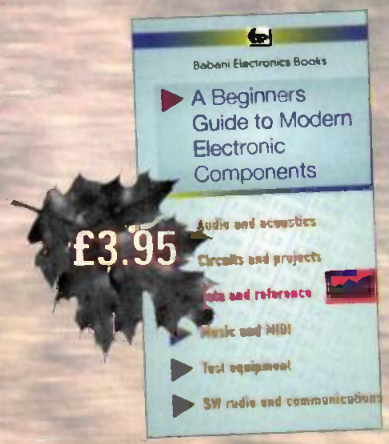
Fig. 2: The r.f. amplifier in the role of a simple 'active antenna' (see text).

PROF

It's approaching the time of year when many radio enthusiasts are starting to think of autumn and winter projects and perhaps forgetting the garden for a bit! So, to help you plan and organise, yourself the *PW* team has a selection of helpful books packed with information, ideas and encouragement!

A Beginner's Guide To Modern Electronic Components

R. A. Penfold



Just starting a Radio Amateur's Examination Course?, or just beginning in radio? If the answer's yes to either question...this little paper-backed book could provide a great deal of help.

The experienced author guides the reader through the modern maze of electronic components, discussing and explaining on the way the intricacies of diodes, capacitors, semiconductors, etc. However, although instructive and very informative this book 'talks' to the reader and not 'at them'. This 168 page book is an **ideal beginner's reference and instructional source** and costs just **£3.95.**

Power Supply Projects

R. A. Penfold

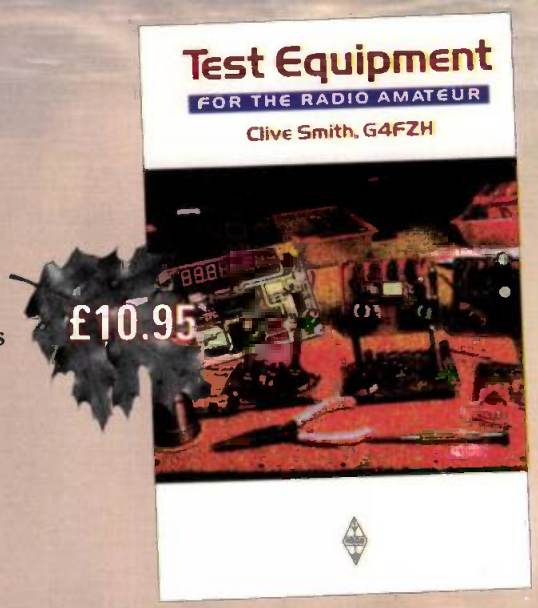
Very often newcomers to the radio hobby or those enthusiasts with little constructional experience are rather put off from trying their hand at building power supplies. But there's no need to be frightened of possible explosions if you follow Robert Penfold's experienced leadership!

Robert covers topics such as ripple voltage, general smoothing circuits, voltage regulations and provides some helpful projects and ideas. Ideal for the beginner and inexperienced alike, this book will prove to be very useful to help the student gain confidence and work safely when building equipment to be used with 'mains' electricity supplies. 92 pages. **Recommended.**

Power Supply Projects costs **£3.99.**

Test Equipment For The Radio Amateur

Clive Smith G4FZH

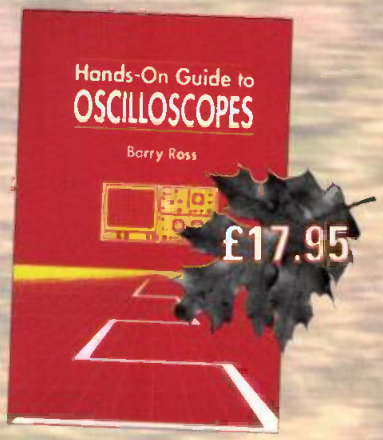


This slim paperback book has become a minor 'classic' - the clear evidence being that it's run to a third edition. The book is a very useful guide describing, as it does using, building and understanding test equipment.

Along with p.c.b. designs you can build projects (including: a d.c. micro/milliammeter, 198kHz receiver and standard frequency source, simple spectrum analyser, power supplies, Wheatstone bridge, and v.h.f. 'dip' meter). The vast majority of the projects in the book originate from the author himself - and he knows his subject well. **Highly recommended** at just **£10.95** for 170 pages.

TO ORDER ANY OF THE TITLES MENTIONED HERE PLEASE USE THE ORDER

FILES

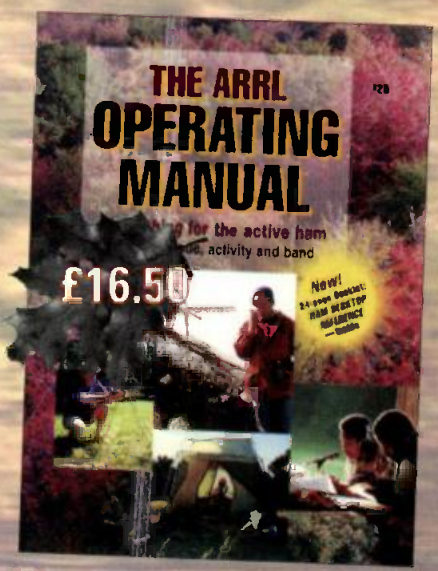


Hands On Guide To Oscilloscopes
Barry Ross

Have you ever hankered after an oscilloscope or been tempted at some you've seen on display? Well, if you've ever shown any interest in using a 'scope but don't have the expertise or knowledge this soft-backed book will surely help.

It covers all aspects of oscilloscope use and covers from the most basic 'scope up to the modern complex 'storage' types. It's well illustrated, and written by an author who spent many years in the oscilloscope industry. 227 pages. **Recommended**. *Hands On Guide To Oscilloscopes* costs **£17.95.**

The ARRL Operating Manual

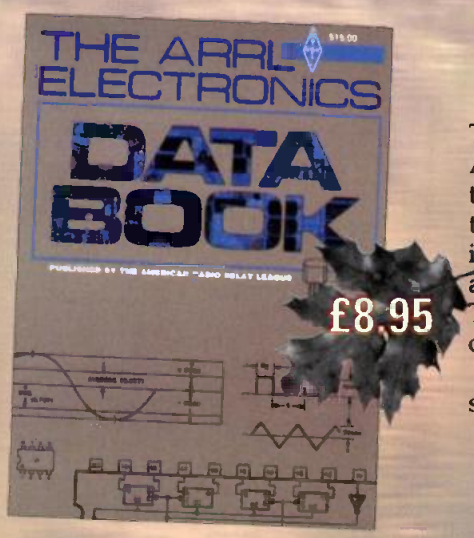


The title on this book is totally misleading and does not do it justice! This is because the book in reality provides an excellent manual for both the absolute beginner in the Amateur Radio hobby and the established Amateur. Of course the book has a distinct 'American Flavour' but this is very much to the readers' advantage in its style and approach.

The reader is introduced to radio through short wave listening (complete with an interesting look at the origins and present activities of the Voice of America) right through to radio clubs, operating, contests, operating portable, data communications, etc. On reading the book the British reader will be made very aware of how 'high profile' the hobby is in the USA.

Although the European reader will have to be aware of differing frequency allocations available to North American readers, the book provides an excellent introduction and reference manual to the hobby and a refreshing read. And as a bonus there's an extremely useful 24 page 'desktop reference' booklet to help you when you're on the air (bearing in mind the frequency allocation differences). Approximately 300 pages. A **highly recommended reading and reference source.**

The ARRL Operating Manual is available for **£16.50.**



The ARRL Electronics Data Book
Edited by Doug DeMaw W1FB

This long established soft-backed book - edited by a Radio Amateur who needs no introduction to *PW* readers! - is packed throughout with useful data, 'building block' circuits, technical theory for reference, i.c. pin-out details and a host of information to help in the hobby. It provides an enormous amount of data to help the constructor and experimenter alike. Toroids, coils, filter design details, using specific i.c.s, all are covered.

Approximately 200 pages make up this essential reference source which costs just **£8.95.**

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Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors.

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

BARGAIN basement

Compiled by Zoë Crabb

FREE ADVERTS

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For Sale

2 brand new 8A Variacs 110V, £20 each. New 1960s transistor tester, £20. Valve tester, Mullard, with cards, £30. Plus other items of vintage test equipment, offers. Michael Dranfield, 6 Calesdale Close, London Road, Buxton, Derbyshire. Tel: (01298) 73492 night.

2m-70cm QSYing sale: Azden PC-6000 25/5W 25/12.5kHz plus airband, £150. Two Yaesu FT-23R, £140 and £110 (marked). Trio TR-9130, £300. Yaesu FRG-9600, £250. Also other items + hi-fi for sale, s.a.e. for lists. Please write to Keith Burrows, 10 Basil Street, Stockport SK4 1QL, messages (with luck... via pensioner!) on 0161-477 5303.

100MHz scope HP1741A dual-trace with manual, £145. 15MHz Gould OS250B dual trace with manual, £55, both v.g.c. John, Coventry. Tel: (01203) 450476.

American Heathkit HW17 2m (144MHz) base or mobile, complete with HW17-A f.m. transmitting module and HW17-1 mobile power unit, 12V, all manuals, collector's item, good condition, £50 plus carriage, 1960s era. G8AYK, Burnham-on-Sea. Tel: (01278) 784570.

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AR88D, £65. GRC-9 complete station, £180. BE-201, £80. FT-101E, £180. Eddystone S870, £50. WS19 for restore, £70. Collins 180K-3 a.t.u., v.g.c., £50. Wanted military sets, RXs, TXs, any condition, age. Tel: Worcs (01562) 743253.

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Copies of Newnes *Radio & TV Servicing*, most early volumes to 1966, £6 each plus postage, pair of WWII field telephones, type L, £15 plus postage. Tel: Aberystwyth (01970) 890563 **not Sundays please.**

Datong filter FL3, c/w instructions and power adaptor, £50. Browns headphones type F, offers. Tel: (01262) 604823.

Decca radiogram cabinet, Beau front, circa 1937, fitted complete audio system. Panasonic SGHMO9A turntable radio, 3-band, 2 tape decks, graphic equaliser, CD terminals, 4 speakers, multi-change switch, instruction book, £370. Tel: (01923) 249133.

Drake T4XC MS4 R-4C 6kHz filter, Sherwood mods, 2 filters, spares, fully crystals, offers. Collins 755-3C i.c. valves, spare valves, SP3 filters, £700. AVO gen III, v.g.c., £50. 'Phone Bill on 0141-562 4571.

Drake transmitter type T.4XC and Drake receiver type 4RC for sale with operating manuals for each. Tel: Norfolk (01553) 840373.

For sale or exchange Reception Set R107, g.w.o., 1.2/17.5MHz or exchange for 1155 or R210 valve, £70. Tel: (01203) 440637.

FT-277ZD 160-10m (1.8-28MHz) as FT-101 + FTV901R transverter 2m (144MHz) insert, £450. FT-7B 80-10m (3.5-28MHz), 50W variable, mobile h.f., £220. IC-735 h.f. transceiver, £550. KW Ezee match a.t.u., £75. Alan G4OJN, QTHR. Tel: Essex (01277) 624386.

FTDX401 updated, pair QQV0640s, outputs 175W c.w., 300W p.e.p. out, inc. 1.8 and 10MHz WARC band, 8-pin power mic., no drift, hear it on the air, £200. Other working, £150 o.n.o. Tel: 0181-858 1448.

IC-R7000 receiver, 25-2000MHz, good working order, £350 o.n.o. Racal RA1792 h.f. receiver, good working order, £550 o.n.o. Rotator, small domestic type, £20 o.n.o. Tel: Cheltenham (01242) 863631.

Icom 706 MkII, mint, boxed, £850. Heath HW9 QRP TX/RX plus matching a.t.u. and s.w.r. meter, v.g.c., manuals and boxes, £350. Yaesu FT-767 h.f. TX/RX, boxed, £750. Tel: Bristol (01454) 887461.

Icom 735, mint condition, hardly used, boxed with Kenwood low-pass filter, £550 o.n.o. Peter, Lancashire. Tel: (01204) 385466.

Icom 737A h.f., boxed, £875. IC-706 with remote lead, boxed, £675. IC-R7000 RX, mint, boxed, £500. Azden PCS 7500 6m (50MHz) f.m., 50W mobile, c.t.c.s.s., boxed, £235. IC-3220H 2m/70cm (144/430MHz), boxed, £295. IC-24ET 2m/70cm (144/430MHz) hand-held, boxed, £180. Eddystone RXs 1990R/I, 770R/2, part ex. Bob, Kidderminster. Tel: (01562) 757480.

Icom ICR70 receiver, 100kHz to 30MHz, £225. MFJ Grand Master memory keyer MFJ484C, £60. SMC monitor scope, £60. All excellent condition with manuals. Ray G3IOI, Essex. Tel: (01268) 733035.

Kenwood 680S h.f. + 6m (50MHz) transceiver, 50MHz (10W), h.f. 100W, boxed, g.w.o., £600 o.n.o. Tel: (01872) 270679.

Kenwood TM231E 2m (144MHz) mobile, boxed, v.g.c., £125. Kenwood TM431E 70cm (430MHz) mobile, boxed, v.g.c., £125. Tel: Staffs (01283) 716634.

Kenwood TR-751E 2m (144MHz) multi, mint, boxed, £350. Yaesu FT-8000R 2m/70cm (144/430MHz) mobile, £300. Yaesu FT-50R 2m/70cm (144/430MHz) handie, £200, both boxed, three months old, all less then three hours use. Gary on 0151-327 2296 before 9pm.

Kenwood TS-570D 100W h.f. d.s.p. TX, £1150. Yaesu 50R 2m/70cm (144/430MHz) handy with extra keypad, £200. Also Roberts R861 s.w. s.s.b. radio, £130. All as new. Pete on (01256) 420896 any evening.

Kenwood TS-830S, all amateur bands, 1.8 to 30MHz, very little use and unmarked, £375. Yaesu FT-23/FT73 speaker mic., battery charger NC28C plus new NiCad battery FNB20, £35. Tel: Prestatyn (01745) 857119.

KR400 medium duty rotator + all cables, 2m beam, £100 o.n.o. SEM transmatch with ezitune + top band, £100 o.n.o. SSM 6m Europa transverter, £20, may p/ex any of above for hand-held. Martyn on (01422) 251520.

Linear amp UK, Explorer 1000, excellent condition, £750 o.n.o. G4CRY, York. Tel: (01904) 789755.

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Morse keyer unit, MFJ-452X, interfaces rig with any AT keyboard, 8 x 250 char. buffers, 150 char. type ahead buffer, includes Iambic keyer, l.c.d. read-out, sidetone, with manual, as new, GM3HBT, QTHR. Tel: (01698) 888618.

Nova p.m.r. 15W full coverage v.h.f. mobile for 2m (144MHz) auto toneburst, direct frequency entry on repeater channels, £80. Various M series Pye mobiles 294/296 with conversion info., £10/30 each. David, Peterborough. Tel: (01733) 774725 or E-mail david@dekhan.demon.co.uk

Phillips synthesised world receiver, model D2935 BFO for amateur bands memory storage. Tel: 0181-575 7984.

Pre-war HMV radiograms: Model 521 (1931), £150. Model 581 (1936), in bureau style cabinet, £200. Both in good working condition. Tel: Derby (01332) 700658.

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Racal MkII, v.g.c., £120. Racal RA17, v.g.c., £115. B40-D, manual, speaker, very sensitive, £60. Icom ICR-7000, boxed, remote control, h.f., v.h.f., (two radios into one), excellent performance, mint condition, £600. Swap radios. Tel: 0181-813 9193.

Rapid Results College RAE Course plus various textbooks and revision books, £50. Tel: 0181-854 9589.

RCA MI-8167 h.f. TX, 350W comp. £200 or swap. AR88D, £65. Eddystone 870, £50. Collins auto a.t.u., 180k, £50. Bird Wattmeter TS-2609A/U, £40. Wanted key for Syncal 30 and PRC-320. Ben, Worcestershire. Tel: (01562) 743253.

Rockwell-Collins 755-3C, 325-3A, 516F, ps manual, offers. Eddystone 940, new cap resistors, valves SP, £180. AVO gen. III, £50. Valve tester 160, data manual, £90. 'Phone Bill on 0141-562 4571.

Sony ICF-SW7600G, boxed, still under guarantee, £100. **Trio 2300** 2m (144MHz) transceiver, has fault, but working, boxed, £50. Eddystone model 740, £40 o.n.o. Buyer must collect this item, Murphy A122M vintage radio, offers. John, Bucks. Tel: (01908) 379250.

Standard C58 all-mode transceiver with Daiwa 25W linear, £165. BNOS 160W linear s.s.b./f.m., £140. MuTek mast-head pre-amp with r/f control box, £60 plus manuals. Tel: (01705) 264587.

Tektron CS455 150MHz dual-trace scope, £150. Tel: Birmingham 0121-753 1145.

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Trio TS-520S with s.s.b. and c.w. filters, fan, no mic., g.w.o., good starter rig, only, £180. CW/RTTY interface, G3LIV model with leads, plugs into BBC computer, £15. John GM4AQO, QTHR. Tel: (01592) 874719.

Trio/Kenwood R1000 communications receiver, c/w manual, excellent condition, 200kHz to 30MHz, mains or 12V d.c., original box, £210. Morris, Cornwall. Tel: (01208) 880532.

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Versatower, rise and tilt 50ft with

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Vibroplex Lightning bug key, £75. G3BIK electronic keyer, £50. RM Nimbus AX/2 286PC, £20. Keyboard mouse and 12in colour v.d.u., £40. Roy GW4KGD, Abersoch. Tel: (01758) 712108.

Yaesu 747GX, fitted with f.m. board and narrow c.w. filter (500Hz) in excellent condition with manual, £450 o.n.o. John G3SZM, Worthing. Tel: (01903) 241810 after 8pm and at weekends.

Yaesu FRG-7700 communication receiver, Yaesu FRT-7700 a.t.u., good condition with manuals, boxes, radio has memory with battery back-up, £325 o.v.n.o. Mike, Bristol. Tel: (0802) 375090 (mobile).

Yaesu FRG-8800 with improved front-end filters, d.c. option and all modifications, plus manual, £375. Eddystone EB35 with battery pack, spare connector, all manuals, rare maroon case, £95. Realistic DX160, £60. Tel: (01502) 711880.

Yaesu FRSDX 400, 'Top Band' and all bands, very good condition, £160 o.n.o. or willing to part exchange for hand-held multi-band transceiver, 'phone any time and ask for Arthur on (01634) 712270.

Yaesu FT-101Z, AEA ET-1 tuner, MFJ 1K dummy load and Cushcraft A5, all in good condition, offers. Sam, Herts area. Tel: (01707) 396022.

Yaesu FT-290R MkII 2m (144MHz) multi-mode with

accessories, boxed, v.g.c. and MFJ 5/8l base antenna, £300. Yaesu FRT-7700 h.f. receiver antenna tuner, boxed, v.g.c., £35. Simon G7WIK, Leics. Tel: (01509) 233726.

Yaesu FT-690 MkII, boxed, multi-mode, as new, with charger, batteries, £300. John on (01283) 538223 after 1800 hrs.

Yaesu FT-736R 2m and 70cm (144/430MHz) modules, excellent condition, £950. Kenwood TS-680S h.f. transceiver, includes 6m (50MHz) band, £575. Icom R7000 scanner, excellent, £750. Kenwood TS-850SAT, £1050, as new. Mark on (01953) 457909, can deliver reasonable distance.

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ZX Spectrum + 48k with RX4 tape, c.w., RTTY, AMTOR, SSTV, £35 inc. P&P. RX4 tape and instructions inc. P&P, £5. Tel: Derbyshire (01298) 78268 anytime.

Exchange

Amiga 500+ 1Meg, colour monitor, extra d/drive, three boxes full of discs, plus some boxed games, exchange for a decent scanner to at least 1300MHz, buyer collects. Tel: Worthing (01903) 260851.

Bush BAC 31 receiver, very old, used the old type battery with grid bias a.c./b.m. vintage, needs attention, signal generator type CG6/1, ranges 30Hz to 100Hz, 1100kHz, 300kHz, swap for good base receiver. Tel: (01767) 677070 evenings after 6pm.

Swap for coal fired loco, one Racal 1217 RX, Aries P100 media, lots of it, R/C planes complete, Melodeon 3 row 3 voice organ, 'phone for details, price, etc. Tel: Beds (01234) 743175.

Wanted

6m (50MHz) transverter for 2m (144MHz) rig, manual for Yaesu FT-290R Mkf, manual for standard C150 handie, circuit diagram for Tait T500 v.h.f. mobile. Pete on 0117-963 3306.

19 Set control boxes, six and 12-pin leads, headsets and variometers, swap C12 24V p.s.u. for 12V version, 18 Set wanted, must be in original condition, swap or buy. Tel: W. Yorks (01274) 824816.

19 Set variometer in un-modified working condition and control box No. 16T and 17T, also in good condition. Tel: W. Yorkshire 0113-256 4183.

Any info. that will help me study at home for the RAE or any info. about obtaining a home study course, if you can help in any way please call Shaun, Leicester on (01455) 614087 anytime.

Cossor Commando CC302 transceiver circuit diagram required, costs gladly repaid. Alan G0HBC, QTHR. Tel: 0121-745 1000.

Dead or alive Trio TR-2300, search your attics, etc! John GM8MLH, QTHR. Tel: (01838) 200304.

Does anyone have or know of a transmitter type TCK-7, it was advertised in *Short Wave Magazine* around 1960, about 5ft high, 2ft wide, 2-18MHz, 400W, all valves. Nick G8NAV, Kent. Tel: (01227) 272507.

Due to transit damage, I am still looking for an Akai 4000DB (or DS) tape deck like the one I missed in May/June (see my July advert), alternatively, Sony TD-377 considered. Please write with full details to Keith Burrows, 10 Basil Street, Stockport SK4 1QL.

Eddystone Morse or Marconi Morse key, bugs, also GPO telegraph key and sounder, any condition considered. Tel: Aberdeenshire (01771) 623654.

Enigma machines and Hagelin M209 encrypton-decrypton devices, any other equipment for encoding messages also considered. John G7GCK, Leicester. Tel: 0116-231 3194 or E-mail via jalex@easynet.co.uk

For Mk123 set, a source of the power connector McMurdo MS18, P1867 plus any spares and accessories. J. S. Haggart, 22 Alnwick Road, Newton Hall, Durham DH1 5NL. Tel: 0191-386 1116.

Good home available for your unwanted Morse key, RAF type D. Robert, Colchester. Tel: (01206) 542559.

Grundig table mains radio, new, Marlborough model 3365 or Bush mains table radio model VHF64 and Grundig short wave radio, professional Satellit model 2400 stereo or model 1400. Hugh McCallion, No. 8 Strathard Close, Coleraine, Co. Londonderry, N. Ireland BT51 3ES. Tel: (01265) 43793.

Guide to EMC Robin Page Jones, AH2B antenna element 2.5m long, frequency 3.5, 28MHz, for sale Megohs meter Corark 250V 500V, 1kV, £40 o.v.n.o.J. Tarleton, 23 Falcon Way, Woodville, Derby DE11 7QS.

Handbook or any info. required for Telrex multi-element tri-band beam(s). GW3IEQ, QTHR. Tel: (01286) 831340.

HF TX or transceiver suitable for c.w., will swap for portable Clarke MkII mig welder, large bottle gas, plenty of wire, good for welding car body work. Tel: (01254) 832350.

I bought a Yaesu FRDX400 from Longleat Rally, but need the handbook and circuit diagram for it, if G3UUV reads this, could he please contact me regarding the above radio. Mike, Bristol. Tel: (0802) 375090 (mobile) anytime.

Icom IC-U10 70cm (430MHz) handie or very similar as good price for one in good condition, cash waiting, been looking for ages for an IC-U10, so please make my day. G0SEC, 66 Rockhampton Close, Little Moor, Weymouth, Dorset. Tel: c/o (01305) 767610.

Instruction manual or photocopy for Yaesu FTV901R transverter wanted urgently. Fred Western, 40 Galon Uchaf, Merthyr Tydfil, Mid Glamorgan CF47 9TP. Tel: (01685) 384826.

Low voltage (13.8V) high power 'Ham bands' s.s.b. linear amplifier (7-21MHz min.), c/w manual. Tel/FAX: (01637) 860305 or E-mail: G3LMO@AOL.COM

Manual or circuit diagram for KW202 comm. receiver, circa 1970, photocopies would suffice, costs paid. P. A. O'Dell, 92 Buttermoth Path, Luton LU2 0TR. Tel: (01582) 418140.

Modern h.f. s.s.b. manpack, e.g. Racal 4000 series, complete and running. Clive G4NVX, Hereford. Tel: (01432) 343309.

Motor unit model MR-750U for a Daiwa multi-torque rotator, model MR750E, also mobile bracket for a Yaesu FT-707. G4WBV, QTHR. Tel: Bristol 0117-968 2861.

MRF245 power transistor or pair of MRF247 d.s.p. 100 for TS-850. 500Ω pot for G4OO/KR400 rotator, c.t.c.s.s. board FT-690II, c.t.c.s.s. board FT-726R, Yaesu SP5 speaker for FT-1000D. Patrick on (01953) 884305.

Oscilloscope, g.w.o. with manual, Collaro or Garrard record deck, old domestic radios, valves, components, cash, can collect. Mr J. Creasey, 4 Low Farm Drive, Folkingham, Sleaford, Lincs NG34 0SP.

PMR PKT radio, all ready crystalled up for 70cm (430MHz) u.h.f., for Novice, also 70cm beam, quargy, info on how to get on 23cm, eg: radios, aerials, wanted GC10 board for Kenwood TS-670 quad bander. Mike 2E1FCG on (01226) 742971.

Racal RA63 sideband unit wanted, RA98 isb unit, MA168 diversity unit, RA37 and RA137 low frequency units, RA17 receiver for sale or exchange. Tony, Worcester. Tel: (01905) 641759.

Spy. Clandestine radio sets wanted by private collector, American, British, French, German, Polish, Russian, etc., good price paid for the right items, also incomplete units for spares. Bill G8PUJ, QTHR. Tel: 0181-505 0838 evenings.

Straight Morse key and oscillator, also Datong Morse Tutor or other. Dave, Cornwall. Tel: (01579) 362908.

Technical software RX4 programme on cassette for Commodore CBM64 or other cassette prog. to work with CBM64 giving RTTY, SSTV, c.w., AMTOR, etc. Tel: (01253) 873452.

Teleprinter and controller or RTTY software hardware for a 486 PC, I know teleprinters are noisy but the mother-in-law is deaf, will collect 50 miles of Bristol, please help. Mike on (0802) 375090 (mobile) anytime.

Valves: 6KD6, 6146B, 6GK6, 12BY7A, FL50B TX, 21MHz beam or quad, 18MHz beam or quad, old valve receiver, old RA17L receiver, carriage paid, please write to: Ed Kelly EI5DR, Cregganavar, Breaffy, Castlebar, Co. Mayo, Eire.

Welz s.w.r. p.w.r. meter, type SP220 1.8/200m, must be good condition, state price inc. P&P. G2BCY, QTHR. Tel: 0191-265 4780.

Yaesu FT-77, info required on unmodifying a Yaesu FT-77 which has been modified (not by present owner) to receive Citizens Band on some bands. Tel: 0141-632 5408.

Yaesu h.f. converter (0.1-30MHz) for FRG-9600, also 'dedicated' top-band transceiver, s.s.b. QRP about 3-10W. GW0GHF on (01222) 703429 or QTHR.

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Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

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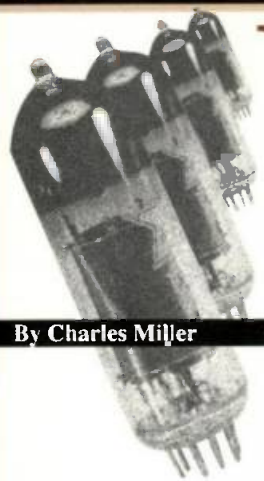


Valve & Vintage

By Charles Miller

Judging by the fact that PW's 'wireless shop' is illuminated by gaslight this month and there's a real vintage 'flavour'...it must be Charles Miller's turn to be 'mine host. This time he's talking about 'Doctor Loewe's Magic Multiple Valves'!

Continuing our look at the oddities that sprinkle the pages of valve history, this time let's examine some 'Teutonic tubes' that twinkled brightly for a while around the end of the 1920s. These were the brainchildren of a very capable German scientist, Dr. Loewe, eponymous founder of one of the foremost radio companies in that country.

In the middle 1920s, Dr. Loewe was taken by the idea of making radio construction simpler by combining two or more valves in a single envelope. Then came the great inspiration - why not take the idea to its logical conclusion and include all the coupling components, condensers and resistors, in the envelope as well?

Exciting Conception

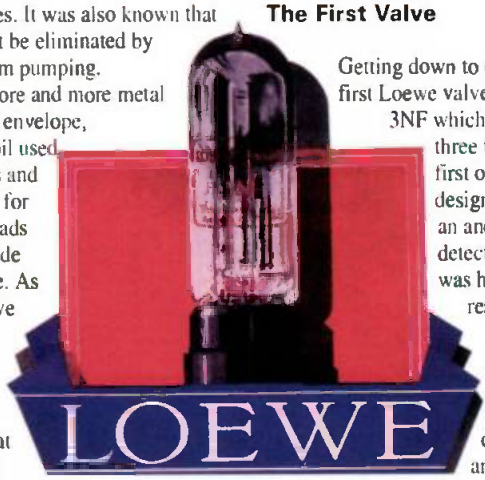
Dr. Loewe's idea was an exciting conception but not too easy to realise. The size of the individual valve structures wasn't a great problem, as even in 1925 it was already possible to miniaturise the devices.

There was, for example, the diminutive WeCo valves which had electrode structures smaller than the B7G valves made 15 years later. Nor was it hard to make condensers and resistors small enough.

The difficulties were (first) arranging the various bits and pieces in such a way that there would be no mutual interference. The second was obtaining a good 'hard' vacuum within the envelope.

It was already well-known that the metal parts of any valve tended, in various degrees, to a certain extent to absorb what were called occluded gases. It was also known that these couldn't be eliminated by simple vacuum pumping.

Having more and more metal objects in the envelope, such as the foil used in condensers and the wire used for connecting leads obviously made matters worse. As far as the valve electrode structures were concerned it was found that they could be made to give up their occluded gases if they were preheated before evacuation, but this didn't work with the condensers and resistors.



One of Doctor Loewe's 'magic multiple valves'.

Eventually Dr. Loewe had the bright idea of sealing each of these within its own little evacuated envelope. This also had the beneficial effect of preventing them from attracting electrons away from the valve assemblies.

First 'Integrated Circuit'

Sorting out all this took a good deal of time but **by the middle of 1926 Dr. Loewe had managed to come up with the very first integrated circuit devices known to mankind!**

With one of the 'i.c.s' you got virtually a complete three-valve set in one 'bottle'. All **you had to do** was to attach a tuned circuit to one end and a loudspeaker at the other, connect up the batteries and then sit back and listen.

The successful 'one bottle' unit would have been a remarkable achievement alone. But he also managed to devise a self-neutralising tetrode that was only a step away from the highly-esteemed screen grid!

By combining two of the tetrodes and various resistors and condensers in one envelope the esteemed Dr. Loewe ended up with something that would provide **two stages of r.f. amplification**. Placing one of the devices ahead of the other gave provided the equivalent of a five-valve set that could perform as well as, if not better than, many conventional types.

The First Valve

Getting down to details, the first Loewe valve was the 3NF which contained three triodes. The first of these was designed to act as an anode-bend detector, which was handy in two respects.

Firstly, the triple valve didn't need a grid condenser and leak, saving two components. Secondly, it didn't impose so much damping effect on the tuned circuit that fed it, which was good for selectivity.

It also meant that reaction wasn't needed to 'perk up' reception, thus precluding the sort of oscillating interference so easily produced by unskilled operators (Remember the BBC's Captain Eckersley's 'Please don't do it - referring to overdoing the reaction?).

Simple resistance capacity coupling was used from the detector to the next triode and again on from this to the output section. Apparently, not even Dr. Loewe fancied the idea of trying to cram a conventional inter-valve audio frequency transformer inside the 'bottle'!

In practice, the 3NF would work satisfactorily with a 90V h.t. battery but if the utmost sensitivity and output were required the supply could be stepped up to 150V. The current drain wasn't quoted; maybe it would have been too daunting for prospective users!

On the l.t. side the filaments of the first two triodes were rated at 2V and the last at 4V, to be run in series-parallel from a 4V accumulator, drawing about 170mA. (That actually wasn't too bad at all - three old bright emitter triodes would have taken five, or more, times as much).

A conventional grid bias battery also was needed to put some negative volts on the grids of the detector and output triodes.

The "wonder of 1926" - the OE 333 (see text).

The 2HF Valve

As far as the other type, the 2HF valve was concerned, the tetrodes were described in a contemporary report as "being...of the 'double grid' variety". Here the inner grids were used to neutralise the space charge.

Alternatively, if you prefer it, the inner grids were used to lower the impedance...[the] "h.f. amplification may be improved by means of low impedance valves; in that way we see the use of the double grids". (But of course, this piece may have lost something in the translation from the German. On the other hand, it may have gained something....unintelligibility!

Aperiodic (i.e., resistance-capacity) coupling was used between the two sections and both the input and output circuits were tuned. As a result the gain and selectivity of this new wonder of the wireless waves should have been pretty good.

The price to be paid in battery power was a rated anode current per section of 3mA at 90V, with the "inner grids" drawing about 5mA at between 10V and 20V.

Each filament was rated at 2V and they were connected in series far operation from a 4V accumulator "without the use of a rheostat".

Special bases had to be developed for the valves but rather surprisingly both types needed only six-pin holders. This was achieved by making as many as possible of the internal connections common, such as the filaments in both valves and the "inner grids" of the tetrodes in the 2NF.

As regards physical size they weren't too large (about a big as a half-pound jam jar). What a lot in a bottle!

Scott-Taggart Frosty

In late July, 1926 John Scott-Taggart's Radio Press, in its *Wireless* magazine, printed a somewhat frosty review of the Loewe valves. They were interesting, it stated, but it was impossible to say whether they would give really satisfactory results.

The review hinted that such multiple type valves had already been developed in Britain but had not yet made their appearance on the market (could this have been the voice of publisher John Scott-Taggart in the background?).

However, by the following Autumn, with Scott-Taggart departing to pastures new in Melbourne Place, WC2 to concentrate on selling his own-brand valves, *Wireless* became more enthusiastic. They even invited Dr. Loewe over to demonstrate his valves at Radio Press's Elstree laboratories!

There, on the evening of 20th September, 1926 "in the presence of Mr. John Scott-Taggart (*who was probably suffering from a severe bout of mixed emotions!*) and members of the staff...a remarkable example of compactness was shewn us by Dr. Loewe...lifting up the lid at the top of the receiver revealed what appeared to be an amazing thing, for apart from the valves and their holders there was **nothing** else to be seen inside with the exception of three tuning condensers and one or two connexions...".

After describing how the set could be used as the equivalent of either a three-or-five-valver, the report summed it up as giving excellent sound quality although leaving something to be desired as regards selectivity.

For the time (1926) this was a tiny set only measuring 6 x 4in. (see text).

Berlin Exhibition

A more public appearance of Dr. Loewe's inventions took place a few days later at the Berlin Wireless Exhibition. Here on display was "das kleiner Wunder von 1926" (the little wonder of 1926), the receiver model OE 333 a (for the time) tiny set measuring only about six inches by four inches by two inches high.

Shown then working on a frame aerial and driving a fair-sized horn loudspeaker, the OE 333 went into production and eventually began to be sold in the UK via a British off-shoot of Loewe Radio set up in Fountayne Road, Tottenham, London.

The OE 333 was certainly still being produced in 1929, when examples of it were available together with a specially designed cone loudspeaker type EB 71. This was: "in a tastefully finished cabinet" that had supplanted the horn and was shown on trade stand 291 in the gallery of the September RadiOlympia show.

At RadiOlympia

Also on display at RadiOlympia were the 3NF and 2HF valves. The price of the receiver was £3.3s.Od., whilst the loudspeaker cost £2.10s.Od.

The 3NF retailed at £2.3s.6d. and the 2HF at £1.12s.6d. (And as I've often stressed in these and other articles, it's fatuous to convert these prices directly into decimal currency since this gives a totally distorted impression of real values).

The only worth-while comparison is to match the prices against the wages of the period. And if you had been, let's say, a manual worker for a major radio manufacturer you would have been lucky to get £3 a week, so the OE 333 would have cost you more than a week's wages.

So, when examples of occasionally turn up at vintage radio events at asking prices up in the hundreds of pounds they may yet be cheaper in real terms than they were 70 years ago!

Many More

Loewe Radio went on to make many more multi-valves. They were used in some very interesting sets in Germany until at least 1936, but these were not officially sold in Britain.

As far as the UK is concerned, despite all the apparent advantages Loewe valves never really caught on to any great extent for reasons that aren't hard to deduce. Apart from costing a good deal more than ordinary valves, if any one section of a Loewe type should happen to fail the whole expensive device would be a write-off.

On balance, the home constructor was better off sticking to discrete valves and the chance of being able to scrounge replacements! Failure of any of the internal components would have stopped the valve in its tracks as well, but these turned out to be extremely reliable.

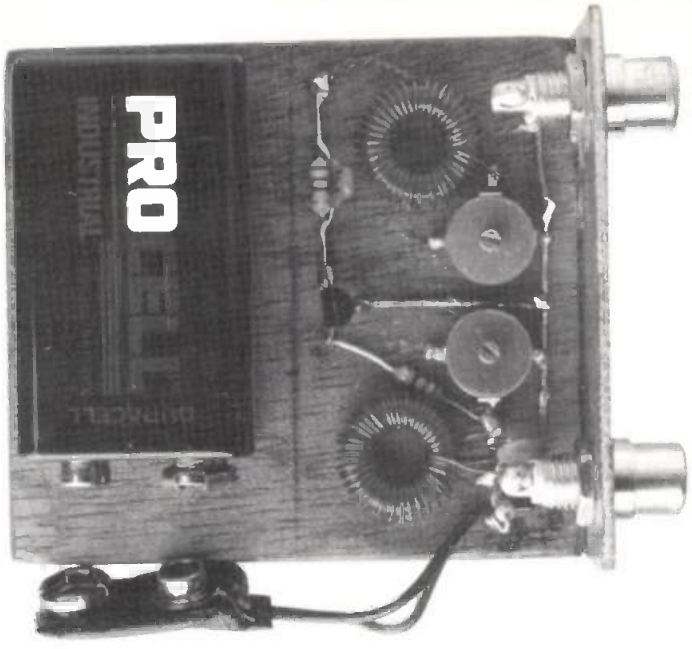
In fact, a very useful spin-off from valve manufacture was established by selling the high-vacuum resistors and condensers separately for use by home constructors in ordinary valve receivers. It just proves once again doesn't it....that it's an ill wind that blows nobody any good!

PW

Cheerio from Charles, see you in January.

Back To The Drawing-Pin Board!

By Steve Ortmayer G4RAW



Once again Steve Ortmayer G4RAW has come up with a simple and practical project. This time it's a 7MHz pre-amplifier that can be built easily using the very useful drawing-pin-and-wooden board technique.

The 7MHz receiver I described in 'Back To The Drawing Pin Board' (*PW* page 30 January 1994) is very simple and a pre-amplifier is a great help with weak signals. The pre-amplifier I'm describing this time can be used ahead of any '40' metre band receiver to improve its performance **(but be careful of old valve sets that may use high voltages!)**.

Grounded Gate

The circuit is very simple and uses an f.e.t. in grounded gate mode and gives a few dB gain to the signal. Incidentally...they're 'funny animals these dBs, the way they jump about to 10 $\log_{10}$' aren't they?

Even more funny are dBWatts. I use QRP (low power) and have had contacts all over the world with 1W, which is 0 dBW. It's hard to imagine getting anywhere with a zero signal!

However, it's now back to the project! The circuit is laid out on drawing pins in the usual way. Check the wiring before connecting to a 9V battery. I didn't bother with an on/off switch.

Improvement In Levels

Listen to your favourite part of the band and switch to the pre-amplifier and notice the improvement in signal levels! I chose 7.030MHz which is the QRP calling frequency.

Peak up the trimmers C1 and C3 by listening to a weak signal, they seem to be a bit more interactive so try them a few times. Once built, an amplifier such as this can really help simpler receivers.

PW

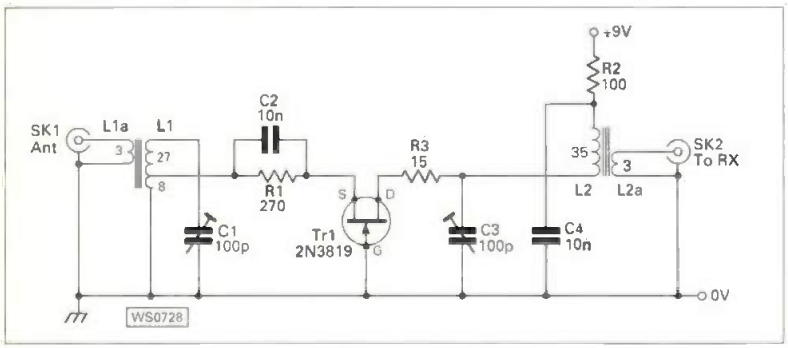


Fig. 1: Circuit of the 7MHz pre-amplifier (see text).

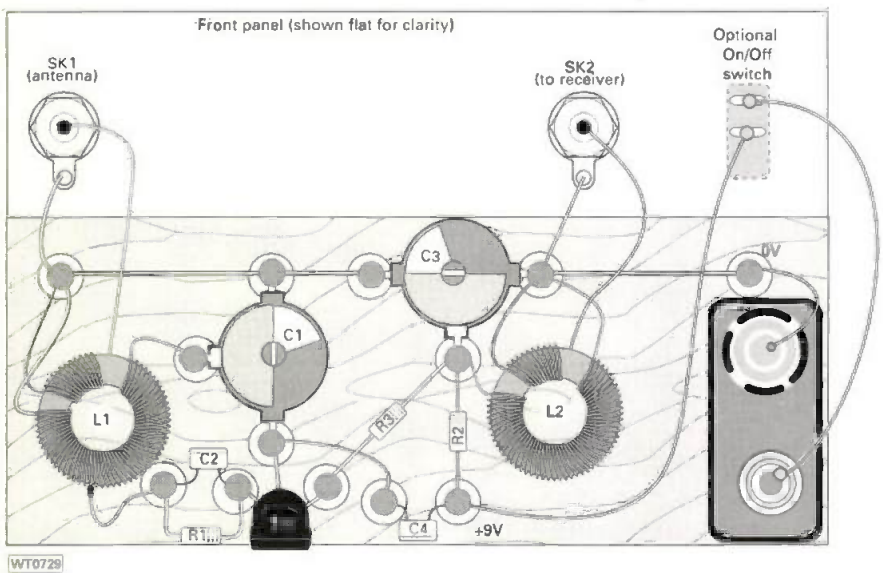


Fig. 2: The 'drawing pin' and board lay-out for the pre-amplifier.

Shopping List

Resistors
Metal film 0.25W miniature 5%

15Ω	1	R3
100Ω	1	R2

Capacitors
Miniature disc ceramic

.01μF	2	C2, 4

Trimmer capacitors

100pF	2	C1, 2.

Semiconductors
Field effect transistor

Tr1	2N3819
Inductors	L1/2 35turns on T50-2 toroid L1a and L2a three turns over L1 & 2 (tap L1 eight turns up from earth end).

Miscellaneous: Wooden base board, suitable input/output sockets (your choice, I used phono plugs and sockets), PP3 battery and connector.

MIKE RICHARDS G4WNC

BITS & BYTES

This month Mike Richards G4WNC brings you 'up-to-speed' on 56Kb modems with a explanation of the technology used.

Since I mentioned Hellschreiber Nets a few months ago I'm pleased to see that activity is continuing to grow. **Bernard G3JYF** has contacted me this month with details of his activity. So far he has had very good success across Europe by monitoring the 7MHz band on 7035kHz at around midday on Sundays.

Bernard has also set-up a regular sked with **Dave G4CXQ** on 3.5MHz. He can be found most Tuesday evenings on 3578kHz at around 2130UTC.

Bernard's very keen for others to join him and is quite happy to arrange contacts for other times/frequencies. If you'd like to take him up on this offer he can be contacted on E-mail or Packet as follows: **G3JYF@aol.com** or **G3JYF@GB7NEQ**. If you have any reports or comments to offer on this 'antique' mode please drop me a line or E-mail.

Super Fast Modems

If you read computer magazines you must have noticed the incredible hype around the new 56Kb modems that seem to be appearing just about everywhere. As the technology links very closely with my recent reports on digital audio, I thought you might be interested in a down-to-earth explanation of the technology, its limitations and the benefits.

I'm sure many active amateurs are wondering if this new technology is adaptable to radio to improve the data speeds encountered on the Packet networks. I'm afraid the answer is a resounding **No**!

The new fast modems take advantage of the configuration of a modern telephone network and are not directly transferable to the Packet radio environment. Nevertheless, the technology can be of great benefit to the ever-growing number of amateurs that use the Internet as a source of information and software.

The higher speeds mean faster downloads and consequently less time 'on-line' and therefore a lower 'phone bill! So, let's take a look inside the technology to see just how the developers have managed to make such a significant hike in modem speed.

At the time of writing there are still a few arguments as to what standard will prevail. Until this is resolved you will need to check which system your Internet Service Provider is using as the two systems are incompatible!

The two contenders are US Robotics with their X2 system and a number of other manufacturers who are using the Rockwell K56Flex system. As far as I can gather, US Robotics seem to be left on their own and most of the industry is siding with the Rockwell chipset and are likely to be the overall winners.

As far as I can tell, the two systems are very similar in operating principle and benefits so, it's just the practical implementation that's incompatible. As I say, just take care before you buy!

Modem Operation

In order to understand the modem operation you just need to take a look at the data path through a typical telephone network. The principles used are exactly the same as those I described in an earlier issue.

If we start from the telephone at the customer's house, shown in **Fig. 1**. The speech is first turned into an analogue electrical signal by the microphone in the hand-set. This passes over a pair of wires to the telephone exchange where it is connected to the digital exchange equipment.

The first job here is to convert the analogue signal into a digital form so that it can pass through the network. This is done by using the sampling technique where the instantaneous voltage on the line is measured and then stored as an eight-bit binary number.

If you recall, digital systems can only handle numbers, hence the need for the conversion. In order for this sampling system to provide a reasonably true representation of the original voice signal, the measurements/conversions have to take place at least twice as often as the highest frequency you want to send over the network.

As the normal standard for communications is 300Hz to 3.4kHz that would require a sampling or measurement rate of 6.8kHz. In practice, this is increased above the minimum limit to 8kHz.

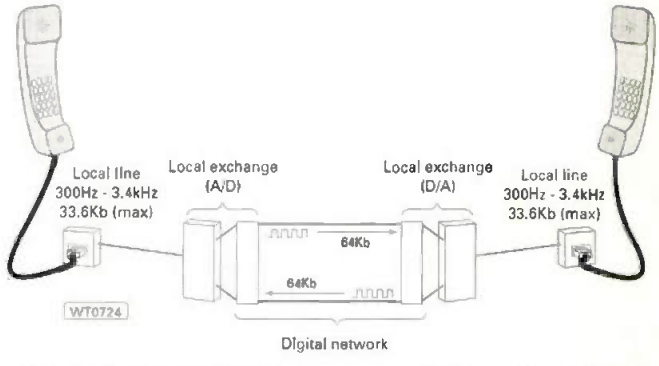


Fig. 1: A conventional 'phone connection over a digital exchange.

One of the limitations of the conversion process is that an eight-bit binary number allows just 256 voltage steps from the lowest to the highest. Whilst this might seem quite impressive, if the audio signal has a small dynamic range (small difference between the loudest and quietest parts) then only a small portion of these sampling points will be used and the digital representation will be less than optimum. One of the ways around this is to add some audio processing so that the signal better matches the digital converter, or maybe to spread-out the sampling voltages so that they are a better fit with the signal.

In practical systems both techniques are used to get the best possible out of the conversion process. The errors that result from the sampling process are called quantisation distortion and can be quite unpleasant in severe cases.

In addition to the measurement errors from the sampling process there are noise components that further deteriorate the signal. I'm painting a rather black picture here but the reality is actually remarkably good quality. The use of this technology has resulted in much clearer calls. It's also important to remember that exactly the same technology, but with 16 bit sampling at 44.4kHz, is used for the excellent quality music CDs.

Getting back to the telephone line, the digital signal that has been created is then mixed with 30 others to make the basic 2Mb/s digital building block. This is then switched and sent through the digital network.

At the far end, the sampling and signal processing is reversed to produce a very good likeness of the original analogue speech signal. Just before I wrap-up this part of the tutorial, let's take a look at the data rate that's being used by a single telephone channel. You can work this out very simply from the information I've already given you.

Remember, the audio signal is sampled 8000 times per second and each sample is represented by an eight bit number. To work out the bit rate over the channel you just have to multiply these two figures together, e.g. 8000 samples/second x 8bits = 64,000 bits/second. This is therefore the absolute maximum data rate that could be sent over the line with no conversion processes to degrade the signal.

Digital Modems

With the basic understanding of a modern telephone network at the back of your mind, lets just take a look at the workings of a digital modem. I'll start with the word modem itself. This is an acronym for MODulator/dEModulator and describes the basic way in which these units work.

The purpose of the modem is to be able to send a digital signal from a computer over a telephone line that was designed to handle speech signals. The very simplest of modems used a principle very similar to that still used for RTTY signals.

First of all the binary numbers in the computer need to changed from

their parallel format to serial. Inside the computer the eight-bit numbers are carried around using a separate wire for each of the eight bits this system is called a parallel data bus.

In order to link with a modem the binary has to be converted into serial format. This is where the numbers emerge from, what's known as, the serial port one bit after the other. The speed at which they emerge being known as the bit rate or baud rate.

In the early modems, the serial data was connected to the modem and the modem then sent one of two available tones depending on whether the particular binary digit was a one or a zero (often called mark and space in RTTY terms). At the distant end the receiving modem detected the frequency of the incoming tone and passed either a logic one or zero into the serial port of the computer. As you can see, the system was pretty straightforward and could produce some good results.

On the down side, the speed over a standard telephone was somewhat limited and few made it much above 2400baud and that was over a special private land-line. In fact, I can remember visiting a company who were trying to develop modem to send 9.6Kb/s over a standard telephone line!

At the time (1970s) speeds of 9.6Kb/s were unheard of. Anyway as computers became more widespread, there was increasing pressure to find ways to send data faster and more reliably over the standard telephone network. As a result, there have been a whole string of developments with new, previously unattainable, speeds becoming available at remarkably low prices. The development has now reached the stage where the latest 33.6Kb/s v34 modem really is just about the limit for an analogue modem using a telephone line.

The main limiting factors for a further improvement is the noise and quantisation distortion levels. How can the manufacturers possibly hit 56Kb/s?

If you think back, the telephone channel between exchanges runs at 64Kb/s and it's just the losses caused by conversion process at each end of the system that ends-up restricting the modem speed to a maximum of around 33.3Kb/s. The solution used by the new 56k modem technology is to simply cut out one of the conversion stages!

Normally you couldn't do this as the conversion equipment is in the telephone exchange and effectively out of reach. The trick is to take advantage of the direct digital connection used by all the major Internet Service Providers.

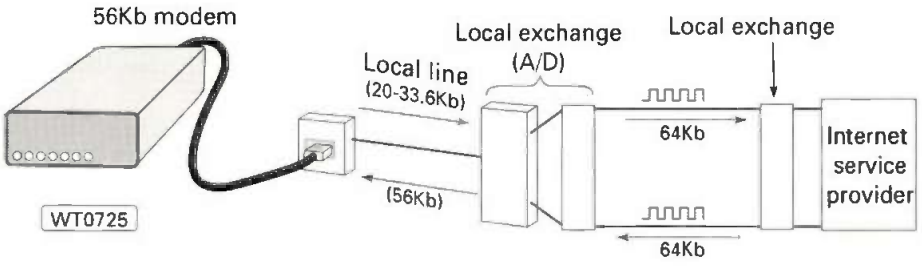


Fig. 2: A 56Kb modem connection.

Rather than use lots of ordinary telephone lines, they normally have a dedicated digital pipeline between their local exchange and the Internet service provider's equipment, see **Fig. 2**. All they have to do is replace their existing interface systems with the new 56Kb/s technology and they're in business.

By doing this the digital signal from the Internet service provider's connection to the Internet remains digital right from the Internet through to your local telephone exchange. It's only this last, relatively short, local 'hop' that uses conventional analogue technology.

By cutting down the number of digital/analogue conversions to just one, the manufacturers are able to achieve that extra 'through-put' that takes the speed very close to the 64Kb/s absolute limit for a telephone line. Because this new system uses a few tricks to achieve the higher rate, there are a few limitations that you need to be aware of.

First of all there are the two standards, I spoke of earlier - they are totally incompatible. You therefore need to speak to your Internet service provider and ask their advice before you part with any of your hard earned cash!

Most of the major providers have realised the need to upgrade and should be able to advise you what to get. You will probably find that they also use this as a great selling opportunity and offer some form a package deal with a discounted modem!

In order for the system to work you do need to be connected to a digital exchange and your service provider has to have the appropriate equipment fitted. I've read a number of reviews from the US which indicate that 56Kb/s and higher can only be achieved if you have a clean line and are relatively close to your local exchange. However, the good news is that the modem will automatically do the best that it possibly can as far as transmission speed goes, even if it does have to drop back to 33.3Kb/s.

Another important point to note about the 56k technology is that the very high data speeds are only available in the receive direction. The transmit will only operate at 33.3Kb/s or less. If you're using the modem for Internet access, this is fine as you normally only transmit the odd keystroke or two but want to receive lots of graphics rich Web pages.

If you do upload a lot of information to the Internet you definitely won't see 56Kb/s but you should get somewhere around the 24-33Kb/s rate. If you currently own a 14.4kbs modem or slower, I would recommend upgrading to the new modem as soon as you can afford it, (providing your Internet service provider can support it).

If you already have a 28 or 33k modem, I'd be inclined to hang on a while before splashing out. If you do buy, make sure your modem is software upgradable. This is a neat system where you can upgrade the modem's software by taking a download from the Internet. If you have this feature you will be able keep your modem up to the latest standards just by visiting the manufacturers web site and downloading an upgrade file.

That just about completes this tutorial, but if you have any enlightening experiences with 56Kb/s modems or service suppliers then please drop me a line with the details.

Special Offers

If you'd like a copy of Hamcomm/JVFAX, etc., I've arranged a very special offer with the **Public Domain and Shareware Library** (PDSL). They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter! Please direct all orders and enquiries about this disk set to **PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: (01892) 663298** and request library volume: **H008739abcde**.
The software is only available as a set of five disks as follows:
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That's all I have for you this month, so until next time cheerio. Don't forget to keep your news and views coming to me **Mike Richards G4WNC** at **PO Box 1863, Ringwood, Hants BH24 2ZD** or via E-mail to **mike.richards@dial.pipex.com** Don't forget to pay a visit to my Web site at: **http://dialspace.dial.pipex.com/mike.richards/**

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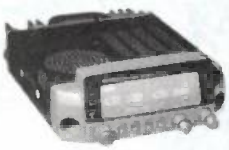

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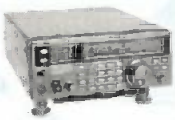

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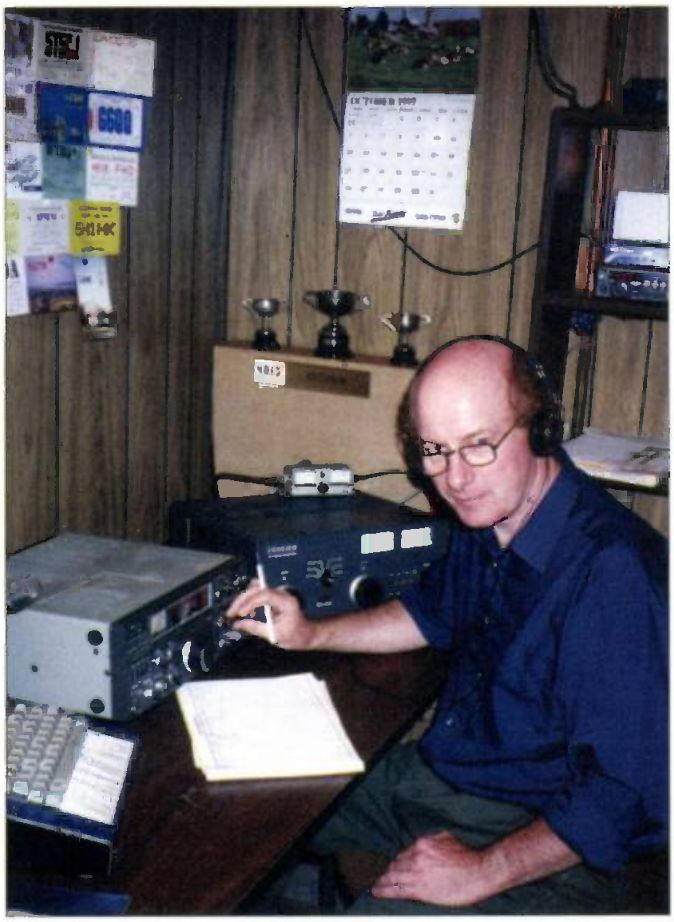
ED TAYLOR NØED

SCENE USA

Ed Taylor N0ED takes a look at the h.f. bands in the USA and Canada, and explains the differences in allocation and usage from our own.



Ed N0ED busy in his shack.

Although amateur radio is a world-wide hobby, the rules for each country are different. This may help you to understand where to look for transatlantic contacts.

Have you ever tried to make a single sideband (s.s.b.) contact with the USA on 7MHz? At the right season and time of day it's not too difficult, but there's an important fact you have to know. American stations are not allowed to transmit s.s.b. **below 7.15MHz**.

European stations are not allowed to transmit **above 7.1MHz**. You have to work 'split', using separate frequencies for transmit and receive.

The example is an instance of the fact that most parts of the world have the same h.f. amateur bands, but the allocations are **not** identical. It becomes important to know this when you are seeking DX, or chasing a multiplier in a contest.

Let's look at the bands available to the USA, and compare them with what is available in Europe. I'll also try to give a feel for the way each band sounds, and what you might expect to hear from the American perspective.

Plenty Of Room

The first thing you notice about the h.f. bands in North America is that there is generally plenty of room. This is particularly true of 3.5 (80m) and 7MHz (40m) which are quite a lot bigger than we are used to in the UK. But there are several twists and turns in the story, so I'll go through the bands and find out what Americans actually have.

Take a look at **Fig. 1**. This shows the bands available in the USA, and what each class of licensee is allowed to use.

The band plan is complicated enough that many amateurs keep a copy next to their rig. It would not be smart to make a mistake!

One of the main points to note is that the s.s.b. and c.w. segments are generally **mandatory**. European amateurs are accustomed to a band plan which works by 'Gentlemen's agreement'.

In the USA, the modes are separated by law. My 'reading' of public opinion is that most American amateurs like it that way, although there is sometimes discussion about the amount allocated to each mode. I will explain why this might be the case later.

The 1.8MHz band is an exception. Because of various restrictions which were in place until a few years ago, there have not been any restraints on where each mode can operate.

The recommended band plan calls for c.w. and narrow band modes on 1.8 to 1.84MHz, with s.s.b. and wide band modes above this. The 1.83 to 1.85MHz allocation is reserved for intercontinental QSOs. This is much the same as in the UK.

'Top band' (1.8MHz) is used mainly at night for fairly local working, particularly in the centre of the continent (where I live). It's tough to work outside the US and Canada without a big antenna system. You can chat to people over 500 - 1000km in the evenings, although the high level of static can make things difficult in the summer.

In fact, the noise from thunderstorms affects all the lower bands, to an extent which is rarely experienced in Britain. It's discouraging to have almost continuous S9 crashes covering up a station you really want to hear!

The 75 Meter Band?

Wouldn't you like to have a 75m band in Europe? The 3.5MHz band is half a Megahertz wide, and the top end is even called 75m!

But note that only half the band is allocated to s.s.b., even less if you don't have an Extra Class licence. Practically then, the amount of space is not as much as you might expect, and there are areas of low occupancy between about 3.6 and 3.75MHz.

Because of the large size of the USA, there is, however, generally enough room for all the usual s.s.b. conversations, in which you can hear every subject discussed. The band allows coverage of much of North America in the evenings, and further afield in good conditions.

The 7MHz band is nice and wide, but there is a complicating factor. International broadcasters in many parts of the world use frequencies above 7.1MHz, which will be obvious to anyone who ever casually tuned around.

The broadcast stations are increasingly audible in North America as night-time approaches, and they significantly reduce the spectrum available for QSOs. Since broadcasters are located every 5kHz, a favourite trick is to choose frequencies inbetween. As long as the sidebands are not too strong, it is possible to find many usable gaps this way.

When making a 7MHz s.s.b. CQ call from Europe, expecting a reply from the USA, you need to find a clear frequency above 7150kHz. Then announce this as the place you will be listening.

It's also usual to check briefly on your own frequency, in case there is a call from an amateur whose band ends at 7100kHz. As an additional courtesy in a longer QSO, you should ask whether your listening frequency is clear in North America.

It would be bad manners to obliterate an ongoing conversation you can't hear, by having callers use the same frequency as an existing QSO. A similar procedure is sometimes used on 3.5MHz, although this is less necessary.

Let's hope that we can soon achieve a harmonised 7MHz band, which will be extremely useful for both local and DX contacts. It would also save spectrum space, so one frequency can be used for US/Europe s.s.b. QSOs, instead of two.

Because there is little likelihood of moving the broadcasters, the proposal is to extend the lower end of the band to 6.8 or 6.9MHz. It can't come soon enough!

Under Utilised

The bands allocated at the World Administrative Radio Conference (WARC) in 1979 are rather under-utilised in the USA. Although not very wide, there is frequently room

for good contacts.

The 10, 18 and 24MHz bands are the same size as in the UK, with the same band plan. All are used for US and trans-continental working, and are recommended for QRM-free usage. Since there are fewer US amateurs with big antennas and amplifiers for these bands, the competition is less, and smaller stations can often achieve surprising results.

So, what about 14MHz, which is perhaps the most popular h.f. band? The US allocation is the same as ours, but there are nonetheless some differences.

You'll notice that s.s.b. is not permitted below 14.150MHz, whereas in Europe we are accustomed to using s.s.b. anywhere above about 14.110MHz. The result is that South Americans and Canadians (who are not restricted) can frequently be heard in this segment, which often remains relatively peaceful.

Of course, if you expect a reply from the USA, avoid this part of the band. Actually, you would be best above 14.225, so as to pick-up General and Advanced Class licensees as well as Extras.

Listening on 14MHz in the USA, you will notice that much of the traffic is what you would consider 'local', that is, between Americans. Not surprising, since the size of the country is comparable with the whole of Europe.

When rare DX appears, it seems as if every amateur in America descends on the same frequency! Another amusing aspect of 14MHz in the USA is that stations regarded in Europe as hard to find can be almost commonplace. For example, it's fairly easy to work Australia, and VK signals can pass almost unnoticed among the North American conversations.

While we're awaiting the return of a few more sunspots, discussion of the upper h.f. bands may seem a bit academic! But 21MHz has its moments even now.

As you can see, the band plan is similar to that in Europe, and usage is generally inter-continental. The same applies to 24 and 28MHz. These bands have the added attraction that small antennas and low power are all that is needed to bring long-distance contacts.

Although there is currently little DX activity on 28MHz, with 21MHz also being pretty quiet, contest weekends can liven things up. Try checking these bands during the the most popular world-wide contests, organised by the American magazine, *CQ*.

The s.s.b. weekend is 25-26 October, and the c.w. contest is on 29-30 November. Don't be afraid to call DX stations: they welcome **any** contacts, particularly towards the end of the 48 hours. Listen to the way they operate, then call and be prepared to give a signal report and your zone number (UK is 14). You may be pleased at finding some new countries.

An interesting facet of 28MHz in the USA is the presence of f.m. repeaters, with output between 29.610 and 29.700MHz. Channel separation is generally 20kHz, with occasional half-spaced exceptions, and the input is 100kHz lower.

When conditions are favourable (which should be the case again in two or three years time), it's possible to work through these repeaters from the UK. This can cause a welcome element of surprise for locals in the US accustomed to chatting to their friends around town! It's also an indicator of transatlantic conditions, if you can hear the output of one of these repeaters (or even just a warbley carrier), you know that propagation to North America might be possible.

International Beacons

Another useful indicator of conditions is the international chain of beacons found on 14.1MHz. Stations from around the world, including several from North America, take it in turns to transmit, using an automatic timing system.

If you leave your receiver set to c.w. on this frequency, you will quickly be able to establish whether communication is possible with the USA and many other parts of the world. As we get into the next sunspot cycle, we'll become more interested in the these and other beacons. The publication *Amateur Radio Operating Manual* (available from *PW* Book Store) lists frequencies and locations, as well as other useful information.

Let me add a word about Canadian allocations. They have the same bands as Americans, but the band plans are **recommendations**, not **legal requirements**. This gives Canadian stations more flexibility, so you will hear VE stations using s.s.b. on 7080kHz, for example.

There are fewer Canadian amateurs than American, which means the likelihood of abusing this privilege is lower. Canadians are also very careful not to annoy their neighbours to the South by blatantly using a mode in the 'wrong' place.

Class System

I haven't really said much about the different US licences, the class system and what bands they can use. (The six classes were described in 'Scene USA' published in January 1996). At the lowest level (as far as h.f. is concerned), Novice and Technician Plus licensees have a rather thin time. They receive Morse allocations on 3.5 7, 21 and 28MHz, but s.s.b. enthusiasts just get a segment on 28MHz.

General licencees and above can use Morse, data and voice on all bands, with more desirable segments becoming available at the higher levels. Refer to Fig. 1 when seeking contacts with the USA.

You can increase replies by choosing the correct frequency, and being aware that stations may be able to hear you, but be restricted by their licence from calling.

Changes are in the works, if recent suggestions by the US national society, the ARRL, are adopted. In summary, the Technician Plus licence would be renamed, with spectrum expanded and moved to more useful parts of the bands. There would be additional s.s.b. allocations on 1.8, 3.5 and 121MHz.

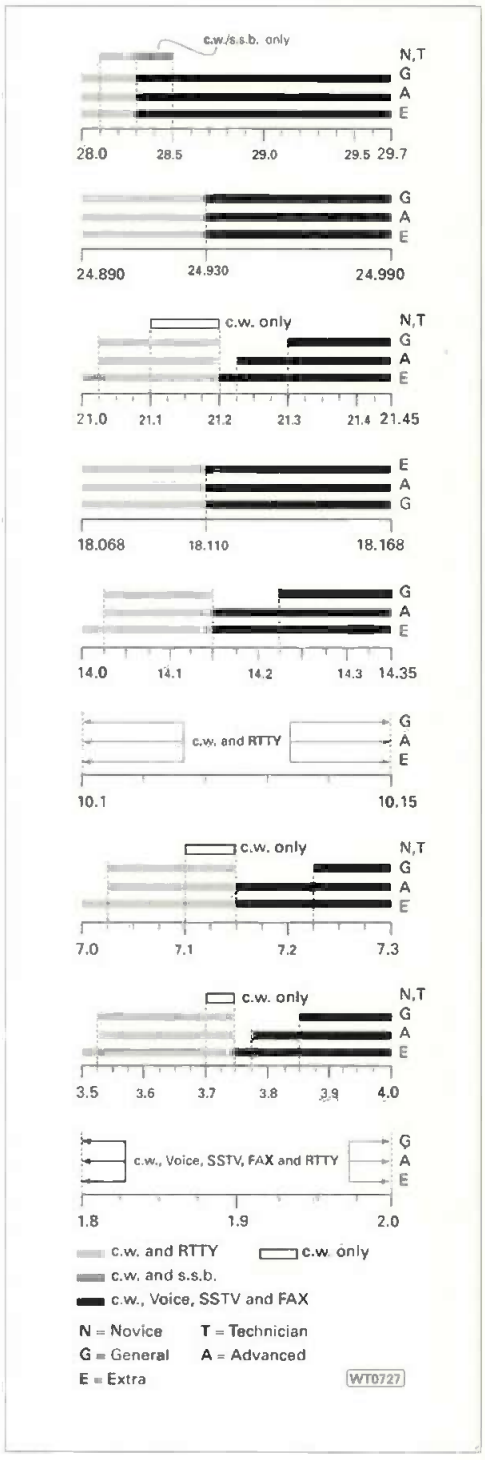
More bandwidth is proposed for other classes of licensee on phone, which will help a little in intercontinental QSOs. Until we have a harmonised 7MHz band, I would like to see a small s.s.b. allocation below 7.1MHz, but this does not seem likely. However, the changes would make it easier for UK Novices to contact US 'Intermediates' (probable new name for Technicians) on 3.5MHz.

There are other amendments proposed for the h.f. bands which will have a more profound effect around the world. These have been prepared by the International Amateur Radio Union, and their support by the US administration might encourage other governments to react favourably. Apart from suggesting 300kHz for 7MHz, proposals are for a new band at 5MHz, and increases to 250kHz for each of 10, 18 and 24MHz.

An extended 14MHz band is proposed, although I feel we should ask for more than an extra 50kHz. In any event, we can expect some additional room on h.f. as commercial services move up in frequency and to satellite systems.

That's all for this quarter, next time I'll look at the US allocations on v.h.f. and u.h.f. and you'll wish the UK had a 144MHz band the same size as in the USA! 73, and write to me **Ed Taylor N0ED, PO Box 261304, Denver, Colorado 80226, USA** or E-mail at **EdTaylor@compuserve.com** The deadline for January is the middle of October.

Fig. 1: The United States h.f. band allocation.



END

DAVID BUTLER G4ASR

VHF REPORT

This month David Butler G4ASR looks at your reports of DX openings on the 50 and 144MHz bands. There's also news of delays to the latest AMSAT satellite and some contest details.

Conditions on the 50MHz band during July were very similar to those recorded during the previous month. In June I reported daily Sporadic-E (Sp-E) openings on the 50MHz band to stations in Europe, Africa, Asia and via multi-hop Sp-E to North America.

Although the intensity of single-hop openings appeared to be slightly less during July, the number and duration of multi-hop Sp-E openings to Canada and USA was increased with openings being recorded on at least 8 days. On two occasions, July 10 and 13, the ionisation was of sufficient intensity to support Sp-E openings on the 144MHz band.

In between all of these events were two small auroral openings, on July 9 and 15, which allowed back-scatter contacts to be made on the 50, 70 and 144MHz bands. Enhanced tropospheric propagation (tropo) was noted on many days during July with openings into Scandinavia and western Europe occurring on the v.h.f., u.h.f. and microwave bands.

The 50MHz Band

Activity levels in Europe have now reached an all time high with virtually every country now having permission to use the 50MHz band. Additionally, some countries have recently seen a relaxation in restrictions allowing, for example: operation by v.h.f. class licensees, increases in power levels and wider frequency allocations.

Because of the greater activity there was hardly a day during July when the 50MHz band wasn't open to somewhere in Europe (or further) via Sp-E propagation. Among the regulars were some choice DX such as CN8LI in northern Morocco, EH9IB in Ceuta and Melilla (which counts as Africa) and ZA1MH a new station active from Albania for a year or so. QSLs for this station go via **Z32KV, Box 10, Struga, Macedonia**.

There was also very much activity from various islands, both large and small. These included CT3FT (Madeira Islands), EH8BPX (Canary Islands), IA5/IW5CNU/P (Elba), IM0/I2ADN (counting as Sardinia) and ID8/IW8DRG.

In less sunny climates were the stations of ES0I (KO17) a special event station from an island off the Estonian coast, JW0R (Svarlbard), OH0JLQ (Aland Island), OJ0/OH1VR (Market Reef), OY9JD (Faroe Islands) and TF/PA3DWD operating from various squares in Iceland. Other DX stations reported included 4Z5JA in Israel, YM7PA an expedition to Turkey (of which more later), UA1WJ (KO47) and UA6LQ (KN97) located in European Russia and UR4LL (KO70) operating from the Ukraine.

By the way, Alex UR4LL informs me that from July 10 all Ukrainian radio amateurs were allowed to use the band 50.080-50.280MHz with 10W output using c.w. or s.s.b. There are over 50 locator squares in the Ukraine and plans have been made to activate at least 20 of them next year. Alex reports that the only problem at the moment is lack of information and good equipment for the 50MHz band.

Dutch Expedition

In 1996 a group of Dutch radio amateurs obtained permission to operate from Georgia on the 50MHz band. Using the callsign 4L6PA the group made some excellent contacts but regretfully few with the UK. This was probably due to them being located 3500km away from central England. (This is one of those awkward distances mid-way between two and three Sp-E 'hops').

Although 4L6PA only worked a handful of UK stations they did enjoy some fabulous propagation to the Far-East working a number of Japanese stations over a path of some 7700km. On completion of the expedition the group donated a Trio TS-690 transceiver and 5-element Yagi to **Omari 4L5O** for future use on the 50MHz band from Georgia.

After months of planning the expedition group consisting of **Pim PA0TLX, Jan Willem PA0JWU** and **Allard PE1NWL** and assisted by Omari 4L5O decided to operate this year from a coastal resort in northern Turkey. The QTH was perfect, on top of a 5-storey building located right on the beach.

The station consisted of an Icom IC-756 and a 5-element Yagi mounted 25m a.s.l. Using the call sign **YM7PA** the group made a total of 1106 contacts on the 50MHz band in an 18-day period during July.

The UK stations making initial contacts with YM7PA were G3SYC (IO93) at 1603UTC on July 3 and GW3SYR at 0539UTC on July 10.

Fig. 1: The 50MHz 'personalities' at the UK Six Metre Group Annual General Meeting 1997. Pictured from left to right are Pim PA0TLX, Frank PA3BFM, Allard PE1NWL, Angelo I2ADN, Bob WA6BYA and Ma JA6IDJ.

Another opening on July 12 picked up GD7KHG (IO74) at 1150UTC and GM0HUO (IO86) at 1159UTC, both of these contacts being made on s.s.b.

The station of GI4OPH (IO74) was worked at 1021UTC on July 14 and GJ4ICD (IN89) made it in the log a few minutes later at 1025UTC. Apart from the two s.s.b. QSOs all initial contacts were made using c.w.

A total of 44 DXCC countries were worked with the best DX being a 599 c.w. contact with VE1ZZ (FN84) on July 12 at 1216UTC. Amazingly the QSO was over a distance of 7700km, exactly the same as the best DX from 4L6PA in the previous year! Any QSL cards for this expedition should go via **PA0TLX, PO Box 2010, 1180 EA Amstelveen, The Netherlands**.

Plans are already underway for next year's expedition to Armenia (EK8PA?). Incidentally, the photograph in **Fig. 1** shows two of the YM7PA operators, PA0TLX and PE1NWL. Also shown are well known 50MHz operators PA3BFM, I2ADN, JA6IDJ and WA6BYA

At the QTH of **Ken Osborne G4IGO** (IO80) a total of 28 DXCC countries were heard on the 50MHz band on just one day, Sunday July 13. They were CT, CU, DL, EH, EH9, ES, F, G, HB9, I, IS0, LY, OE, OK, OM, PA, SP, SM, SV, S5, T9, YL, YM, YU, ZA, 5B, 9A and 9H. The maximum usable frequency (m.u.f.) was up to the 144MHz band during the afternoon but the Sp-E propagation just missed his QTH.

John Heys G3BDQ (JO00) reports that after an absence of ten years he is again active on the 50MHz band. He is using an Alinco DX-70TH transceiver and instead of a beam, which was scrapped some years ago, he is using a 50m long wire antenna.

John discovered that by using a Pi-section antenna tuning unit (a.t.u.) the long wire works really well on the 50MHz band. Recent contacts made with this set-up have included EH6SA (JM19), EH9IB (IM85), ES1AJ (KO29), ES5DE (KO38), LY2BI (KO14), LZ1KDP (KN12), OJ0/OH1VR (JP90), TF/PA3DWD (IP03) and 9A3FT (JN83).

Numerous stations in I, LA, OZ, SM and SP have also been worked by John with his uncomplicated system. A couple of Canadian (VE) stations were heard, one peaking 579, but they faded rapidly. John mentions that when the real DX starts (in a few years time, via F2 propagation) then he will probably put a beam back up again.

Transatlantic DX

As I mentioned earlier there was an increase in transatlantic multi-hop Sp-E events on the 50MHz band to North America. Openings were reported from the UK on July 1, 8, 10, 12, 14, 15, 16 and 17 and if you know of any more please let me know.

The openings at the beginning of the month were very brief, GJ4ICD (IN89) hearing the Newfoundland beacon VO1ZA (GN37) at 1107UTC on July 1. The Canadian station VE1PZ (FN85) was heard at 1825UTC on July 8 by a few stations in eastern England.

Whether an auroral opening on July 9 triggered the good Sp-E conditions on July 10 can only be conjecture but whatever it was it certainly livened up both the 50 and

Continued on page 63

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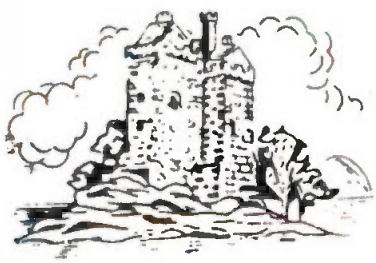

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Continued from page 60.

144MHz bands. As early as 0920UTC the 50MHz band was open from Canada to stations located in Poland.

Later in the day, from 1200UTC the band opened up again enabling stations in ON and PA to make contacts into VE1, VE9, VO1, W4 and W4 call areas. In the UK the opening started a little later, the first report being at 1320UTC when G7EXO (IO91) heard VE1ZV peaking 57.

Stations located in much of central England and Wales were then able to make transatlantic contacts on and off until approximately 1630UTC. Among those being worked were the stations of VE1PZ, VE1YX, VE1ZV, KM1H, WA1OUB and W3EP. The beacon FP5XAB (GN16) was also heard at 1500UTC by M0BAA (IO93).

Later in the evening, between 2125-0016UTC, the Scottish station MM0AMW (IO75) had what appeared to be a pipe-line into VE and W. He also managed to work OX3LX (Greenland).

Nobody else in the UK worked any transatlantic OX at this time. Really amazing!

Doug VE1PZ comments that it is surprising what an increase in X-ray flux will do for Sp-E propagation. He reports that the opening on July 10 was his best to Europe so far, working 92 stations in 14 DXCC countries. His first station in the log was SP2SGZ at 0920UTC and the last was SM1BSA at 1635UTC and for the whole duration the band was open to somewhere in Europe!

At the QTH of **Bob Mobile WA1OUB** (FN43) a total of 37 stations in northern Europe were worked between 1517-1628UTC. These included ten contacts with SM, DL, G, GM, GW, ON, OZ and PA.

A brief opening, between 1230-1330UTC, was observed on July 12 but only the stations of K2MUB and VE1ZJ were reported into the UK. The opening appeared to favour stations located in CT, DL, EA, OK and OZ. This was the day incidentally that the Turkish expedition station YM7PA contacted the Canadian station VE1ZZ.

Another very brief opening occurred on July 14 with VE1PZ reporting reception of beacons located in CT and G at 1245UTC. No contacts from the UK were thought to have been made at this time though.

Transatlantic openings in the three day period July 15-17 were very good. Interestingly, events on July 15 were intermingled with a number of small auroral openings.

A few brief Sp-E openings to VE and VO were recorded between 1600-1730UTC but the best event started around 1930UTC and continued throughout the evening, probably beyond 0100UTC, by which time most European operators had closed down. The stations of VE1JZ, VE1PZ, VE1ZZ and VE9AA were particularly active as were USA stations such as K1SG, K1WW, KM1H, WA1OUB, W1JR and K2QE.

Around 2300UTC the 'skip' extended to the W4 call area with the stations of G4HBA (IO80) working AE4RO and GW3JXN (IO72) catching KJ4E. On the following morning, July 16 at 0630UTC, PA0LSB reported hearing VE9AA but propagation didn't favour the UK very much this day. This was a pity as later in the day, around 1545-1745UTC, stations in DL, OE, OK and S5 had a really good opening into the W4 (Florida) call area. (The distances involved were between 7000-8000km).

Fortunately the UK was the place to be on July 17 with stations such as G3HTA (IO80) in the south of England to G4FVP (IO94) in the north managing to make many DX contacts with North American operators. The main opening took place between 1800-2000UTC with call areas VE1, W1, W2 and W3 being worked, mainly on c.w.

For your information a very useful indicator of these types of multi-hop Sp-E openings may be gained from listening for North American stations on the 28MHz band. For example, during the evening of July 17, between 1925-2015UTC, the station of GW4HDR reported hearing K1ZFE, N1LLW, W2HCW and W3ORU. In southern England G3SED heard 28MHz signals between 1735-1900UTC from W1WKO, N3CAU and W3VIR, all at very good strengths.

Excellent Opportunities

Now I'll turn to your reports of Sp-E openings on the 144MHz band. During July there were two days when events occurred, providing some excellent DX opportunities.

On July 10 there were in fact a total of five separate openings during the day. The first around 0600UTC was from southern England to Croatia (9A) and Romania (YO). Not many people were active at this time but early bird **Lee Adams G4RKV** (JO01) caught YO2BWD (KN27) for an 1800km contact on the 144MHz band.

Many more stations were active for the second event of the day commencing at 1000UTC. This lasted about 15 minutes allowing **Jim Smith G0OFE** (IO90) enough time to work two Lithuanian stations LY2SA (KO14) and LY2MW (KO24), the latter being at 1873km.

The next opening favoured stations in the north of England (IO93, IO94) although some operators in locator squares IO91 and IO92 did make a few contacts. In this opening, around 1030UTC, stations were making contacts into LY and SP.

The fourth opening of the morning, between 1045-1110UTC, allowed stations in Scotland to make DX contacts into central Europe. The station of GM8LFB (IO88) made s.s.b. contacts at this time with DL3JIN (JO60), OE1KEB (JN88) and OK1PG (JO70).

Probably the best event of the day however was an hour long opening between 1200-1300UTC. Stations in southern, eastern and central England could work into OH and SM and at the same time stations located in northern England and Scotland were making contacts into central Europe.

At the station of G4RKV contacts were made with OH1PU, SM4JIQ, SM4VQP, SM5EFP and SM5NVF. Jim G0OFE was pleased to work OH2BAP (KP20), his first OH on the 144MHz band in 13 years of DXing.

The contact was also his best DX at 2007km. Jim also worked SM4VQP (JO79), SM5ERW (JO89) and SM5MIX (JO78).

A report from **SM4HFI** (JP70) mentions that he made contact with 11 French stations and one solitary G station, G0FIG (IO90). The Swedish station was running a TS-700 transceiver into a power amplifier running 2 x QB3-200s in push-pull. This provided 400W output into an antenna array of 2 x 15-element Yagis.

Another Sp-E opening on the 144MHz band was reported on July 13. Unfortunately (well, for me anyway) it occurred at the same time as the British F1 Grand Prix!

At my QTH (IO81) I noticed the band was open around 1415UTC. I managed to sneak in four s.s.b. contacts with I8MPO, IC8FAX and IW8DUL (all in JN70) and IT9MPX/9 during the advertisements before returning to watch the race on the television!

Satellite Delays

According to a news release from ARRL Headquarters the September 30 launch date of the Phase 3D Amateur Radio satellite has been put in grave doubt. It appears extremely unlikely that Phase 3D will be able to meet revised mechanical specifications in time to fly on schedule aboard the Ariane 502 rocket.

Amateur Satellite (AMSAT) officials are holding out a glimmer of hope that the Ariane 502 schedule will slip just enough to let Phase 3D catch up again. But those chances are considered very slim.

The latest set-back for the next-generation amateur radio satellite came when the European Space Agency (ESA) significantly increased its estimate of vibration levels the Phase 3D payload would be exposed to aboard the Ariane 502. The revised estimates mean AMSAT will have to move fast to make structural changes in the Phase 3D space-frame in order to withstand the anticipated rougher ride.

Contests

Now I'll turn to news of some contests coming soon and first up is the **Worked All Britain** (WAB) group 144MHz 'phone contest being held between 0900-1700UTC on **Sunday September 14**. Exchange signal report and WAB area, e.g. SO33. Further details can be obtained from **G8UYD (QTHR)**.

Later in the day between 1800-2200UTC the **RSGB** are holding two separate contests on the 1.3 and 2.3GHz bands. These are fixed station events, i.e. no portable operation allowed if you're entering the contest.

On **Wednesday September 17**, between 2030-2300 local time, the third (out of five) c.w. cumulative contests on the 144MHz band is being held. The contest, open to RSGB members, has sections for either single or multi-operation. The remaining dates incidentally are **October 2** and **17**.

The second RSGB 70MHz Fixed station contest is being held on **Sunday September 28** between 0900-1300UTC. Full QTH information needs to be exchanged. For example, IO90AR, Poole or IO81MX, 20km west of Hereford. There will be sections for either single or multi-operator fixed stations.

The first of five 1.3GHz and 2.3GHz cumulative contests is being held on **Tuesday September 30** between 2030-2300 local time. Just like the event on September 14 this will consist of two separate contests with no overall two band tabulation being made. The other dates for these cumulative contests are **October 15** and **30**, **November 14** and **December 1**.

The largest u.h.f. and microwave contest of the year is being held over the weekend **October 4-5** between 1400-1400UTC. All bands between 430MHz to 248GHz will be in use and as it's co-ordinated with IARU Region 1 much activity can be expected throughout Europe.

Running concurrently on the Saturday will be the RSGB 1.3 and 2.3GHz Trophy contests. These events run for the first 8-hours of the IARU contest between 1400-2200UTC. The VHF Contests Committee cup is awarded to the winner of the 1.3GHz event and the G6ZR Memorial Trophy to the winner of the 2.3GHz contest.

Remaining on the u.h.f. theme the first of five cumulative contests on the 430MHz band are being held on **Friday October 10** between 2030-2300 local time. The other events are on **October 27**, **November 11** and **26** and **December 11**.

Deadlines

That's it again for another month. Don't forget to send me your list of locator squares, counties and countries worked for the 1997 table. Forward any news, views, comments or photographs to reach me no later than **Saturday September 27**.

Send them to me at **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP**. You can also contact me via Packet radio @ **GB7MAD**, the UK DX Cluster @ **GB7DXC** or E-mail via **davebu@mdlhr1.agw.bt.co.uk** Alternatively you can telephone me on **(01873) 860679**.

END

LEIGHTON SMART GW0LBI

HF FAR & WIDE

Leighton Smart GW0LBI presents his round-up of your activities on the h.f. bands. It's the column that reflects your time on the air and depends on YOUR reports!

I'll start this month with a report from **Mr W. Guerrero ZB2IB**, Secretary of the **Gibraltar Amateur Radio Society**. The letter says that two stations currently using ZB callsigns are in fact pirates, and request information from readers regarding their presence on the bands.

The callsigns in question are **ZB2FUM** and **ZB2/EA5XUM**. It transpires that ZB2FUM has not been issued, and as far as ZB2/EA5XUM is concerned Gibraltar does not have a reciprocal licence agreement with Spain, neither is it a member of CEPT.

Mr Guerrero closes by asking 'HF Far & Wide' readers for any information they may have on these two illegal stations. Any information can be E-mailed to him at **zb2ib@gibnet.gi** or FAXed on **(350) 75452**.

I'm sure that our readers will help if they can, Mr Guerrero. As they really are a keen lot, and not a lot happens on h.f. without them either working it or hearing it!

Moving on, a letter has arrived from **George Woods G3LPT** in Bury St. Edmunds. He tells us he holds an open Net on 29.570MHz f.m. every weekday mornings except Mondays at 0830.

Apparently, as far as George is concerned, the band is never really dead, and is quite an active spot on the dial for the East Anglians. George would like stations in the area to join the Net, as well as those from other areas no doubt.

Your Reports

Onto your reports now folks, as space this month is limited. We'll start with 7 and 10MHz this month, as it appears that most of our reporters have been spending their time on the higher bands.

As for me, well, I get dizzy if I go as high as 3.5MHz! First then, comes **Sean Gilbert G4UCJ** of Milton Keynes who reports all c.w. 7MHz contacts with VP8CWI (Falkland Islands) at 2118 with PY7ZZ (Brazil) at 2258, OY1G (Faroe Islands) at 2343, YV1GCG (Venezuela) at 2354, EI2V/AM (Aeronautical Mobile at 16000 feet above Eire) and ZP5/LU6BEG at 2225UTC.

A momentous change of direction this month for our 'ace QRPer' **Eric Masters G0KRT** of Worcester Park, Surrey, in as much as he has been working with QRP s.s.b.! Using a newly-acquired Yaesu FT-7 which runs 10W, he got stuck into 7MHz and worked DL1CMB (Germany) at 1857, and HB9ATE (Switzerland) at 1450. On c.w. however, he hooked up with UA9CM in Asiatic Russia at 2255UTC.

Moving up to 10MHz, there's **Ted Trowell G2HKU** from the Isle of Sheppey in Kent. He lists c.w. contacts with 9K2HN (Kuwait), IF9/IT9AUP (Egadi Island), and SM0OIG/5 on Roslagen Island, all at the early hour of 0600UTC.

Also 'bashing' the key on 10MHz has been **Carl Mason GW0VSW** of Skewen, in South Wales. Carl lists contacts with 5B4/DF2UU (Cyprus) at 1900, and VK1CA (Australia) at 0558UTC.

The 14MHz Band

Down to Yeovil now for the 14MHz band report, and **Don McLean G3NDF**. Don's enormous log, filled with the help of a beam antenna and a lot of determination, includes s.s.b. contacts with A61AQ (United Arab Emirates) at 1729, BV3CD (Taiwan) at 1603, FG5FC (Guadeloupe) at 2333 QSL via F6DZU, HS0VH (Thailand) at 1611, OD5NJ (Lebanon) at 2035.

Also reported were S21L at 1635 (QSL via Box 5129, Dhaha 1250, Bangladesh), TA2LM (Turkey) at 1641 QSL via TA2CMM, and ZD8JF (Ascension Island) at 1927 QSL via GW0ANA. Other contacts included 9K2SS (Kuwait) at 1917, 9M8ZZ (East Malaysia) at 1656 QSL via PA3FWG, and VP2EY (Anguilla Island) at 2337UTC.

In Mountain Ash, Mid-Glamorgan, **Steve Locke GW0SGL** has been as active as usual. He lists all s.s.b. contacts with JA4ACI (Japan) at 1650, 5N8NDP/P (Nigeria) at 2003, 6V1A (Senegal) at 1742) and VP5/K5YG (Turks & Caicos Islands) ay 2300UTC. Steve uses a TH-7 beam antenna on the 14MHz band (see **Fig. 1.**)

In Kent, **John Constance G0VGD**, using 100W and a G5RV dipole antenna managed to hook up with VE3TWX (Canada) at 2322, ZP4LH (Paraguay) at 2218, 6Y5DA (Jamaica) at 0021, AA3GZ (USA) at 2147, VK3PT (Australia) at 0224, CP3EB (Bolivia) at 2125, and CU2GYE (Azores Islands) at 2143UTC.

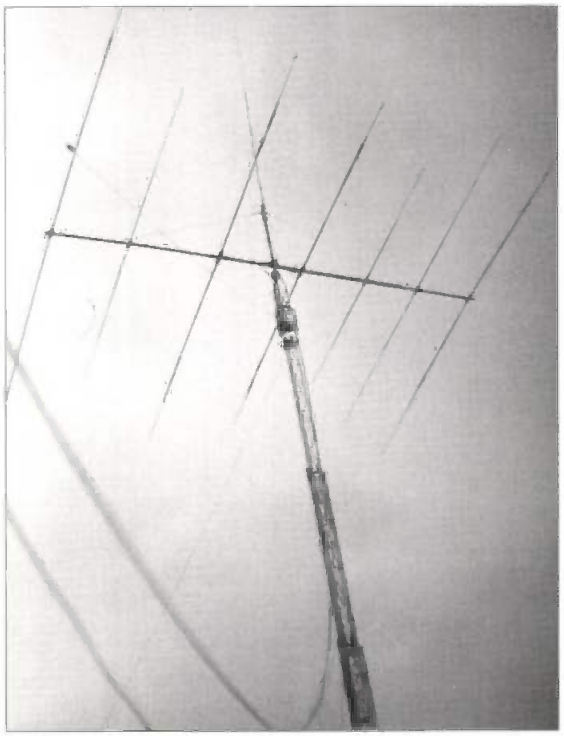

Fig. 1: With a magnificent beam antenna like the TH-7 it's no wonder Steve Locke GW0SGL does well!

A new reporter now in the form of **Alan Bowett** from Stockport, Cheshire, who is enjoying s.w.l.ing as part of his active retirement (what a great way to spend your retirement!). Alan reports hearing 9H1DL (Malta) at 2332, 4X6TT (Israel) at 1723, 9K2GS (Kuwait) at 1910, and LX1DE (Luxembourg) at 2213UTC, using a Grundig Yacht Boy 400 receiver. Welcome aboard, Alan!

Finally for the 14MHz band comes **Terry Ibbitson G0VTI** who lists contacts with ZW100BH (Brazil) at 2024, OX/DZ1IYL (Greenland) at 1555, and 9K2HN (Kuwait) at 1949UTC, all on s.s.b.

The 18MHz Band

Up to 18MHz now, and over to Ted G2HKU who has listed his '17' metre contacts as EA6/DL1KBO (Balearic Islands) at 1000, with TK/F5LGF (Corsica) and SV8/DK2OC (Hydra Island) coming in at around 1500UTC.

Carl GW0VSW hooked up with 4X1FQ (Israel) at 1941, and CU3DJA (Terceiro Island, Azores) at 1117UTC.

Steve GW0SGL meanwhile, in a rare excursion on the 18MHz band hooked up with PU2LCA (Brazil at 2003, FG5FR (Guadeloupe) at 2056, and CN68GB (Morocco) at 1200UTC.

Finally back to Don G3NDF to 'tie up the ribbons' this month. He reports contacts on 18MHz with BV5BG (Taiwan) at 1539, T77M (Republic of San Marino) at 1516, ZD8JHH (Ascension Island) who says he will QSL direct on his return to the UK at the end of 1997, and ZD7MY (St. Helena Island) at 1938UTC (QSL via Box 107, St. Helena).

Time To QRT

Well, that's about all I can squeeze in this time around folks and it's time to go QRT! Hope I managed to get everybody in, fair and square! Thanks again for your continued support for the column, good DX and cheerio for now!

Logs to me by the **15th of each month** to: **33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (01443) 411459 or 710749, FAX: (01443) 710789.**

END

PETER SHORE

BROADCAST ROUND-UP

If you would like to find out what really goes on behind the scenes at BBC Radio, here's your chance. Peter Shore explains all.

There has been a good deal of activity in recent weeks in the world of satellite international broadcasting. At 1600UTC on Monday 4 August, a new service sprang to life on Astra 1A over Europe. The audio subcarrier at 7.56MHz on transponder 7 - Sky Two television - started to carry a mixture of programmes from the **Voice of America** and **Radio Free Europe** in English and the languages of the Balkans.

The new service, put together rather hurriedly I understand from sources in Washington DC, is directed at both potential rebroadcasting stations and listeners in homes in the Balkan region, with particular emphasis on Serbia and Bosnia. It's designed to complement the 'life-line' broadcasting which Voice of America has been running for the region, and is the first time that VoA has used a satellite service to target the direct-to-home market in a specific target area.

The service is brought to the Astra uplink in the UK by World Radio Network, the London-based international broadcaster, using its growing number of international circuits.

Latest Schedule

The latest schedule from **Radio Havana Cuba** suggests that English programmes can be heard: 0100-0500UTC on 6.0, 9.82 and 9.83MHz to North America; 0500-0700UTC on 9.82 and 9.83MHz to North America; 2030-2130UTC on 13.715 and 13.725MHz to Europe and 2230-2330UTC on 6.18MHz to the Caribbean

The station also carries programmes in Esperanto, heard for half-an-hour in Europe on Sundays at 1930 and 2200 on 13.715MHz and to North America at 2330 on 6.07 and on Monday at 0700 on 9.82MHz. You can contact **Arnie Coro**, the host of DXers Unlimited who supplied this information, via E-mail at **acoro@tinored.cu**

Language Skills

Want to brush up on your Arabic language skills as you sit at your computer? **Radio Kuwait** now makes two of its newscasts available through the popular RealAudio Internet system.

The bulletins transmitted at 1000 and 1700UTC are stored for the convenience of listeners. You will find the station at **www.radiokuwait.org**

You can also now listen to **Deutsche Welle**'s English-language service on the Web. The 30-minute Newslink programme is available, together with weekly features including Inside Europe and Living in Germany are also stored on the Internet. Check out DW at **www.dwelle.de**

Behind The Scenes

If you would like to find out what goes on behind the scenes at the world's leading broadcaster, here's your chance. On 29th October, Her Majesty the Queen will open the BBC Experience. Situated in Broadcasting House, home of BBC Radio in central London, the new permanent BBC Experience exhibition will tell the history of the BBC as it celebrates its 75th anniversary.

More than 200,000 visitors are expected each year, each of whom will be given a guided tour of the BBC, including its history and programmes. Audio-visual and interactive shows and displays combine with historical exhibits which include some of the earliest radio equipment from the Marconi Collection.

Broadcasting House, home of BBC Radio in central London. *(Photo courtesy of BBC Resources).*

Guides will lead groups of about 30 people through the Experience on a tour which will last about an hour and a half. Visitors will have the chance to try making radio programmes, including a three-minute play, or be the castaway in *Desert Island Discs*.

Entry to the BBC Experience, which is open between 0930 and 1730 every day of the year, except Christmas Day, costs **£5.75** for adults, and **£4.00** for children, with under-5s free.

To book tickets to this unique show, call **(0870) 6030304** in the UK. If you want to book from outside Britain, call **+44 1222 577771**.

Frequency Information

Last month I mentioned that the **Voice of Greece** is now on the air from Voice of America transmitters in the USA. Here's the frequency information you need to be able to tune in the new service: 0600-0800UTC to the Pacific from Delano on 9.775MHz; 0900-0950UTC to Australia from Delano on 9.775MHz; 1200-1350UTC to Canada via Greenville on 9.59MHz; 1830-2200UTC to Canada via Delano on 11.73MHz and to Latin America via Greenville on 17.745MHz.

Look out for new programmes from **Radio Thailand**. A report on Glenn Hauser's World of Radio programme suggests that the station will launch Arabic, Cantonese, Russian, Tagalog and Spanish services 'shortly'.

World of Radio also reports that **Turkmen Radio** now has English once again. A 10-minute programme of news is heard at 1400UTC on Tuesdays, Thursdays, Fridays and Saturdays on 5.015MHz. Has any *PW* reader heard the station?

Range Of Programmes

The quite wonderful thing about short wave radio is the almost unbelievable range of programmes which cover just about everything under the sun. And for example, some years ago, the BBC's Persian Service ran a highly successful series about the remarkable history of the Persian cinema!

Today, **All India Radio** offers the chance to catch the latest news from the hugely popular Indian film industry. Every third Sunday of the month at 1350, 1830 and 2120, with a repeat at 2330UTC on Monday, you can tune in to Film Story, while Indian Cinema can be heard on the second Monday of the month at 0005, repeated the second Saturday at 1030, 1425, 1910 and 2215UTC.

English from All India Radio is on the air: 1000-1100UTC on 11.585, 13.70, 15.05, 17.387, 17.84MHz; 1330-1500UTC on 9.545, 11.62, 13.71MHz; 1530-1545UTC on 7.41, 9.91, 11.74MHz; 1745-1945UTC on 7.41, 9.95, 11.62, 11.935, 13.78, 15.075MHz; 2045-2230UTC on 7.41, 9.91, 9.95, 11.62, 11.715MHz and 2245-0045UTC on 9.705, 9.95, 11.62MHz.

Bursts Of Data

Look out for 4-second bursts of data appearing on short wave frequencies across the spectrum, including some channels very close to the broadcast bands. The United States Federal Communications Commission has granted permission for a new radio location service which will allow thousands of 15W h.f. stations to take to the air.

That's all for this time around. Keep your ears close to your radio dial as the evenings start to close in during the northern hemisphere's autumn. And let me know of interesting finds from the broadcast bands.

END

— GRAHAM HANKINS G8EMX —

FOCAL POINT

This time Graham Hankins G8EMX looks at the first UK amateur band available for Fast-Scan ATV use.

Alan Banner G7UMW of West Bromich uses 25W of 70cm ATV from a 2C39 home-brew valve PA to send a P5 'shack shot' into Stourbridge.

There is more to Amateur TV than reports of microwave bands and the repeaters. This time I will take a look at the very first UK amateur band available for Fast-Scan ATV, which is 430 to 440MHz. For simplicity, I will refer to this band by either just one frequency, 436MHz, or by wavelength, 70cm.

Do you remember when amplitude modulation (a.m.) was almost universally used in amateur radio? Well, a.m. is still the standard method for modulating a 436MHz carrier with a video waveform.

The big advantage of a.m. for ATVers is that, by using a diode probe and an oscilloscope, the final modulation can be directly monitored from the antenna feeder cable. We will see shortly why this is a very important thing to be able to do.

The design and setting-up of video modulators is part of the fun of ATV on 436MHz. A video signal is made up of synchronising pulses and a video waveform.

The total amplitude of the video signal from a camera or other vision source is 1V. Therefore the sync. pulses will be 0.3V, leaving the vision waveform a maximum of 0.7V between 'black' and 'peak white'.

For an accurate picture to be transmitted, it is important that the 0.3V sync/0.7V video proportion is preserved during modulation. If an a.m. video modulator is not adjusted properly, all sorts of on-screen distortions happen.

'Crushing' of the sync. pulses, or lessening their 'squareness' will result in poor line or frame locking for the receiving ATV station. Any non-linearity in the video part will give an inaccurate picture, or produce a 'soot and whitewash' effect on screen. Hence the diode probe and 'scope, so that the 'shape' of the results of modulation can be accurately monitored and adjusted.

The vision modulator's frequency response needs to start from d.c. because any substantial area of constant brightness, or darkness, constitutes a steady value in the picture signal. Conversely, a lack of high frequency performance during modulation will result in the received picture lacking detail and definition. If there's insufficient amplitude modulation power, or depth the picture contrast will suffer.

So there is much more to transmitting and receiving an watchable ATV picture on 436MHz than is involved in achieving intelligible speech quality in a 'phone contact. All this adds to the sense of achievement in ATV operating on the 70cm band.

Quality Pictures

Amateur TV stations on 70cm (430MHz) used to strive towards 5MHz of vision for near-broadcast quality pictures. But now, the currently accepted practice is to incorporate a video filter before any modulation. The UK 70cm amateur band is only 10MHz wide and these days carries voice repeaters and packet links in addition to conventional simplex phone QSOs.

Stations with their wide-band video usually filter their vision signal to around 3MHz and use an actual 70cm carrier of perhaps 436.5MHz to keep within the band. Remember, after simple amplitude modulation the radiated bandwidth will still be 6MHz wide.

Amateur TV on 70cm is usually in monochrome. Some ATV operators may be able to transmit full colour pictures on 70cm in parts of the UK where other activity is low, but in view of the extra bandwidth needed, the majority of colour ATV has moved away from 70cm.

The latest discrete and integrated semiconductors are frequently to be found in current designs for 70cm transmitters. Even so, in the ATV world the valve - and its substantially higher voltages - has never really gone away.

Until quite recently, every amateur video camera 'saw' a scene by means of, usually, a vidicon tube. And of course, at the other end of the vision 'chain', the really big valve that produces the end result (the picture tube) continues to reign (almost) supreme.

For ATV transmitters, radio amateurs in the UK are permitted up to 26dBW p.e.p. on 70cm. The easiest method of producing this massive signal with amplitude modulation is by a pair of valves with forced air cooling. So, there is still talk of anodes, cathodes, grid bias and heaters!

But here's, a word of caution. Even at much lower power levels, television interference (TVI) to domestic TV can be a problem with an amplitude modulated ATV transmission on 70cm.

An ATV station can be legally, and cleanly, putting several Watts of power out when the telephone rings or there comes a knock at the front door. A neighbour, maybe next door, perhaps many houses away, is seeing your pictures over the programme they are trying to watch!

Many cases of TVI can be cleared with filters added to the neighbour's domestic system. But in extreme cases, co-operation and compromise are needed, you may have to avoid beaming in a specific direction, or stop ATV activity on 70cm at certain times. However, it must be emphasised that rarely is TVI found to be caused by a fault in the amateur station.

Receiving 430MHz ATV

The u.h.f. tuners of older domestic TV sets may adjust down to 436MHz without modification, but most ATV stations put an up-converter ahead of the TV's antenna socket. A simple converter may use a free-running oscillator stage and bipolar mixer, better designs have a crystal for stability and mosfet mixers.

If you fancy joining the ATV activity on 70cm, the **British Amateur Television Club** can provide a lot of help to members. To join the BATC, contact membership secretary **Dave Lawton G0ANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD.**
E-mail:
100046.1056@compuserve.com

Amateur Television A to Z

This mini-dictionary will reach 'Z' in December. To take us there here is the next instalment of my ATV alphabet.

Repeaters: TV repeaters are on 1.3 and 10GHz and usually transmit an ident card or news pages 24 hours, unless accessed.

Seventy five ohms (75Ω): The standard impedance for all video signal links. Mismatching can cause picture distortion.

Test cards: Mostly electronically produced from an EPROM. Printed circuit boards are available from some Repeater Groups.

Cheerio for now, there may be some surprise news next time! Keep sending those reports, and newsletters to me, **Graham Hankins G8EMX, 11 Cottesbrook Road, Acocks Green, Birmingham B27 6LE.**

END

Due to the fast turn around of popular secondhand items, readers should check on availability of advertised stock. In other words...if you spot something you fancy...don't delay or you could miss it!

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Icom ICR7000 25 to 2000mhz **£699**
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ICOM IC-725	£595
ICOM IC-W2E	£199
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ICOM IC-728	£629
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YAESU FT-411 + EXTRAS	£189
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Icom IC-720A	£329.00
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Icom ICR-72E short wave receiver	£550.00
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Lowe HF-225 as new	£285.00
Lowe HF-225 + key pad	£299.00
Lowe PR-150 new	£189.00
Panasonic RFH-10	£49.00
Realistic DX-394 as new	£195.00
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Yaesu FRG-100 short wave receiver	£375.00
Yaesu FRG-8800 short wave receiver	£349.00
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Yaesu FT-102....£475
Yaesu FT-102 + FV-102DM & FC-102....£799
Yaesu FT-767 + 2/6/70cms boxed....£TEL
Kenwood TS-120V + VFO-120/SP-100....£299
Icom IC-726 - boxed....£650

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Kenwood TS-700S....£450
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Icom IC-290D....£300
Yaesu FT-736 + Munek boxed....£TEL
Yaesu FT-790R + mic. case & box....£225
Yaesu FT-290R Mark II....£350
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Yaesu FT-230....£175
Kenwood TW-4000 boxed....£250
Icom IC-251 boxed....£TEL

RECEIVERS/SCANNERS
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Kenwood R-5000 boxed....£699
ICOM IC-R71E boxed....£599
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AR-2500....£275
Drake R-8E....£699
AOR AR7030 mint condition....£600
Maruhan RT-618 handheld scanner....£140
Lowe HF-225....£375
Sony PRO-80....£150
Yaesu FRG-9600 – HF converter....£350
Yaesu FRG-7....£140

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Kenpro KT-22....£80
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Yaesu FT101EE	£185
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Kenwood TS440S - 100W HF inc ATU	£675
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Kenwood R1000 - Choice of two	£225
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SEM Tunrmatch - Manual ATU	£85
Diawa CNA1001 - Auto ATU	£145
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MFJ 407B - Keyer	£49
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NRD-525 Receiver £599.00
Lowe HF-250 Receiver c/w FM/AMS & speaker £399.00
AOR-3030 Receiver £425.00
Kenwood R5000 Receiver £575.00
Realistic DX-394 Receiver £189.00
Icom IC-R70 Receiver £429.00
Lowe HF-225 Receiver £329.00

SCANNERS
AOR-3000 wideband scanner £499.00
Icom IC-R7100 wideband receiver £799.00
AOR-1500 Handheld scanner £169.00

HF TRANSCEIVERS
Kenwood TS-850S £949.00
Icom IC-720A c/w PSU £479.00
Yaesu FT-890AT £639.00
Yaesu FT-102 £399.00
Icom IC-735 £549.00
Icom IC-745 £450.00
Icom IC-751 £589.00
Yaesu FT-757GX £499.00
Icom IC-725 £499.00
Kenwood TS-680S HF + 6M £649.00
Icom IC-745 (mains powered) £489.00

VHF/UHF
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Kenwood TM-733E dualband mobile £399.00
Kenwood TM-701 dualband mobile £299.00
Kenwood TM-255E 2m multimode £599.00
Alinco DJ-580E Dualband handheld £239.00
Kenwood TH-28E 2m handheld £149.00
Alinco DJ-1 2M handheld £159.00
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LX FT890AT Yaesu HF 100W £1250
LX IC-706 Icom HF + 2/6m £779
LX FT7B Yaesu HF 50W £235
AX FT990 Yaesu HF 100W £1650
AX IC765 Icom HF 100W £1699
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RX FT101 Yaesu HF Valve £260
RX FT757GX Yaesu HF 100W £495
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RX IC726 Icom HF 100W £850
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PX FT736R Yaesu 2mtr/70cm £1299
PX FT51R Yaesu 2mtr/70cm £325
PX IC3201E Icom 2mtr/70cm £309
PX C5800 Standard 2mtr m/mode £259
LX DJ580E Alinco 2mtr/70cm £245
LX TH21E Kenwood 2mtr port £100
AX FT790R Yaesu UHF port £310
AX TM-732E Kenwood 2mtr/70cm £525
RX DJ160 Alinco 2mtr/70cm £155
RX DJ560 Alinco 2mtr/70cm £335
RX FT8500R Yaesu 2mtr/70cm £575
RX FT212RH Yaesu 2mtr FM £175

RECEIVERS
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PX R2000 Kenwood HF Gen RX £375
PX FRG7700 Yaesu HF Gen RX £295
PX AR8000 AOR Scanner £299
PX AR2800 AOR RX M/base £359
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PX FRG100 Yaesu HF Gen RX £395
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LX FRG00 Yaesu HF RX £425
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And finally on offer is *An Introduction to Microwaves* BP312 by **F. A. Wilson** (normal price £3.95 plus P&P), which is aimed and those who wish to find out more about the practical uses of microwaves in communications and television. There's also a section on radar and heating and the domestic microwave cooker is not forgotten either. An ideal introductory book.

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