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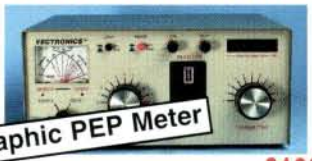

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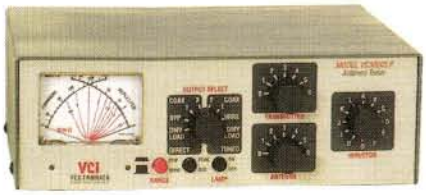

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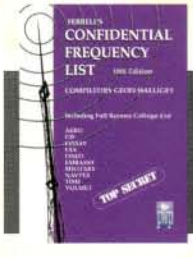

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TSM-1612	6/2/70 (2.15/6/8.4dB) 2.1M	£54.95
DB-7900	144/70 cms, (5/7.6dB) 1.5m	£29.99
DB-770M	144/70 cms, (3/5.5dB) 1m	£24.95
DB-1304	144/70 cms, (2.15 /3.8dB) .41cms	£19.95
DB-EL2E	144MHz, ⅛ths, 4.5dB (1.8m)	£29.95
DB-285	144MHz, ⅛ths, 3.4dB (1.3m)	£15.95
PL-6M	50MHz ¼ wave (1m)	£16.95

ACCESSORIES *P&P £2.50 on the following*

MT-1301	H/Duty Mag Mnt + Coax ..... Top Quality	£24.95
MT-3302	H/Duty Hatch/Trunk Mnt ..... Top Quality	£24.95
CF-BPF2	2m band pass filter	£49.95
Q-Tek	6m band pass filter	£42.95

Q-TEK ANTENNAS P&P £8.50

Q-TEK ZL SPECIALS

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2m	7ele (boom 60"/11dBd)	£45.95
2m	12ele (boom 126"/13.8dBd)	£69.95
70cm	7ele (boom 28"/11dBd)	£24.95
70cm	12ele (boom 48"/13.8dBd)	£44.95

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2m	8ele (boom 125"/11dBd)	£46.95
2m	11ele (boom 186"/12.7dBd)	£65.95
2m	5ele crossed (boom 64"/9dBd)	£69.95
2m	8ele crossed (boom 126"/11dBd)	£85.95
4m	3ele (boom 45"/7dBd)	£39.95
4m	5ele (boom 128"/9dBd)	£59.95
6m	3ele (boom 72"/7dBd)	£49.95
6m	5ele (boom 142"/9dBd)	£69.95
70cm	13ele (boom 76"/12dBd)	£36.95
70cm	13ele crossed (boom 83"/12dBd)	£55.95

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70cm	HB9CV (boom 12")	£16.95
2mtr	HB9CV (boom 20")	£19.95
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6mtr	HB9CV (boom 32.5")	£36.95
10mtr	HB9CV (boom 52")	£65.95

NEW HF MOBILE WHIPS (PL-259)

Easy to mount HF mobile whips ready to go with PL-259 fitting.

PL-80	80m whip (approx 1.5m long)	£21.95
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PL-20	20m whip (approx 1.5m long)	£19.95
PL-6m	6m whip (approx 1.2m long)	£16.95

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6m	Length 126" (SO239)	£49.95
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★ No ATU or ground radials required

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ITP-20	20m version (10.1m)	£49.95 P&P £6
ITP-17	17m version (7.8m)	£49.95 P&P £6
ITP-15	15, version (6.7m)	£49.95 P&P £6
ITP-12	12m version (5.9m)	£49.95 P&P £6
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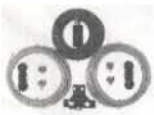

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Add them to your ½ size G5RV and convert it to a full size. (New length only 69 feet total). £22.95 P&P £2

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Flexweave H/duty (20 mtrs)	£12.00	P&P £5
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Q-TEK BALUNS

Wound on ferrite rod and encapsulated into a dipole centre with an SO239 socket. Brass terminals form the balun output and stainless steel screw eyes offer an anchor point for the ends of the antenna. Ratio power rating is 1000 watts.

1.1 Balun	£22.95	P&P £2
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6.1 Balun	£22.95	P&P £2

Q-TEK TRAPS

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80 mtrs	Traps	£25.00 P&P £4
10 mtrs	Traps	£25.00 P&P £4
15 mtrs	Traps	£25.00 P&P £4
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K-08	8 pin "Kenwood" round	£9.95
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YM-08	Modular phone "Yaesu"	£9.95

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A high quality headset that will fit most hand portable and most HF & VHF/UHF tcvrs via optional interface.

£24.95 P&P £3.50

Supplied with two pin molded plug-will fit Alinco/Yaesu/Standard/ADI/Icom hand helds). Optional leads (P&P £1.50).

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F-303K	8 pin "Kenwood" round	£16.95
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F-303YP	Modular "Yaesu" phone	£16.95
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5 section telescopic mats. Starting at 2½" in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

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4 x 5 foot aluminium sections each swaged at one end.

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WALL BRACKETS + MAST BASE PLATES

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12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
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Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom

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This Ear/Mic comes with an "over the ear" earpiece as EP-300

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2M FM handheld amplifier 2-5W input. 30W output (for 5W ip). Turn your handheld into a mobile for under £50

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High gain 2m + 70cm telescopic antenna with wideband receive.

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QS-300

A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

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NISSEI METERS

NISSEI METERS

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UK's most popular 300W ATU with built-in dummy load.

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Portable all mode SW receiver with built-in cassette recorder.

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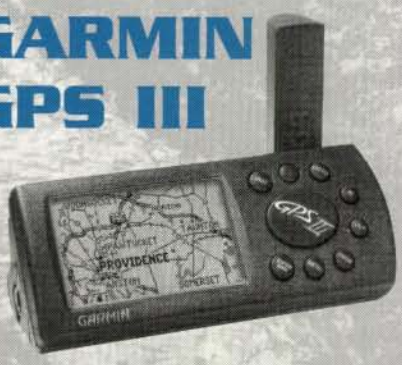

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Yupiteru MVT-3300	£154.99
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Icom ICR-8500	£1499.00
Yaesu FRG-100	£489.99
Icom PCR-1000	£Call

keylines

I'm always very pleased indeed when a feature or series of articles in *PW* is well received by our readers. It's always very good to know we're 'on target' and this certainly seems to be the case with 'Radio Basics'.

However, although many beginners (and quite a few experienced people too) are enjoying with me the pleasures of discovering or re-discovering the fascination of radio with the help of 'Radio Basics' - I've also received some critical comment from others who disagree with the way I present some circuits.

In a way I feel as if I've got a few other 'teachers' standing behind me - all waiting to jump on my all-too-public published words and perceived errors. It's a price to pay for the privilege of writing regularly in *PW* - but I feel I should perhaps also point out why some circuits may seem 'over simplified' and set the record straight for good.

Firstly, everyone should be fully aware that all the circuits published in 'Radio Basics' have been built, tried and tested by me specifically for the series. Nothing will appear unless I have built and used it myself in the form it's published within the magazine.

Secondly, I should point out that occasionally a circuit will be suitably simplified to illustrate - almost in 'block' diagram' fashion - what it does. **However, you can be assured that the circuit will work and does so as I've described it**. You can then build the circuit yourself - learn and then proceed onwards. And the next time you read a book on theory, what you've learned in practice will prove to be of great support.

There are some interesting ideas on the way through 'Radio Basics' and some might seem unconventional - but they work extremely well as you'll find out with this month's 'upside down' printed circuit board technique - something I've used to teach the hobby for well over 30 years with successful results.

So, please keep writing and join me every month. But be assured that I'll be doing my utmost to provide good tuition, an interesting read with practical projects every time. It's a wonderful hobby which I'm determined to share with many more of you.

Prisoner Support.

Finally, this month I ask all those readers who showed interest in supporting the two prisoners to begin studying the RAE - to contact me directly at the *PW* office. This is so that I can provide an up-date on the situation.

In return for an s.a.e. I'll send you a report in letter form with the latest news. Please mark your letter (with s.a.e so I can send them back by return) - 'Prisoner RAE Update'. Thank you, and cheerio until next month.

Rob Mannion G3XFD

Club Spotlight

As from the August issue of *PW* the 'Club Spotlight' section is changing format and will appear as a special occasional feature. However, clubs will not be losing out because we are expanding our news pages and club news, events and information will in future be presented on those pages.

So, in future **Donna Vincent G7TZB** our News & Production Editor will be handling possible club items for inclusion in the news. Special event stations, club events (with colour photographs) and other 'newsey' items will be considered.

Next, I have to re-assure 'Club Spotlight' readers that *PW* is not abandoning its support for Amateur Radio Club. No Sir! (or Madam) - in fact the 'Spotlight' is still very much 'switched on' and in future will be used to illuminate individual clubs and their activities. We plan to reply to clubs directly when we think they could benefit from the Spotlight treatment, and this will be most likely be 'triggered off' because of a news item which we think could expand into an interesting feature.

What will then be requested from the club concerned will be a feature of a maximum length of 800 words. It should include a selection of good colour photographs, a little history of the club, its members, activities, 'characters', etc., and a copy of the magazine (if one is produced). It will be the ideal chance to promote your club.

Finally on the 'Club Scene' this month I must remind everyone who intends to enter the 'Club Spotlight' Magazine Competition that time is running out fast. All magazines stand a chance of winning, and this year all entrants will see a copy of the judges' comments on their entry.

So don't lose out - read the entry details in the June issue of *PW* (particularly the number of issues required) and get those magazines off to reach us no later than **Wednesday 1 July 1998**. Good luck and we look forward to reading your entry. I'm sure it'll be good!

COMPILED BY ROB MANNION G3XFD

STAR LETTER

Radio 'Make Overs'

Dear Sir

I have an idea that I wish to put forward to the *PW* Editorial team. On TV at present there are a lot of 'make over' programmes where a team of 'experts' descend on some willing person and they get 'made over' either make-up, clothes, decor or garden, etc.

So...why not get the *Practical Wireless* team of experts to do a radio make over on a willing amateur, preferably someone new to the hobby who is unhappy with their situation radio wise? This make over may not necessarily include buying new rigs, but to offer practical advice on improving their current set up.

I don't wish to sound voyeuristic, but I think I would like to read about how the *PW* team would swoop onto a station and do a make over. Finally - when is the next unbeatable subscription offer and what will it be because I'm tempted to subscribe!

Ron Hague G4XOU
Nottingham

Editor's reply: An excellent idea Ron and what do other readers think of the idea? For myself I'd like part of the 'make over' to be the invitation to take over part of the old BBC Daventry transmitter site or Rugby (transferred to Dorset of course). Look out for our next 'special' subscription offer - and of course you can use your £10 voucher towards it!

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**

Amateur Radio Licence?

Dear Sir

It was nice to see the review of the Hora C408 u.h.f. transceiver in May's *PW*. I was getting tired of the 'what is amateur radio all about?' debate, but I can't help noticing that at 230mW it comes in below the MPT 1329 licence-free specification, (500mW on 458MHz). And it is probably less powerful than the 49MHz walkie-talkies you can buy in the well known high street stores.

So, what is the Amateur Radio licence all about?

Martin Brown
Hertfordshire

Novice Licence

Dear Sir

I believe that one of the most significant advances in Amateur Radio in recent years has been the introduction of the Novice Licence. It can potentially bring young people into a hobby which can be rewarding over a lifetime and may even lead to the more tangible benefits of a career in communications/electronics.

However, here in the Welsh valleys I perceive a problem which is likely to dampen the enthusiasm of any newly licensed Class B Novice. The hilly terrain and general lack of activity on the 70cm and 50MHz bands means the Novice will be confronted with a 'wall of silence' for much of the time.

Admittedly, 50MHz has DX potential and will improve as the sunspots increase over the next few years. Nonetheless, I think that Novices should be allowed access to the 144MHz band, this will make it more easy for them to communicate with the general amateur population locally.

Surely all of us have gained some insights and knowledge about Amateur Radio by talking to others over the air? If we are to nurture Novices, releasing the 144MHz band will be a significant step forward, it will then be up to us 'old hands' to help and encourage them.

R. E. Jones GW4FCV
Gwent

Editor's comment: I agree with the suggestions from GW4FCV. And in fact some 'movement' in the suggested directions could be detected last year at the Radiocommunication Agency's 'Open Forum' at the 1997 RSGB HF Convention. This very subject was raised and it appeared from the response of the RA officials present that they were/are considering increasing the Novice frequency allocations - particularly on h.f. However, it was at this same Open Forum that (from statements directly from the RA) I got the distinct feeling the 'rationalisation' of Amateur Radio allocations throughout the EU could mean the loss of 70MHz. I wasn't alone in thinking this judging by the response of the audience and generally we may win some and lose some frequencies.

Happy Memories

Dear Sir

Reading about PM1HF valves, etc. in Charles Miller's 'Valve & Vintage' brings back happy memories of spilt battery sulphuric acid and later how the double cotton covered copper wire from the Igranic coils was a source of wire for projects for many years. The long wave one (a No. 200?) being the most prolific. I still have a pre-war AVO R/C bridge complete with its old type 5A round pin mains plug and a Runbaken 'Testoscope', a fancy title for a small neon in a Bakelite tube with screw driver probe used (as they are now!) for voltage tests.

Although the Second World War produced its well known supply of radar with its klystrons and magnetrons, radios, spy sets, transmitters and test gear, etc. some used as they were and others

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Pra*

Callsign Number Plates

Dear Sir

I have just read 'Keylines' in the June issue of *PW* and agree with your comments on callsign registration plates. It brought to mind the day of my Morse test as I sat in my car letting my nerves settle before the drive home from Macclesfield, I noticed the examiner's car had his callsign across the radiator grill of his car made from the metal letters available from DIY shops.

Perhaps this is the way to go, maybe an enterprising person would make stick on plastic strips for rear windows similar to the many garages selling second-hand cars and the "I've been to North Wales" signs we also see. Would the RSGB be interested?

Of course we could all make our own with a bit of ingenuity and then politely raise the 'two fingers' sign to the greedy people at the Treasury. I knew this solution does not have the 'snob' value of a personal number plate, but if the object is to make yourself known to other road users, it has possibilities.

Of course, being sensible people we would not abstract any rear view or block our radiator intakes air flow.

Ken Evans M0AQQ
St. Helens

Dear Sir

Regarding the price asked by DVLA for personal car number plates. I think they have got their knickers in a twist! Surely the price asked for any item depends on the demand for that item.

Now, I am the only likely buyer of G3BYY in the country in the same was the Editor is the only likely buyer of G3XFD. With such a limited demand, it is surely a buyer's market and I would be prepared to pay around £25 and not a penny more!

The answer surely is a country wide boycott.

Ted Elliott G3BYY
Middlesex

modified, there were also several unique pieces of equipment. Unfortunately, most of these were also broken up for further projects and my one remaining piece is a new and still unused item, advertised as a '1½m receiver', available in several formats with or without a second r.f. stage and variously annotated R3188, APR4790 or ZC8931, but in effect, a complete v.h.f. receiver with antenna and LT/HT inputs and video output.

Later investigation indicated that it was probably an early v.h.f. version receiver of the A1 Fighter Intercept system, also used for ASV (anti submarine detection), later being upgraded to 10cm frequencies. So what else is there out there?

PS: I have only held a ZC4 Ham licence so I don't think that I will be trying for the multi-lingual test (New Regulations) even in April! So hard luck 'Lirpa Loof'!

Norman Smith
Staffordshire

Crystal Set Challenge

Dear Sir

With reference to the *PW* 'Radio Basics' series and adding 'extras' on to crystal sets. Some of us crystal set buffs think using batteries and transistors is cheating! Making a set that works well on the medium wave is not too difficult, the short wave is another matter. After much experimentation, I have come up with a design: The coil former is a 100mm x 45mm diameter plastic tablet container that you can get from Boots. Wind 15 turns of heavy gauge insulated wire, e.g. bell wire so that there is a gap between each turn. Then wind a second coil into the gaps, only the first coil is connected.

The receiver uses two diodes in reverse which increases the volume. The resistor across the headphones reduce the distortion. The 100pF variable capacitor in series with the ground provides fine tuning and improved selectivity.

With an indoor attic loop aerial tuned to the 49m h.f. broadcast band, I can pick up the BBC World Service from Rampisham (near Dorchester) and numerous foreign stations. I would be interested to hear how its performs with a long outside antenna.

Richard Felton
Somerset

Editor's comment: From the circuit he supplied, Richard's design uses the 'full wave' type of diode detector circuit which was popular in the 1920s and still features in the various books from the American-based 'Xtal Set Society' (available from the *PW* Book Service). From the comments received here in the office - many readers enjoy the challenge offered by these very basic receivers and they can provide an introduction to the radio hobby or be yet another specialised area of our hobby.

Saint Maximilian

Dear Sir

The deeply moving story of Saint Maximilian Kolbe SP3RN in the February issue leads me to wonder how many Radio Amateur martyrs there have been about whom we know nothing. Canonised or not, anyone who voluntarily goes to his or her certain death in order that another may live is surely a saint anyway.

Edward Eleazer G0OUQ
London

***tical Wireless.* All other letters will receive a £5 voucher.**

news

COMPILED BY DONNA VINCENT G7TZB

headline news

Small But Perfectly Formed!

The latest tiny transceiver to join the growing trend of miniature communications is **IC-Q7** from the Icom. The Q7 takes the shape of an f.m. dual-band hand-held transceiver, which has been designed to be lightweight, compact and to fit neatly into the palm of a hand.

Measuring just 580 x 860 x 270mm the IC-Q7 boasts a large built-in speaker to provide clear audio especially in noisy environments, as well as push button band switching system and CTCSS decode/encode function fitted as standard. The Q7's minimal number of controls, compact design, user friendly approach and with a price tag of just **£215** represents excellent value for money.

Other features of the IC-Q7 include:

* Automatic squelch
* 200 memory channels
* Backlighting with timer
* RIT function

For more information on the IC-Q7 contact any Icom approved dealer or **Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741** or **FAX: (01227) 741742** or point your Web browser at **http://www.icomuk.co.uk** Look out for a review of the IC-Q7 in next month's *PW*!

News From Nevada

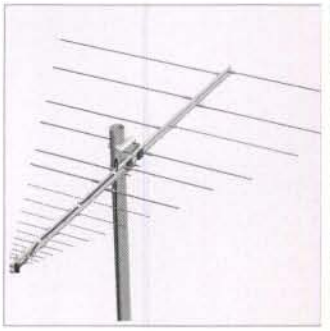
Time really does move on at a pace - if you own one of the high specification Timewave 599zx and 59Y DSP units according to a news release from Portsmouth-based **Nevada Communications**.

The press release announces that there's an up-dated software package - called DSP-RTTY available to increase the versatility of both units. The manufacturers claim it enables the filters to 'dig' right into the noise for really weak signals and it's claimed to provide 100 times fewer errors than the KAM Plus or PK-232 units.

The DSP-RTTY harnesses the power of the DSP-599zx and the DSP-59Y with the communications capability of Microsoft Windows 95®. You'll be able to operate contest quality RTTY with only the DSP units, your radio and Windows 95®.

Features in the software up-date system include the RTTY facilities: CQ, 'Brag', exchange and start-up tapes, 45-110 baud, Baudot/ASCII , split or combined transmit-receive window and large buffers. The manufacturers also claim that "Keyboarding is easy and flexible" and that the user can choose from character, word or line mode. You can also embed macros in macros and minimise keystrokes for efficient operation.

The DSP-RTTY controls either the 599zx or 59Y and both DSP units operate RTTY with a one-touch button. Straightforward operation is provided by simple push-button saving and recalling the complete RTTY set-up (Baud rate, frequency shift, tuning display, etc.). The complete package will sell for around **£79.95**.



Logging On To New Antenna

The log periodic antenna - although extensively used commercially and within broadcasting - has never seen much use on the Amateur Radio bands. However, now that Nevada are introducing their **Scanmaster® LP1300** log periodic wideband beam antenna covering 105 to 1.3GHz things could change!

With a claimed gain of 8.5dB and good front-to-back rejection over a wide frequency range this antenna could prove to be very useful for anyone with limited space for antennas as the maximum boom length is 1.5m and longest element length of 1.43m.

Built to commercial standards in the UK the antenna features stainless steel and aluminium materials with the boom pre-assembled and comes with the feeder cable with injection moulded connector fitted. The Scanmaster LP 1300 is also supplied with a hardware mounting kit that allows the antenna to be used vertically or horizontally polarised on mast up to 50mm (two inches) diameter. Termination is by a female N type connector and power handling is stated to be 500W.

Further details on the LP-1300 - which sells for **£99.95** and the Timewave DSP-RTTY can be obtained direct from Nevada Communications at **189 London Road, North End, Portsmouth, Hampshire PO2 9AE. Tel. (01705) 662145, FAX (01705) 690626**.

Marconi Celebrations

July 1998 marks the centenary of the early Marconi experiments that took place in Dublin Bay in 1898. Just three years after Marconi's success in transmitting radio signals he was invited by a newspaper to take his radio apparatus to Dublin.

Upon reaching Dublin Marconi boarded a boat to

report on the yacht races of the Kingston Regatta 16km south-east of Dublin. Using his spark-gap transmitter, Marconi's c.w. signals from the cabin of the launch *Flying Huntress* conveyed information on the progress of the races to a receiver in a shore station. After this the information was telephoned to the newsroom of a Dublin newspaper and therefore the news was in the paper before the day's racing had concluded.

During the Regatta signals were flashed back and forth between the boat and shore station. A total of 400 messages were successfully exchanged over a distance of up to to 9.6km. This event has long been

Wandering 'Round The Web?'

Don't forget when wandering 'round the Web to check out the *PW* site. You can find our site at **http://www.pwpublishing.ltd.uk**

On the site you'll find previews of what's in the current issue, an on-line editorial from **Rob G3XFD**, a page from **Tex G1TEX** on all things antennas or electronics as well as the *PW* review list from 1978 and much, much more. The site also comprises of a 'Book Store' page, together with subscription details and an order form.

So, go why not give it a look? .... and don't forget to let us have your comments.

Soaking Up Success in Bath

Pictured here are (l-r) **Patrick Herrlinger, Ian Press, Tracey Fielding and Jonathon Snow** all of whom have just successfully completed the Novice Radio Amateurs Course. The course ran at Oldfield Girls School, Bath from September 1997 until March 1998 and was sponsored by the City of Bristol RSGB Group.

One of the candidates, Tracey, is a member of the City Council's emergency planning department and decided that she would like to know more about radio communications and so embarked on the NRAE course. Tracey is now eagerly awaiting her 2E1 callsign.

The course was run by **Steve Hartley G0FUW** and **Mike Coombs G3VTO** and was the second to be run by them. The next course that will be running in Bath will be for the full Radio Amateurs Exam and the tutor for this will be **Chris Parnell G0HFX** from the Trowbridge ARC.

In exchange for Chris running the RAE in Bath, Steve and Mike will run a Novice course in Trowbridge. Their collaboration between local radio groups is believed to be unique.

regarded as the first use of radio in journalism and could also be regarded as the first sports broadcast.

To mark the centenary of the Kingstown Regatta the Wicklow Wireless Society will operate a series of Special Event Stations over the weekend of 18 - 20th July 1998 from a variety of locations associated with Marconi. The locations will include the Moran Park House (Marconi's original shore station) and the National Maritime Museum.

On July 19 a re-enactment of the 1898 Regatta races will take place with reports again being transmitted from a boat following the yachts to the orignal shore station. Trophies will be presented to the winning yachts by Princess Elettra Marconi.

All the Special Event stations will use the callsign **EI1M** and they will be operation on all ba ids from 3.5 - 28MHz using c.w. and s.s.b. Reports can be made via the the EI bureau or direct to EI2WW.

Holdings Update

Further to the mention in last month's 'Electronics in Action' regarding **Holdings Amateur Electronics** and its properitor, **Harry Leeming G3LLL's** retirement we would like to point out that once Harry has moved house to Heysham he intends to set up a small workshop at home to carry out repair work on a part-time basis. Watch this space for more details!

Island Chaser

New into the *PW* Book Store this month is the *RSGB IOTA Directory & Yearbook 1998/99*. This A4 sized 112 page publication provides a guide to participating in the Islands On The Air (IOTA) awards programme and is divided into two sections comprising of a directory and yearbook

The directory section of the IOTA 'guide' lists thousands of islands, grouped together by Continent and indexed by prefix. It also gives details of the IOTA award rules and even includes application forms, offers advice and gives further information for the island 'chaser'.

The yearbook part of the RSGB's latest publication has been completely revised from previous editons and contains the Annual Honour Roll list, articles on IOTA, Internet sites and new certificate holders. New to the book this year is a colour section which includes results of last year's IOTA contest, profiles of Committee members and local checkpoints. Also included for the first time are pictures of the colurful IOTA Award certificates.

The PW Book Store is taking orders now for the *RSGB IOTA Directory & Yearbook 1998/99* which is priced at **£8.95 plus £1 P&P (UK), £2 P&P (overseas)**. So, don't delay, place your order today!

Cluster Link

The DX Cluster, **GB7MBC**, for the North West of England is now linked to the main UK Cluster network. The system uses CLX, a clone of Pavilion PacketCluster(AK1A) which runs under the Linux operating system.

At present access to GB7MBC is on 144.900MHz and hopefully before too long

on 70.325MHz as well. It's also possible to connect via most nodes, both AX25 and TCPIP in the area.

Ian Maude G0VGS is in the process of printing a user manual, which will be available soon for a small cost to cover printing, etc. For more information on GB7MBC contact **g0vgs@gb7mbb.#16.gbr.eu** or E-mail: **ianmaude@btinternet.com**

Receiving You!

Please remember that when sending letters to *PW*, which are intended for consideration for inclusion on the 'Letters' pages to mark them as such. If you don't we are often left wondering if it's personal comment or for publication and then you may miss out on gettting a topic which is close to your heart into print. The same rule applies to any letters sent to us via the Internet.

Thanks for your help on this matter and don't forget we love receiving your letters. So, keep them coming!

Zoë Moves On!

We are very sorry to report that as from this issue we are losing **Zoë Crabb** from our Editorial team, as she is moving onto pastures new. Zoë, who has been a great asset to our team, is moving on to become News & Production Editor on our sister publication *Short Wave Magazine*.

The *PW* 'team' would like to wish Zoë all the best in her new role and wish her continued success in the future. We would also like to take this opportunity to wish **Kevin Nice G7TZC** all the very best as he takes over in the 'hot' seat as Editor of *Short Wave Magazine* .

Donna G7TZB

club spotlight

History Of Wolverhampton ARS

'Club Spotlight' has recently heard from **Tony Osborne M1BSU**, Public Relations Officer of the **Wolverhampton Amateur Radio Society**, which, incidentally, celebrated its 75th anniversary last year. Along with his letter, Tony also sent in a Society Booklet (produced by one of the Society's members, **Bill Moorwood G3CAQ**), which documents the progress of Amateur Radio in Wolverhampton over the last 75 years.

The booklet (41 A4 sized pages, printed back-to-back), is very detailed and makes interesting reading. Included in the contents are: Notable local events, Wolverhampton Town Centre Map, All time roster of members, The Wolverhampton Societies Part 1 & 2, Officers of the Society, Midland clubs of yesteryear, Memories of Wolverhampton and so much more.

If you would like to find out more about the history of the Society then you can order your copy of this wonderful booklet *75 Years & More!* from the Society's Secretary: **J. Smith, 11 Finchfield Hill, Finchfield, Wolverhampton WV3 9DG**, cost £6, which includes postage.

Bill G3CAQ receiving a 75 year plaque from Ian Kyle MI0AYZ/GI8AYZ the RSGB President at last year's Telford Rally.

The 'Spotlight' Is On Again!

It's time to turn the 'Club Spotlight' on again as we invite you to enter your club magazines into the 1998 *Practical Wireless* & Kenwood Club Spotlight Magazine Competition (Last chance - time is running out!). Local clubs entering will be competing for the magnificent original trophy - kindly donated by Kenwood - and 'national' clubs will be competing for the 'Bert's Bell award, which was instituted in 1997 in tribute to the late **Bert Newman G2FIX**.

It's very simple to enter the Club Spotlight magazine competition and all you need to do is to send us the **three most recent copies** of your magazine and a covering letter. The covering letter should make it clear **what category of club your club is eligible**.

For example, the **British Amateur Radio Teledata Group** - BARTAG - winner of the 1997 national award - can only enter as a 'national' club' section, whereas the **Cockenzie & Port Seton Club** - last year's winners, now have to specify that they are a local club.

National Or Local

For either category (national or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired), how long the magazine has been established, how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club.

Carmarthen Amateur Radio Society

Formed in 1981, the Carmarthen Amateur Radio Society has grown into one of the largest in the principality. Meetings generally commence at 7pm on the 1st and 3rd Tuesday in each month at **Hill House, Picton Terrace, Carmarthen, Carmarthenshire**. Visitors are most welcome to turn up on any club night.

The club now has a new 430MHz Repeater Station, located at Peniel, north of Carmarthen, West Wales, callsign Charlie/Mike, (CM, new callers are always welcome). The repeater has an excellent range and operators can access from Cardiff to Ilfracombe to Pembroke.

The Club also operates a Carmarthen Amateur Radio Society Emergency Team (CARSET) and has assisted in local flooding and also during a major oil spill. If you would like to find out more, a full programme of activities has been arranged for the coming year, which include visits, talks, social events as well as club matters can be obtained from **Roy Holt GW6OLS** (Chairman) on **(01792) 875501** or **Islwyn Hughes GW4ZXL** (Secretary) on **(01267) 231359**.

Milton's Meetings

The **Milton Keynes & District Amateur Radio Society** meet every Monday night at **Faulkner House, Bletchley Park** at 1930 to 2200 hours. New members of all ages are most welcome. The Society also run courses for members of the Novice, RAE and Morse exams, and you can find out more from the Monday meetings!

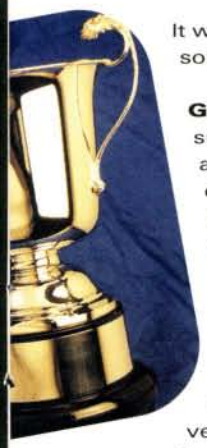
Morse tests are available at frequent intervals at the Society premises, contact **Steve Anstey G0GGU** on **(01908) 694365** to find out more about this. The Society also operates two repeaters **GB3MK**, a 70cm repeater on 433.00MHz and **GB3TG**, a 3cm ATV repeater on 10.135GHz.

More details about the Society can be obtained from **Dave McQue G4NJU** on **(01908) 378277.**

Hoddesdon's Events

The **Hoddesdon Radio Club** looks forward to the visit on the 23rd July of the RSGB Manager, Peter Kirby. This will be Peter's third visit to the club and much publicity is given to allow all interested in the future of amateur radio and the RSGB to attend.

It is also hoped to see a future visit of **Steve Telenius-Lowe** for a talk on the new look *Ham Radio Today* magazine.



It would also help the judging panel if you could provide some historical details on your club.

The judging panel this year includes **Jim Bacon G3YLA**, **David Barlow G3PLE** (who of course first suggested the competition!), **Dave Wilkins G5HY** and **Rob Mannion G3XFD**. Additionally - and for entries in the **national category only** - the Salisbury Club will be providing one extra judge to decide the winner of the Bert's Bell Trophy (Salisbury was of course Bert's Club).

As I've said time is fast running out, so make sure your club's entry reaches us in *PW* Offices in Broadstone **no later than Wednesday 1st July 1998**. This is because the presentations are to be made at the Leicester Show in September (the new venue of course) and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries!

Send your entries to: **Club Spotlight Magazine Competition, *Practical Wireless*, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**.

The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into! Good luck and we look forward to reading **YOUR** magazine!

Rob Mannion G3XFD

Details of the club's programme and a map of how to get there can be had from **Don G3JNJ** on **0181-292 3678**.

Change of Venue

As of 1 June 1998, the **Submarine Amateur Radio Club** will cease to submerge and meet in Torbay Block at HMS *Dolphin*, but instead will surface to meet on Wednesday evenings at the Royal Naval Amateur Radio Society's headquarters within HMS *Collingwood*. More details from **Colin M1ANC**, Hon. Sec., who is QTHR or on Packet @ GB7SUN.

Two Special Events

With effect from April 1998, the Amateur Section of the Radio Officers Association has been known as The **Radio Officers Amateur Radio Society (ROARS)**, but remains part and parcel of the ROAE. The ROARS is organising two special events.

The first is to mark the closure of **Portishead Radio** and the second is to mark the closure of UK Coast Stations. The precise date of the closure of these stations is no known, but indications are that it may be at the end of March 1999.

The aim of both of the special events is to set-up representative stations in the general area of the original stations. In some cases, the actual site is possible, but **David Barlow G3PLE** says that he hopes amateurs who have, or had, an interest in the stations will assist in their recreation.

The ROARS group have at present over 35 members who wish to operate from Portishead Radio and others who want to operate from Area and Coast Stations. A watch keeping schedule will be organised and it is hoped to be able to get permission for PMG holders to be allowed to operate from Portishead only for this event, even if they do not hold amateur licences.

If you would like to find out more about these special events, contact David Barlow G3PLE at **'Pine', Churchtown, Cury, Nr. Helston, Cornwall TR12 7BW**, E-mail: **dbarlow@enterprise.net**

CLUB REMINDERS

The **Barking Radio & Electronics Society** is a licensed centre for the City & Guilds RAE and NRAE courses. Members meet every Thursday evening at 7 till 10pm at the Westbury Centre, Ripple Road, Barking, Essex.

Informal club activities include use of h.f., v.h.f. and u.h.f. equipment, etc. Visitors are welcome any time. More information from **Harry Coots G7WJE** on **(01708) 746731**.

The **Plymouth Radio Club** meet at **The Royal Fleet Club, 12 Morice Square, Devonport, Plymouth**. Just a few up and coming events are: June 16 - Talk on HM Prison Dartmoor by Bill Green (Warden). More information from **Mr D. Perryman, 50 Bellingham Crescent, Plympton, Plymouth, Devon PL7 2QP**.

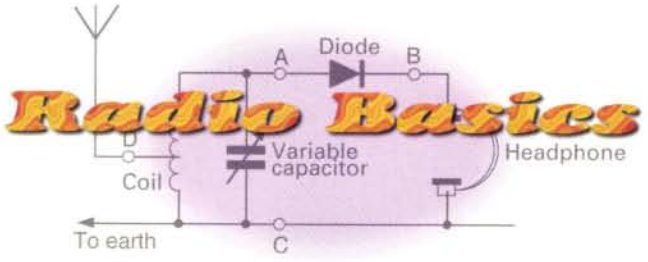
The **Craven Amateur Radio Group** meet on Tuesday at the **White Lion, Kildwick**, which is located on the A629 between Keighley and Skipton in North Yorkshire at 8pm. Business meetings are held on the last Tuesday of each month, with information natters otherwise. Visitors and prospective members always welcome. Weekly club Nets are held on Thursdays on 145.425MHz starting at 8pm. Details from **Howard Aspinall** on **(01756) 793555**.

Members of the **Rochdale & District Amateur Radio Society** meet at the **Bamford and Fieldhouse Cricket Club, off Hollin Lane, Bamford, Rochdale** every Monday night at 8pm. July 6 - The Rev. George Dobbs G3RJV will be on hand to bring all the latest news and views from the USA following his trip to the Dayton HamVention. More details from **Dave Shaw G0PUD**, Club Secretary.

Meetings take place every Friday night at **Binley Church Hall, Brinklow Road, Coventry** commencing at 2000 hours for the **Coventry Amateur Radio Society**. June 12 - Talk, 19th - Night on the air, 26th - Rig test night, July 3 - Night on the air. Visitors are always welcome. Any further enquiries, contact **Robin Tew G4JDO** on **(01203) 673999**.

The **Dundee Amateur Radio Club** meet on Tuesdays at 1900 sharp at the **Dundee College of Further Education, Graham Street, Dundee**. The club tend to have a guest speaker every second Tuesday with various topics relating to radio. The other Tuesday is made up of construction, operating from the club shack or just general rag chewing. More information from **Ray Bennett GM0PTP**.

Meetings are held every Friday from 8pm at the **Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex** for **The Radio Society of Harrow**. More information from **Jim Ballard** on **(01895) 476933** (home) or **0171-278 6421** daytime.



Up until now, we've been using the extremely simple (but effective) 'drawing pin and board' constructional techniques. However, now you've come this far it's time to step forward and start working with your own 'home-brewed' printed circuit boards (p.c.b.s).

Please don't worry - making your own p.c.b.s is not only extremely simple, it's enjoyable and very rewarding. Additionally because of the natural 'built-in' circuit checking you carry out making a p.c.b. there'll be fewer failures in projects.

Many constructors are discouraged from making their own p.c.b.s by the thought of using unpleasant chemicals and difficult techniques. But, by following some simple guidelines any problems are easily overcome and you can end up with a design to be proud of.

Chemicals & Safety

When you're dealing with p.c.b. etching chemicals - you have to be aware of safety at all times. And when you finish with the chemical etchant there's the all-important environmental aspects of disposal to be taken care of, although it won't be a problem if you follow my guidelines.

The most convenient form of etchant used in Amateur Radio p.c.b. work is **Ferric Chloride**. This material comes in dry form and is available from many of our advertisers.

In the dry form Ferric chloride is much easier to handle and store but is still toxic. **So, at all times please wear household rubber gloves to protect your skin, wear an apron to protect clothes, and be particularly careful in avoiding fluid contact with your face, mouth and eyes**.

Once made up into a working solution the liquid is a very deep yellowish brown and will stain anything it comes into contact with. So be warned - keep it away from clothes, the kitchen sink, carpets, etc.

And whatever you do - **do not** be tempted to flush the chemical down the toilet after use. This is not only illegal but the evidence (the yellow stain) will remain in the pan for a very long time.

Instead, when the solution is exhausted you should have a small plastic bucket filled with sand available. Pour the chemical into this and take it to your local Public Amenity Waste Disposal site. Provided you have a small quantity and are not etching boards professionally (as a business) there's unlikely to be a disposal charge.

Design & Lay-Out

The actual design and etching process is, as I've already said, very simple. For the 'one-off' boards most of us require I use the well known 'Dalo' etch resist pen, in conjunction with the one-sided copper laminate board.

For the first p.c.b. excercise I'm going to use the simple diode and one transistor receiver design, described in the April 'Radio Basics' (see page April *PW* page 22 for the circuit). And for practice....I suggest you make yourself a board using this circuit.

When the board is completed, the method I use is to mount the components on the same side of the board as the final etched copper track. As there's minimal drilling involved this is easier and quicker for one-off boards. The final etched copper track component soldering 'pad's have to be larger, but in practice the technique works very well and is very reliable.

Using the Dalo pen you should press gently until the etch resist starts to flow and then draw out the track design you require. Practice makes perfect - and you'll soon get the hang of it!

When you need to make a larger area of track (a component pad for example), press down on the pen barrel to open the built-in valve for a slightly longer period. Then leave the resultant larger spot of etch resist to dry for about half an hour.

The photograph in **Fig. 1** shows the completed p.c.b. design before and after etching. And, now you're ready to start the etching process on your boards.

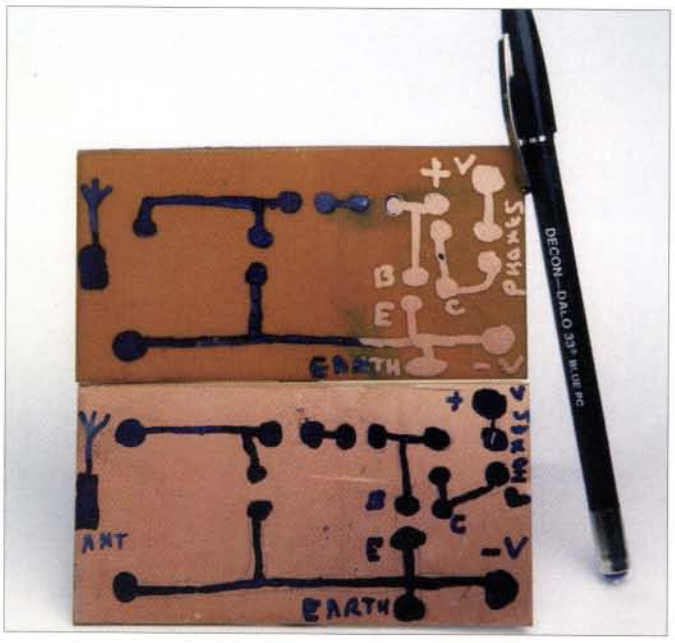


Fig. 1: The simple diode rceiver and amplifier circuit design laid out on copper laminate board before etching (bottom). Letters E, B, and C represents BC108/9 Emitter, Base and Collector connections. The upper part of the photograph shows the same design after etching, with all unwanted copper removed ready for use. The etch resist (blue) has been removed on right side to show final copper 'printed' circuit track.

Sealable Box

I recommend you buy a translucent type of sealable plastic lunch box for etching purposes and **don't use it for anything else!** Place the board to be etched into the box, pour in just enough ferric chloride to cover the board, place the lid on the box, seal it down and slowly rock it from side-to-side in 'see saw', with an additional forwards and backwards rolling action (just like an English Channel ferry!).

The rocking motion minimises the length of time needed, and the enclosed box stops splashing and allows you to use the minimum fluid. After approximately 20 minutes, using photographic plastic tweezers, lift the board out of the fluid to check that all the unwanted copper is etched away, if not, continue the process until only the areas protected by the etch resist remain.

Cleaning & Preparation

When the etching is completed, lift the board from the ferric chloride, allowing drips back into the container before re-sealing it for further use. Then, wearing your protective gloves place the board onto dry newspaper and wipe it off with soft tissue (loo roll is ideal!). The newspaper and tissue can be eventually disposed of together with the 'spent' ferric chloride.

The etch resist can now be removed from the p.c.b. by using aerosol switch/contact cleaning fluid. A very short spray loosens it and after a quick wipe with a tissue and you're ready to go!

Next month I'll describe how to build your radio on the completed board using my favourite version of p.c.b. construction. In the meantime, try making a few practice boards yourself - it's much easier than you think. I made three for use in this article and it took a total of one hour!

PW

This month Rob Mannion G3XFD introduces you to home-made printed circuit board techniques. "No need to be frightened" he says..."It's easier than you think"!

Anytime, Anyplace,

The SGC SG-230 Smartuner

Richard Newton GORSN looks at a highly 'portable' automatic antenna tuning unit, which he found offered effortless tuning and the ideal solution for mobile or base station h.f. operating. Read on to find out more .....

Everybody has their favourite Amateur Radio pastime, for some it's Packet, others v.h.f. DXing but for me it's definitely mobile h.f. working. I always take my Icom IC-706 when I go away camping and use it in the car with a mobile whip antenna.

However, over the past few years I have found myself wanting to set-up a portable station, but I can never bring myself to pack the antenna tuning unit (a.t.u.) and all the other 'gubbins'. My a.t.u. is very nice but it's over twice the size of my IC-706!

It was therefore with more than a little interest that I agreed to have a look at the SG-230 Smartuner. This is a microprocessor controlled automatic antenna coupler.

The SG-230 unit is designed to be situated outside. It's a strong black plastic box, (a little larger than a family size box of breakfast cereal), has moulded brackets with fixing holes and looks extremely rugged.

The SG-230 unit is waterproof at half a metre for half an hour and is supplied with a very easy to read manual. It has nine metres of coaxial cable terminating in a PL-259 plug, which connects to the radio.

Also sheathed with the coaxial cable are four small colour coded wires. Two of these wires are for powering the unit the other two are for the optional Smart Lock control and optional l.e.d. indicator. The only other external connections are the insulated post for the long wire antenna and the earth post. The unit only works with end-fed antenna systems.

The Smartuner is highly portable as it's completely self contained, weighs 3.5kg and could be packed away very easily or bolted to a trailer or vehicle. It can be operated with any type of h.f. transceiver covering 1.6–30MHz and will work with inputs from 3 to 200W p.e.p. The coupler network configuration used by the SG-230 is of an 'π' or 'L' type.

I decided to read the manual before I used the SG-230, this is good advice with any piece of new equipment, especially when you have never used anything like it before and it is not yours to blow up! It very quickly became apparent that if the SG-230 did everything it claimed to do it would be a very simple to use and could be adapted to different operational preferences.

Non-Volatile Memories

The Smartuner has 500 non-volatile memories, these automatically remember antenna and transmitter conditions. On first tuning-up on a given frequency it may take anything up to a few seconds for the Smartuner to tune. However, if you tune off that frequency and then return to it later, the Smartuner will recognise that the conditions are the same and tuning will be done within 10 milliseconds.

The SG-230's memories are fully automatic, when you have filled all 500 the unit will then lose the oldest one and replace it with the new information. As if this was not enough the

Anywhere.....

Smartuner will **always** check that it has the best tuning solution. Even when using a memory it will still check to make sure that this is the optimum tuning solution.

If you want to use the Smartuner to tune the bands and see what is about by just using your antenna without the tuning elements in circuit this can be easily achieved by turning the power to the Smartuner off for just over two seconds and then turning it back on. This resets the Smartuner to stand-by.

The tuner will not engage any of the tuning elements until it sees r.f. energy and therefore find a solution. If it's desirable for the tuning elements to be by-passed all the time when in receive, this can also be done. You simply have to move a jumper on the printed circuit board. Similarly the 500 memories can also be by-passed if desired by the use of a jumper.

The coupler is designed with 64 different input capacitor values, 32 output capacitor values and 256 inductor values, this provides about half a million different p or L configurations. The Smartuner requires an input of about 5 to 150W to operate, it runs on 12V DC but will also run on 24V DC with an optional extra.

"...connecting the SG-230 couldn't have been easier."

Designed Toughest

The SG-230 Smartuner is designed with the toughest jobs in mind. The weather proofing is designed for mounting the unit on the weather decks of vessels. It can be mounted any way up and in almost any position. The instruction book gives examples of helicopters and tugboats.

However, the SG-230 is less easily attached to a normal family car. Those of you who own recreational vehicles may find there is a good chance that the unit would bolt directly onto the vehicle, if not, an optional extra is available called the 'Quick Mounting System'. This attaches the unit to the outside of vehicles.

The SG-230 is designed for use with end-fed unbalanced antennas such as whips and long wires. (It can however also be fed to a dipole.) The radiating portion of the antenna is connected directly to the coupler through a high voltage insulator. It will work with any antenna more that 2.5m in length however, the longer the antenna the better. In any case you ought to be looking for at least $^1/_4$ wavelength.

Just because you may have to use an end-fed wire antenna your options are not limited. If they are it is only by your lack of imagination!

The SG-230 manual offers some excellent ideas from Base Delta Loops to a 'Machey' Quad loop, dipoles and groundless loops for boats. I can tell you from previous experiments that playing around with wire antennas can be very educational and a great deal of fun. The only h.f. antennas I have ever used are wire and whip and using them I have 'worked' all over the world.

Recreate A Station

I decided that the best way I could put the coupler through its paces was to try and recreate having to set-up an h.f. station in the middle of nowhere. I do like a coffee while I'm working and I had to look after my youngest son, so for the purposes of this experiment the middle of nowhere turned out to be my back garden!

The first thing I looked for was power, only to find that a cell had gone in my 12V battery. So, a 30A power supply and extension lead later I was imagining hard!

I found a length of copper wire in the shack, which I measured in the time honoured 'span' fashion and estimated that it was about 19m. I then found some nylon rope and an egg insulator.

The next thing I needed was a radio, that was easy, the Icom IC-706 MkI. Now, where and how was I going to hang the antenna?

The Smartuner boasts that it's easy to use, it also gives the impression that it can cope with some rather difficult antenna conditions. So, I set-up a little table in the rear garden, hung the wire from the edge of the bungalow and then took it up to the egg insulator that I had attached to the top of my 10m extendable mast, from there it came down on the opposite side of the garden to the wooden

fence. This was now an end-fed inverted V for the want of a better description.

I then fixed the SG-230 to the fence using two screws and connected the wire. I was nearly ready to go, but the ground/counterpoise was my next problem.

The ground/counterpoise problem was soon solved by using a car jump lead clamped on to the earth connector of the SG-230 and the other end clamped on to the nearby chain link fence. That was it - I was ready to go!

The whole setting-up process had taken about an hour. Here I was sat in beautiful sunshine with a cup of coffee and an h.f. radio, idyllic!

So, connecting the SG-230 couldn't have been easier, it really was very straight forward. Once it was 'powered-up' and the radio on, all I had to do was hope.

Speak Or Whistle

To tune the SG-230 all you have to do is speak or whistle into the microphone. I decided to try it out on the 14MHz band first.

I heard **EU5HQ** (Belarus Republic) calling, there was a bit of a 'pile-up' but I decided to go for it anyway. I tuned away from him to tune up. A couple of whistles later and I heard the SG-230 whiz into action, in less than a second it stopped and glancing down to the SWR bridge I saw that I had a 1.5:1 s.w.r.

I called EU5HQ and an instant response came back. Achim EU5HQ gave me a 5 and 7 report from Minsk, he was operating the station of the Russian Amateur Radio League HQ. His own call is **DL7VFM**.

Having had this success on 14MHz I decided to try something a little lower. The tuner appeared to hardly have to think about tuning down on 3.6MHz. It was all so easy.

I then heard a very strong signal from **G3BHM.** On establishing contact I discovered it was Henry from Wimborne, very close to my own location. After a very pleasant chat I decided to let Henry get on with cutting his grass while I moved onto try the SG-230 performance on the 7MHz band.

It was the same story again on 7MHz, the SG-230 whizzed for a second or so and then clunk! An s.w.r. of 1.7:1 was present.

The 7MHz band was very busy indeed. I heard **G4KEE**, a QRP station from Exeter. He was a wonderful signal but just as I had turned the power down to 5W another station came on very close by and wiped him out.

Tuning round I then found **GB2IWM**, I called and got a 5 and 9 report. The station was situated at the War Museum at Duxford near to Cambridge. Frank was operating the station, he informed me that the GB2IWM was a permanent feature at the museum situated on the airfield from which Douglas Bader used to fly.

Spurred On

I was spurred on by the very interesting contacts I and decided to go the h.f. bands again. All I can say is that the SG-230 was a joy to use, it was an effortless task to change band and frequency and this made operating so incredibly simple.

I went on to speak to **Vera EA8AZY** on Tenerife Island on 18MHz and then zipped up to 21MHz to have a chat with **Alex UT4IZ** from Donetsk in the Ukraine, both gave me 5 and 9 reports. Back on 14MHz **Anton UT7CT** from Cherkassi gave me a 5 and 5 report.

Finally, I decided to try 7MHz once more. There I met another station very local to my QTH, **Jim G0DYR** and his grandson, **Christopher 2E1GNW**. Jim was very close by and gave me a good report.

In total I was operating for about three hours and for someone operating under portable conditions the SG-230 is perfect. It really is effortless.

With a little imagination, some wire, some rope and a radio and the SG-230 just think of what you could achieve. I really can imagine having a SG-230 bolted to the trailer camper and operating an effortless portable h.f. station all holiday long. I'm not so sure that my family would share my enthusiasm though! PW

Manufacturer's Specifications

HF frequency ranges	1.6 - 30MHz
Power input range	3 to 200W (p.e.p.)
Input Impedance range	45 to 55Ω
VSWR	Typical - less than 2:1
DC input requirement	13.8V d.c. typical (24V DC optional)
DC operating range optional)	10 to 15V DC (24V DC
Random set times	Typical - less than 2 seconds
Recurrent set times	Typical - less than 10 milliseconds
Non-volatile memory addresses	500
Antenna length	2.4 - 24m (on 3.3 - 30MHz) 7.5 - 25m (on 1.6 - 30MHz)
Installation	Any position
Operating temperature	-35°C to +70°C
Enviromental	Waterproof at immersion depth of half metre, for half hour.
Size	406 x 305 x 706mm
Weight	3.5kg
Case construction	Plastic ABS (optional shock-mount tray)
Cable input	SGC special cable, approx 3m coaxial and two power wire RMT tune and Smartlock wire

"It can be mounted any way up and in almost any position"

My thanks go to Waters & Stanton PLC, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835 for the loan of the SGC SG-230 Smartuner which is available from them for £299.

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Codename GEE

Brian Kendal tells the tale of the first radio-navigational aid, which was first put into service by the RAF in 1941.

Prior to the Second World War, the policy makers of the Royal Air Force were firmly of the opinion that a bomber aircraft could always find its target by use of traditional navigational techniques such as dead reckoning, astro navigation and map reading, no matter what weather or other conditions prevailed at the time. This was a total fallacy, as had been proved only a few years earlier when, on the 12th December 1936, a flight of Handley Page Heyford bombers flying in formation from Aldergrove in Northern Ireland to Finningley in Yorkshire encountered fog and heavy icing conditions. Of these, only one, piloted by a Sgt. Biddulph, safely reached its destination with the remainder either crashing or suffering forced landings.

If such tragedies could happen to regular bomber crews in a daylight exercise in peace time over the UK, what chance would a hastily trained wartime bomber navigator have of finding his target at night, flying over fully blacked out enemy territory, whilst being attacked by anti-aircraft fire and enemy night fighters?

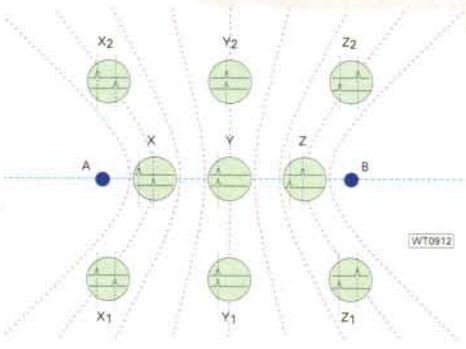

Fig. 1: Hyperbolic position lines. Along each line the arrival time difference between the two pulses is the same. In each case the upper trace represents the transit time from transmitter A and the lower from transmitter B.

Throughout the interwar period there was a marked reluctance to include radio communication or navigation equipment for fear that the external antennas would impair the aerodynamic properties of the airframe. Even by 1939 this had only been relaxed to the point that basic h.f. communications equipment and a simple direction finding were carried even in the largest bomber aircraft.

In late 1940 and early 1941, the UK suffered from a series of highly accurate attacks by the German Luftwaffe, which it had been realised made use of a series of sophisticated beam systems. In the course of time, these systems had each been discovered and jammed to the point where they were unusable and this re-enforced the Air Staff opinion that the use of radio navigation systems was a waste of time, for they could be rapidly rendered unusable by countermeasures.

However, in 1941 Bomber Command claimed that it had bombed the Skoda works at Pilsen. Following this, the UK authorities were surprised to receive a report from a friendly Czech agent that, far from bombing the factory, the night had been completely peaceful and the nearest bomb had fallen more than 80km away!

The Czech and similar incidents resulted in the call for an urgent investigation. Cameras were installed in bomber aircraft for the purpose of photographing the bomb release point and then used for assessing the accuracy of the bombing. By the early summer of 1941, sufficient photographs had been obtained and on analysis by **D. M. Butt**, the Cabinet Secretary, it was realised that, over the Ruhr, one of Bomber Command's main targets, less than 10% of bombs fell within 8km of their target.

It was the Butt report that finally convinced the air staff that traditional navigation techniques were impractical and that sophisticated electronic navigational aids were necessary. It was also realised that if the equipment was enclosed in a shroud of secrecy during the development phase, a period of time must elapse between the introduction of a radio-navigational system and its effective neutralisation by the enemy and during that time the aid would be effective.

First Navigational Aid

The first navigational aid to be developed under the new policy had the codename of GEE. The principles of GEE had already been suggested in 1938 by **Robert Dippy**. At that time, insufficient funds were available to develop the idea further, but in

The Vickers Wellington was used by 115 Squadron at the time of the incident described in the text.

1941 the reverse was true and it took only six months for the first development sets to arrive at 115 squadron at Marham which were flying Wellingtons.

The GEE system was the first hyperbolic navigational aid. You may at first consider that he system seems unduly complex, but in practice, however, the principle is not difficult to comprehend.

First of all consider two radio stations, A and B, spaced apart by about 100km and somewhere between them an aircraft. Each station simultaneously transmits a short pulse of r.f. energy.

If the aircraft is equidistant from the stations, then it will receive both transmitted pulses at exactly the same time. If the aircraft is closer to station A, then it will receive A's pulse first and if it's nearer to B, then the converse will occur.

By measuring the difference between the arrival times of the two pulses, the relative distances of the two transmitting stations can be determined. From that position a line can be drawn on a map which can represent all possible positions of the aircraft.

Pinpointing The Aircraft

If station A transmits again, this time simultaneously with another station, C, a further position line can be drawn and where the lines intersect is the position of the aircraft. Each position line is a hyperbola (hence the term hyperbolic navigation system) and these position lines will intersect at two points, one of which will be the position of the aircraft. In practice, however, this causes little inconvenience for the points are well spaced and there's little possibility of confusion.

The question must be asked as to how the various pulses are identified by the aircraft? In answering the simplest method would be for each station to transmit on a separate frequency, but this would be wasteful in frequency spectrum. To overcome this time separation was used.

The stations transmitted at intervals of exactly one millisecond in the order: A (Master); B (Slave); A (Master); C (Slave). In order that each pulse can be identified, the second pulse from the master in each sequence is followed by a 'Ghost' pulse. The master and slave stations each radiated about 100KW and the frequencies used varied from 25 to 80MHz.

At the receiver in the aircraft, the relative time of arrival of the pulses was measured on a special oscilloscope in which the master pulse with each slave appeared on separate traces. A strobe was then placed over each pulse and using these the timing of each could be measured to a microsecond.

At short distances from the transmitter, the accuracy of the GEE system could be measured in yards, but at extreme range this deteriorated to somewhere in the region of 3.2km. However, although this was not really good enough for pin-point precision bombing, it was a vast improvement on the astro and dead reckoning which it superseded and aircraft could now be sure that they were at least bombing the right target!

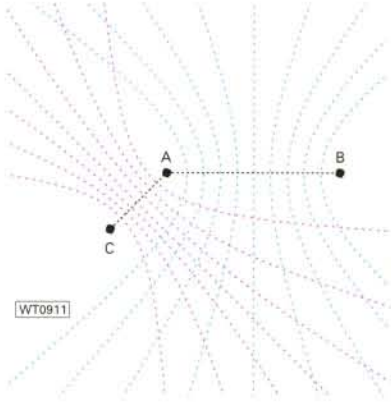

Fig. 2: Combining two sets of hyperbolic position lines to form a grid from which the receiver postion maybe determined. A would be the Master station and B and C the Slaves.

Prototype Trials

On receipt of the prototype equipment, 115 Squadron wasted no time in putting it to test. A number of trials were laid on over the UK and the North Sea. All were highly successful with the navigators highly enthusiastic about the new aid which would give them an accurate fix in virtually any conditions.

With enthusiasm so high and 115 being an operational squadron, before long the inevitable happened - on the 11th August, two GEE equipped aircraft led an attack on a target in the Ruhr valley. This was successful and the experiment was repeated the following night for an attack on Hanover.

However, with the second attack disaster struck. One of the GEE equipped aircraft failed to return to its base. No distress signals were received and no one saw the aircraft go down.

The situation was obviously extremely serious. The demolition charges which would have rendered the equipment into worthless scrap metal were not installed on the prototype equipment.

At worst this meant that the Germans would have recovered an easily repairable example of the GEE receiving equipment several months before it could be brought into general squadron service. In the latter case, they would also have all the information necessary to prepare jamming equipment which would render the equipment unusable from the moment it was introduced.

Overall, it was assessed that there was a one in three chance that the Germans had recovered the equipment, albeit in a damaged condition. What was required was a major damage limitation exercise, a task which fell to **Dr R. V. Jones**.

The first task was the transfer of the GEE equipped aircraft from the squadron and GEE trained air crew reverted to normally equipped aircraft for the remainder of their

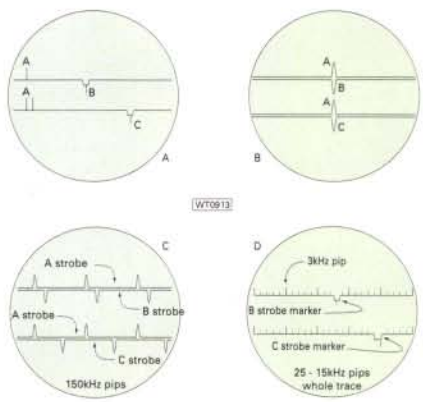

Fig. 3: Examples of GEE indicator traces: (a) The received pulses have been strobed which inverts the two slave pulses; (b) a fast time base has been switched on which enables an accurate pulse alignment, when this is accomplished a switch is thrown which removes signals and leaves the calibration pips as in (c). From this display the fine reading can be taken. On returning to the main time base (d) the whole number of units may be noted.

tour of operations. They were also ordered to tell any enquirers that the system was a failure.

The transmissions from the GEE stations were maintained as it would have been an immediate giveaway had they been terminated. However, the characteristics of the transmissions were subtly changed so that they resembled a normal 'Chain Home' (CH) radar transmission.

The next task was to assess the possibility that the German Intelligence organisation may have learned something of GEE from indiscretions by RAF prisoners. Since the GEE trials had begun, 78 air crewmen from Marham had been lost over enemy territory and many of these were probably prisoners of war and it was probable that they'd heard of GEE and may reveal its existence under interrogation.

Dr Jones then set about the task of giving the impression that GEE was a completely different aid to what it actually was. This was made more difficult by the fact that although no GEE sets were yet available for squadrons, the racking and wiring harnesses were already being installed in all new aircraft.

"....a bomber aircraft could always find its target by use of traditional navigational techniques...."

From his previous work on captured German equipment, Dr Jones knew that equipment type numbers could give away the purpose of the equipment. He therefore arranged that GEE equipment should be re-classified from the 3000 series type numbers which were allocated to pulse type equipment to the 1000 series, which was reserved for communications equipment. This number was also preceded by the letters TR which indicated that the equipment was part of a transmitter receiver, something that the Germans could safely ignore!

The next stage was to develop a new navigational aid which the Germans could be convinced was GEE. For this, three high power Lorenz beam transmitters were installed in eastern England directed over Germany under the code 'J' Beams. This letter was chosen because the German pronunciation of the letter 'G' was very near to 'J'.

The RAF aircrew were quite familiar with Lorenz beams as the system had been in use since before the war on civil airports and the RAF used a similar system known as Standard Beam Approach (SBA) R.A.F. aircraft returning from raids over Germany were encouraged to use these beams as a homing aid.

At this point all that could be done had been done. It only remained to hope that the measures had been effective and to equip Bomber Command just as soon as possible.

Lancaster Bomber in action, note the Gee aerial under the rear fuselage. *Philip Jarrett*

Extensively Used

By the beginning of March 1942 sufficient GEE receivers were available to equip a third of Bomber Command's aircraft and from the 8th of the month the aid was used extensively over Germany. At this point Dr Jones's work began to take effect as although the first GEE receiver fell into German hands on the 29th March, there was confusion between GEE and J and it was not until the end of July that a special unit was set-up to interfere with the aid.

The Germans initiated jamming on the 4 August and from that point GEE was virtually useless over Germany. However, the 5 months of unjammed operation was far more than had ever been expected and by now two further aids were beginning to come on line, H2S and OBOE, which would see Bomber Command through to the end of hostilities.

The accuracy of GEE enabled a complete change in tactics for Bomber Command. Prior to its introduction, aircraft virtually made their own way to the target. This was extremely risky, for the German defence system divided airspace into 'boxes' with radar and night fighter aircraft allocated to each.

With the accuracy of GEE, the aircraft could now fly in a concentrated stream. This could then completely overwhelm a sector of the defence system thus considerable reducing losses.

The neutralisation of GEE over Germany was not the end of the story, as once out of range of the 'jammers' it remained a very useful and accurate system. The ultimate accolade was when, late in the war, a German bomber shot down over Scotland was found to contain a captured GEE equipment.

Hostilities End

By the end of the hostilities, virtually all the airspace of Europe was covered by GEE Chains and initially the newly emerging civil aviation industry made good use of the aid. Unfortunately, from the commercial point of view, GEE is essentially a navigator, as distinct from a pilot interpreted aid, thus requiring a specialist aircrew member.

Extra crew are of little consequence in military aviation, but in commercial operation it represents additional expense. An attempt was made to rectify this problem in a way that it could be operated by the second pilot, but this did not find favour and as a result, GEE gradually fell out of use and by the early 1950s it had virtually disappeared from civil aviation scene.

Military aviation continued to use GEE through the 1950s and 60s. The last Gee chain closed in 1971, marking the end of a navigational system which was both remarkable for its time and was also the forerunner of all subsequent hyperbolic systems. PW

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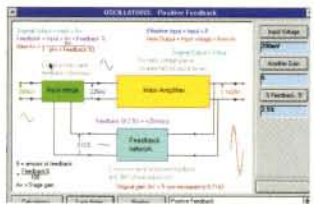

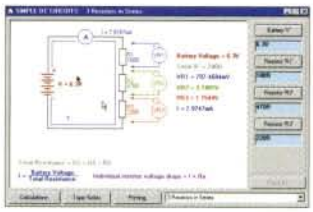

Last month in *PW*'s 'Electronics in Action' section **Tex Swann G1TEX** took a look at one of the latest electronic educational software programs now available on the market - *Electronics Principles 5.0* from **EPT Educational Software**. This software is 'billed' as 'a complete PC based electronics course' and as Tex discovered it offers the user a wide range of electronics principles covering just about everything from simple atomic structures to the latest microcontroller workings.

And to top it all you only need the minimum of system requirements to run *Electronics Principles* from your home PC. The program will run quite happily on a mid-range IBM PC ('486DX2/66 running Windows 3.1) and is easy to install from the three 1.4Mb floppy disks supplied.

So, if you are looking for an easy and enjoyable way of studying for the RAE, City & Guilds, GCSE, BTEC or other qualifications requiring you to have an understanding of electronics principles or simply wish to improve your knowledge of electronics then *Electronics Priniciples 5.0* is the software for you!

***The Electronics Principles 5.0* software package would normally cost £119.44 including VAT & P&P. However, we're offering you the chance to buy yours for just £99 inc. VAT and carriage (UK mainland, overseas readers please add £3.50 P&P).**

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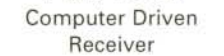

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Telephone our professional sales team for best prices and deals on new and used equipment. See our Traders Table in this issue.

Yes, this month you can switch on that old valved set and while you wait for the set to warm up there's time to look through some books chosen on a 'vintage' them by the PW Editorial team. And immediately we turn to a book which will bring back many memories for anyone who ever assembled a kit from that famous company in Benton Harbor, Michigan in the USA!

Book PROFILES

Heathkit - A Guide to Amateur Radio Products

By Chuck Penson WA7ZZE

£21.95

Anyone who has ever built or owned Heathkit equipment cannot fail to be attracted by the front cover of this substantial soft-backed book. Why? - because not only does it use the same 'Heathkit' style colouring (darker green with a very light shade of green and black finished off with the internationally famous Heathkit surfboard shape logo), it immediately envelopes the readers with a full dose of 'Heathkit atmosphere.

Excellently produced on quality paper and well written and designed this book provides a fascinating read. It also gives an insight to many Heathkit products you may not have heard about. And just in case there's a potential reader who hasn't tried a Heathkit project....those little illustrations showing numbered components - with occasional cartoons - are taken from the famous Heath manuals. **Highly recommended, a good read and valuable reference source.**

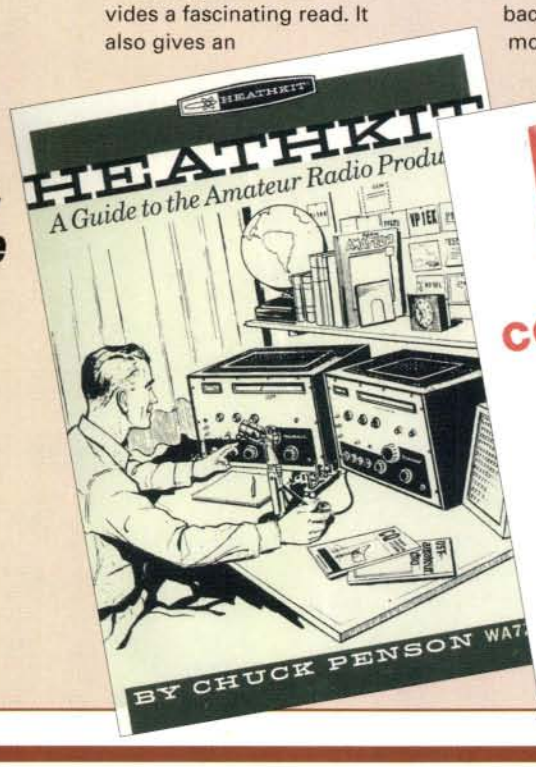
Communication Receivers - The Vacuum Tube Era 1932-1981 4th Edition

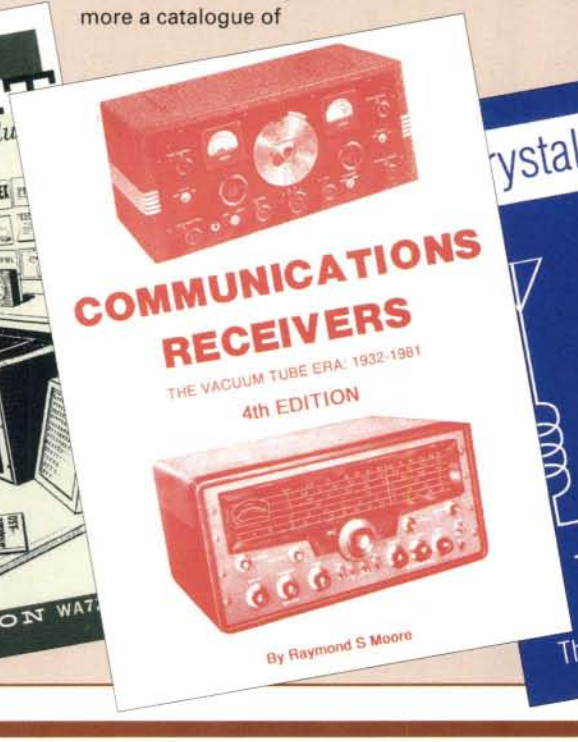
By Raymond S. Moore

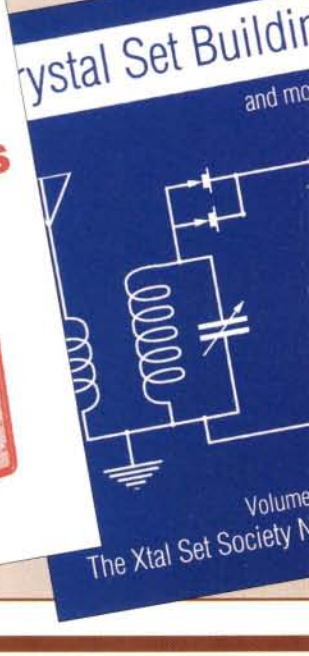
£17.95

Very 'American' in approach (the title provides a clue) this soft-backed book in reality is more a catalogue of receivers - with brief details and some history - than a true book. It's well worth reading for the section on Hallicrafters equipment alone, but the associated text is somewhat disjointed at times with a jerky 'notebook' style. Another problem is that the reader can be misled by thinking that the illustration above or below the text is actually the equipment under discussion...which sometimes it isn't!

But despite the difficulties this catalogue/book would be something any Dayton HamVention 'flea market' explorer should not be without. Fascinating snippets of information and history in a 'home brewed' book format. **Very useful for collectors of American equipment.**

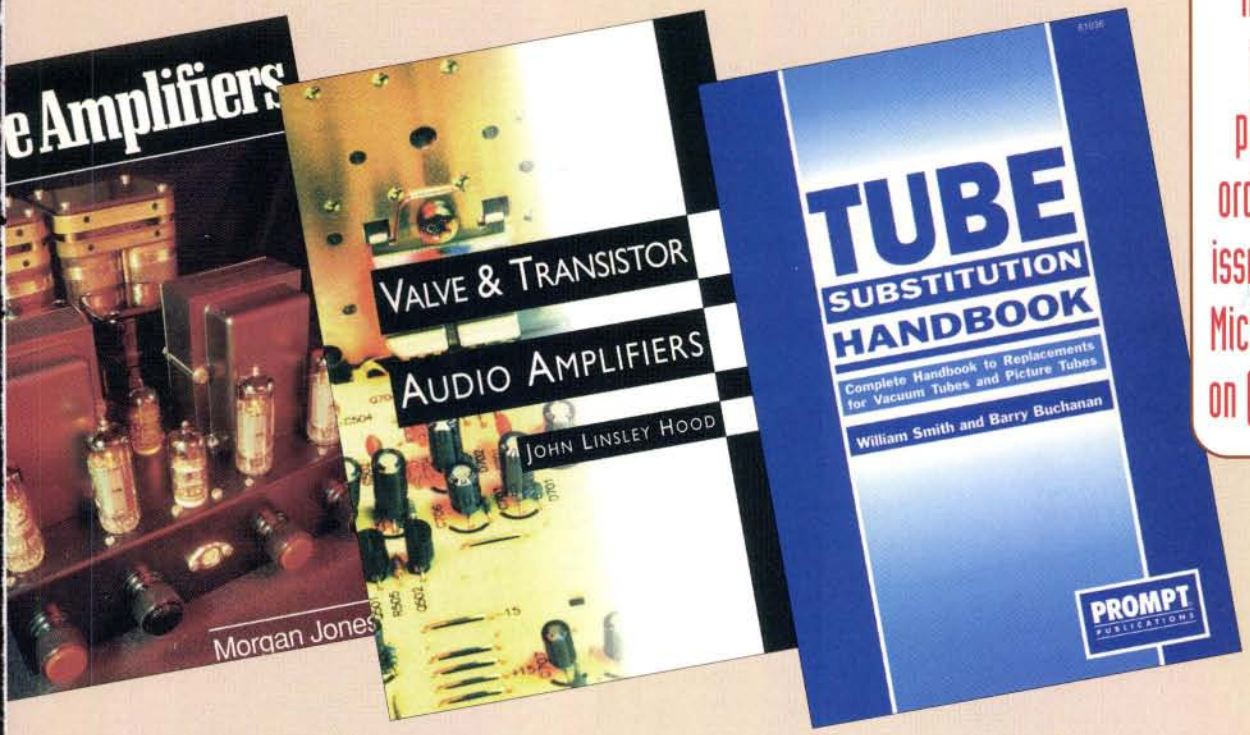






ile you do...look at some books!

To order any of the titles mentioned on these pages please use the order form in this issue or telephone Michael or Shelagh on (01202) 659930.



Crystal Set Building & More
Volume 6 & 7 Xtal Set Society Newsletter

£10.50

The fact that there's a tremendous interest in crystal sets and simple receivers was clearly demonstrated last time we featured The (American based) Xtal set Society's publications in 'Book Profiles'. And to help satisfy the appetite for even more ideas in the 'crystal set' theme - the society has published in small book form (rather than the earlier photocopied format) many more projects, features and ideas - including a ZN414 t.r.f. receiver project.

Truly a fascinating way to explore radio history, and learn something in the same fashion as enthusiasts did in the 1920s. **Well presented, interesting and practical.**

Valve Amplifiers
By Morgan Jones

£25

This book is aimed mainly at the high quality audio enthusiast rather than the Radio Amateur - but despite that there's a great deal of interest for anyone who is interested in using valves. It's not a reprint or an old book 'brought up-to-date' and is in fact aimed purely at those people who may well have never used valves before.

Written in a practical and informal style, the author provides many design guides, information and guidance together with a very neat little 10W audio amplifier design that could prove to be of great interest to *PW* readers. **Useful reference and practical 'source' book on valved audio.**

Valve & Transistor Audio Amplifiers
By John Linsley Hood

£19.95

John Linsley Hood is justly renowned for his hi-fi amplifier designs and this book will provide a very great deal of information for both valved and transistorised types. Covering theory, practical aspects and designs the author takes the reader through the complete process.

An excellent introductory and basic reference work - although in the review copy supplied to *PW* many of the illustrations and diagrams do not come up to the normal 'crisp' clarity and style produced by Newnes (the text is unaffected) - this book is recommend for your bookshelf. **Good design reference source.**

Tube Substitution Handbook
By William Smith & Barry Buchanan

£15.50

This neat, tidy and conveniently sized American-produced book will prove useful for anyone working on valved projects. The neat A5 sized format alone makes it very convenient to use, but together with the referenced base pin-outs in the back of the book - it becomes an ideal extra 'tool' for the bench. Easy to use format, clearly printed.
Recommended for your workbench and library.

Telephone (01202) 659930

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Please note:
Cash not accepted with mail orders.

antennas in action

VHF/UHF

Most Radio Amateurs start off on either the v.h.f. or u.h.f. bands, and at this stage of being in the hobby, you may be looking for information about antennas suitable for the two bands. And to help in **Ian Poole's** *Antennas for VHF and UHF* there are many antennas to suit the Novice, fresh entrants or seasoned hand alike.

The book has nine chapters in slightly over 100 pages, dealing with theory, feeders and the practical side of antennas. There are practical designs for dipoles, Yagis, cubical quads, vertical and wide-band antennas. One chapter deals with antenna measurements that you can make along with the test-equipment needed. This book is a source of very useful information for any level of the hobby.

Help From W1FB

The name and callsign of the late **Doug Demaw W1FB** are both synonymous with easy-to-read, but extremely practical ideas and solutions to problems. In *W1FB'S ANTENNA NOTEBOOK* you will find around 120 pages of practical help and ideas for antennas - feeding and getting the most signal out of them. This book deals mainly with h.f. antennas and is a very useful addition to anyone's bookshelf.

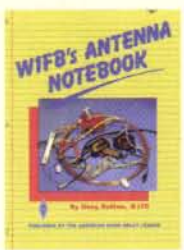
This month I've got a few special offers for you - save the post and package charges when you buy two or more book from this list! (G1TEX)

PW August 1995 * £1

PW April 1996 *£1

More Out Of Thin Air £6.95

ANTENNA IMPEDANCE MATCHING £15.50



W1FB's ANTENNA NOTEBOOK £7.50

Antennas for VHF and UHF £4.95

Buy any two or more Post Free within the UK (* both issues of *PW* count as one choice).

More Technical

On a slightly more technical note, from the ARRL comes *ANTENNA IMPEDANCE MATCHING* by **Wilfred N. Caron**, which sets out to explore in a practical way the mathematics involved with matching in antenna systems. There are times when 10 minutes with pen and paper and a Smith Chart can save hours, or days even, of the 'suck-it-and-see' technique. By working your way through this book you may find it's easier than you think!

PW's Own

A collection of *PW*'s own projects are to be found in *More Out Of Thin Air*. There are no less than 31 topics covered in five chapters headed: Antenna Theory, Constructional HF Antennas, Constructional VHF/UHF Antennas, Antenna Workshop and Miscellaneous. Over 100 pages of interesting projects from *Practical Wireless* brought together in one book for easy reference.

Antenna 'Specials'

The subject of antennas has always been popular in *PW* and past issues of *Practical Wireless* have had sections called 'Antenna Special'. The most recent ones were in August 1995 and April 1996. As as special offer we are making the last of these two issues available at £1 for each of these jam-packed issues (and this includes P&P).

In the August 1995 issue there are 18 pages of antennas and related projects, reviews and ideas. In a larger issue, the April 1996 Antenna special there were 22 pages of antenna projects and reviews from **Denis Payne G3KCR**, **Chris Williams G7NPB**, **George Dobbs G3RJV**, **John Heys G3BDQ**, **Kevin James G6VNT**, **Peter Lait G0IFQ**, **Roy Ratcliffe GW3KZW** and **Ron Wilson G3DSV**. What a list! And now you can get both of these feature filled 'Specials' for less than the price of a single magazine.

welcome to AiA!

Welcome to this month's slightly enlarged nine-page 'Antennas in Action'. As I mentioned in the last issue of A-i-A, there were at least two readers out there who think I should throw 'Tex Topics' away and let other authors have the space. Well, never let it be said that I don't listen to readers, as that is exactly what I've done this month!

Even though the pages are still called 'Tex Topics', this month I've given them over to John Heys G3BDQ to tell you about a novel portable mast and h.f. loop antenna from Funktechnik of Germany. If you would like me to write less, then send in your tips and tricks for antennas and related items....it's your choice.

There are some excellent major articles in this month's A-i-A, especially the article on low-pass filters from **Ed Wetherhold W3NQN**. But don't forget that we still need the shorter ideas for publication. Each month, any reader's trick, tip or good idea published will win a copy of *More Out Of Thin Air*, or a voucher to spend in our Bookstore (whatever your views on 'Tex Topics' are!).

G1TEX

contents

antenna workshop

Straight-Up! David Butler G4ASR looks at the GAP Titan DX multi-band Vertical Antenna and asks 'Will it replace an antenna farm'?

How many of us are lucky enough to have a suitable location or are able to get planning (and XYL) permission for a tower with a multi-band Yagi? Some operators might even find it difficult to erect a simple trapped dipole covering the 3.5 to 28MHz bands. So, instead of thinking horizontal why not think vertically?

Verticals can produce low-angle radiation and will work in a limited space. They make a perfect compliment to a horizontal dipole or any other type of antenna you may be using. However, there some significant problems associated with verticals in general and multi-band versions in particular.

A ground-mounted vertical antenna ideally requires an infinitely large, perfect reflector grounding. In the real world however the ground is far from perfect with varying degrees of conductivity. Near the antenna there is a need for a good ground system to collect the antenna return currents without incurring losses. A good earth system normally employs a considerable number of buried wires or radials extending out to at least a quarter wavelength from the base of the antenna. A ground rod or post, may achieve a good d.c. ground, but contributes very little to the r.f. ground system.

In the case of a multi-band vertical it's conventional practice to use traps, coils or transformers to achieve auto-switching between the various frequency bands. Traps must have a high Q to operate efficiently. Unfortunately their very narrow bandwidth (due to high *Q*) restricts the overall antenna bandwidth. Traps can be lossy, the transmitter power heats them up, and loading coils and transformers also possess similar unwelcome characteristics and of course the more components there are in an antenna the less reliable it may become.

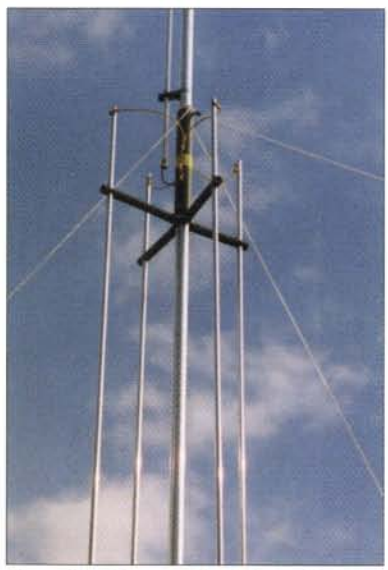


Fig. 1: David guyed the Titan antenna as it was only a temporary installation.

New Design

Recently, GAP Technology (GAP Antenna Products) have implemented a revolutionary new antenna design which eliminates the inefficiencies and losses associated with radials and traps. Ironically, the premise for the GAP principle was the result of an anomaly of a quality assurance test to determine r.f. leakage from what was supposed to be a 'sealed' box. There was a small slit or **gap** in the box that, when energised, let the r.f. through out of the box.

The President of GAP Antenna Products **George Henf KK4CW** remembered the 'gap' and wondered what would happen if he put a slit in a piece of coaxial cable. He hung the cable from a tree and made a slit where electrically he felt he'd find a match at 50Ω. His thinking was that if the feed point impedance of a full size vertical is 36Ω and the top goes to infinity, then somewhere in between should be 50Ω. Thus if the proper elevation is selected (also reducing the earth losses), the radiation resistance will be 50Ω, providing a perfect match to the feedline.

Technically, the earth loss results from the capacitance of the antenna to ground (from above the feed point). Reducing the earth loss eliminates the need for a radial system, a simple counterpoise system is all that is required. There are no traps in a GAP antenna. The elevated feed and the unique tuner rods enable the GAP to operate as a vertical dipole even though it's grounded. Eliminating traps makes the antenna more reliable and increases its operating bandwidth. This is the principle behind the GAP antenna.

Nowadays, GAP Antenna Products manufacture a range of verticals, however the antenna I'm reviewing is the Titan DX shown in the photograph **Fig.1**. This is an 8-band centre-fed vertical using the GAP technology and requiring no radials. The antenna covers the 3.5 to 28MHz bands, stands a respectable 8m tall and weighs in a little over 11kg. It can handle up to 1.5kW of r.f. on all allocations except the 3.5MHz band. But it will comfortably handle the UK limit of 400W on any of the designed bands, no matter what the transmission mode.

As can be seen in the photograph **Fig.2** tuning rods are located around the central mast section. Adjustment of these will raise or lower the resonant frequency but there should be little requirement to adjust them from the factory settings. The rods act as vertical dipoles on the bands that the Titan functions on. The only exception to this is on the 3.5MHz band, where a length of coaxial cable is used to compensate for the missing portion of the antenna. This cable is terminated in a capacitor, referred to by GAP as a CAP unit.

Specify Slot

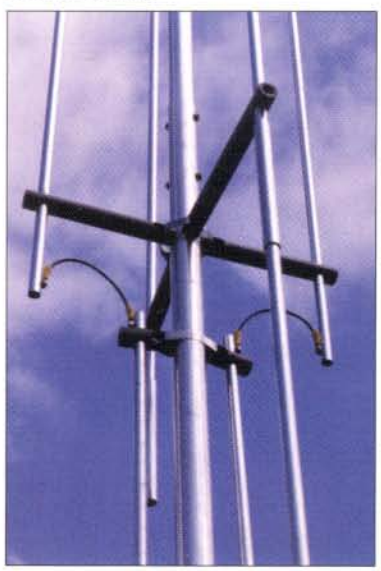
Various CAP units are available, so you must specify in which 100kHz slot of the 3.5MHz band you wish to operate in. For European usage you have 3.5-3.6MHz, 3.6-3.7MHz or 3.7-3.8MHz. This option only applies to the 3.5MHz band simply because the antenna is not tall enough to cover the entire band. I chose the CAP unit for 3.7-3.8MHz.

The antenna is designed to mount easily on a heavy gauge steel pipe, has an integral counterpoise system and, as the feedpoint is elevated, you can mount the vertical anywhere you wish. It can be located close to the ground, on top of a tall pole or even above the roof of a house. Although the Titan is designed to withstand substantial winds unguyed, it's recommended to use guying as a form of insurance.

If you're going to ground mount the Titan then GAP recommend that the pipe is mounted in a concrete filled hole (500 diameter by one metre deep). But as my QTH is 233m a.s.l. on the foothills of the Black Mountains the use of guys are obligatory on a temporary installation. I laid the four rigid counterpoise rods on the ground to see what physical size they take up. I found that they take up a square of three metres each side. If I'd had more time I would have mounted the antenna just above the flat roof of my garage but for the purposes of this review I located it at ground level.

The Titan antenna arrived in a long,

Fig. 2: A close-up of the antenna - which appears to be a distant relative of a trombone.



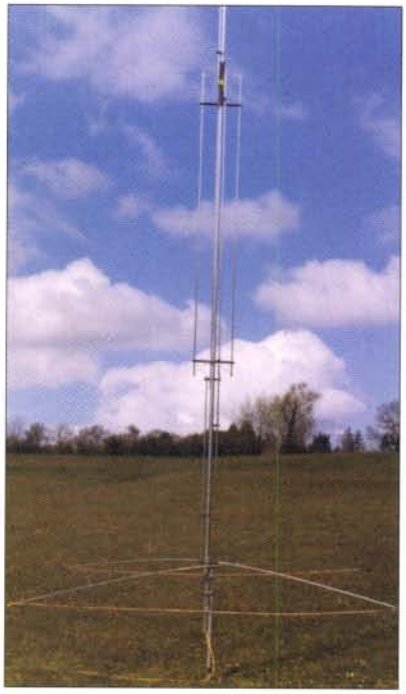


Fig. 3: If ground mounted, the clear space needed at the bottom of the 8m high antenna is about three metres square.

large, flat box. Inside I found all the necessary aluminium tubing, coaxial cable and associated hardware. The main sections and tuner rods are all made of double-drawn aluminium tubing, which is much better than the less expensive extruded tubing. All the antenna components have a real quality feel to them and even the coaxial cable is rated for very high power operation. A 14-page installation and assembly booklet is also included. I'm pleased to say that this gives clear unambiguous instructions and contains many line drawings and diagrams to help with the construction.

To get started with the assembly you'll need a large flat space, such as a driveway or patio, which allows you to find the screws that you drop! All the holes are factory drilled and all you have to do is simply line up a big hole over a little hole and insert a self tapping stainless steel screw with a (provided) nut driver. The only other tools you'll need are a flat-bladed screwdriver (and a soldering iron and cutters to connect the provided PL259 plug onto the end of the cable).

The main sections of the Titan are designed to telescope into each other and are simply held in place by a steel screw. The CAP unit which dictates the lowest working frequency on the 3.5MHz band slips inside one of the sections and cannot be changed (easily) once completed. All the plastic tuner rod standoff insulators are pre-positioned on the various mast sections. It's only necessary to loosen their clamps, twist them into the correct plane and then re-tighten. The tuner rods simply slip into holes provided in the insulators and are held in place by a locking screw.

Assembly Straightforward

The assembly was very straightforward and I encountered no problems whatsoever. It took me a leisurely three hours to read through the instruction booklet, identify all components and assemble the antenna. Now it was time to place the Titan onto the ground post. Although the Titan is 8m tall I accomplished this task single-handedly, although another 'hand' would be useful.

It's better that the counterpoise hoop assembly, shown in the photograph, **Fig. 3**, is fitted after erection, it's a simple matter of slipping in the four counterpoise rods. A length of copper wire is then threaded through plastic caps placed on the end of the rods to make a large square approximately 3m each side. The exact length of the wire affects the centre frequency on the 7MHz band but I just set it to the length given in the assembly booklet and left it at that.

Now it was time to check the voltage standing wave ratio (v.s.w.r. but commonly termed s.w.r) of the antenna on the various bands. The s.w.r. is a measure of how well the feed-point impedance of the antenna is matched to the characteristic impedance of the feed line. (As an aside I should mention that in my opinion the use of s.w.r. as an important evaluation criteria is actually wrong. After all a dummy load will exhibit an excellent s.w.r. match across all frequencies! More meaningful would be measurements of antenna efficiency and radiation characteristics but these are far more difficult to measure).

The s.w.r. tests were very easy to perform and the results are shown in **Table 1**. On all bands between 7 to 30MHz the s.w.r. was no worse than 2:1 and in many cases it was considerably better than this. This is excellent as it allows solid-state transceivers to work from one end of the band to the other without the s.w.r. protection cutting in.

After performing these measurements I then had a completely wacky idea of checking the s.w.r. on the 50MHz band. At the bottom end of the band the s.w.r. was very high (>5:1) however much to my surprise the s.w.r. improved further up the band and measured a comfortable 2:1 between 50.980MHz to 51.780MHz. Co-incidentally this covers all of the f.m. telephony channels centred on 51.510MHz.

This was quite a revelation to me but not as much as the surprise I got when speaking to a GAP engineer about this added feature. He said they already knew about this and asked if I had measured the Titan on the 144MHz band as well! When I checked it showed a very good match across the entire band, with an s.w.r. of 1.5:1 at 144MHz rising to 1.7:1 at 146MHz. Of course these were the findings of the review antenna at my QTH so there's no guarantee these are reproducible elsewhere.

Freq (MHz)	vswr	Freq (MHz)	vswr	Bandwidth (kHz)
3.675	2.0	3.8	1.8	125*
7.0	1.4	7.1	1.3	band
10.1	1.7	10.150	1.5	band
14.0	2.0	14.350	1.7	band
18.068	2.0	18.168	2.0	band
21.0	1.9	21.45	1.4	band.
24.89	1.3	24.99	1.3	band
28.0	1.1	29.7	1.5	band
50.98	2.0	51.78	2.0	800**
144.0	1.5	146.0	1.7	band

* Minimum v.s.w.r. of 1.2:1 at 3.745MHz
** Antenna not specified at these frequencies

Table 1: David G4ASR measured the s.w.r. on all bands from 3.5 to 144MHz, and obtained some surprising results.

n terms of results, it's often difficult to quantify how well an antenna performs during a short review period as there is limited time available for playing with it and of course the state of the sun-spot cycle and the prevailing propagation at the time play an equally important part. At it's lowest frequency of operation (3.5MHz) the performance wasn't really surprising, as it's only 8m tall. It gets you around Europe reasonably well but DX signals from much further afield were many S-points weaker compared to my dipole.

However, once I moved up to the 7MHz band and above, I found that the performance really started to become quite impressive for such a relatively low profile antenna. Using the TS-690S barefoot (100W) and resisting the temptation of turning on the amplifier I made a number of contacts on all bands. Highlights are difficult to assess (and possibly meaningless to other operators) but as an example of the antennas potential I made DX contacts on all h.f. bands.

And don't forget that the antenna works on both the 50 and 144MHz bands as well! A quick excursion onto these bands one evening produced three f.m. contacts on the 50MHz band, the furthest being at 90km. Up on the 144MHz band two f.m. contacts were quickly made, one station being 50km away.

Efficient Vertical

If you need an efficient vertical antenna that takes up very little ground space and covers all bands from 3.5 to 30MHz then the GAP Titan DX could be the antenna for you. It uses quality materials, is very easy to assemble and needs no tuning adjustments. Apart from the 3.5MHz band it covers the entire frequency allocation of all h.f. bands with a low s.w.r. I worked some good DX with it on all h.f. bands and don't forget that although not mentioned in the specifications the Titan appears to work on the 50 and 144MHz bands.

Actually the real bottom line is that I thought it was so good I actually bought the review model and you can't say better than that! My thanks to **Ron Stone GW3YDX** of **Vine Antenna Products** for supplying the review antenna. Ron can be contacted at **The Vine, Llandrinio, Powys, SY22 6SH. Tel: (01691) 831111**, or **FAX: (01691) 831386**.

GAP Antenna Products can be contacted by telephone in America on: **001 561 571 9922**, or for those with Internet access, point your web browser at: **http://www.gapantenna.com**

ED WETHERHOLD W3NQN PRESENTS A SERIES OF LOW-PASS FILTERS FOR AMATEUR-BAND APPLICATIONS, WITH

Filters - Cutting

Minimise those harmonics from your signal with a new low-pass filter with even lower second harmonic output.

In a recent *Practical Wireless* article[‡1], The rev. **George Dobbs G3RJV**, explained the importance of including low-pass filters on the outputs of amateur-band transmitters to attenuate harmonics. The filters he recommended were 7-element Chebyshev designs selected from a listing of 30 designs published in a *Short Wave* magazine article[‡2]. These designs are preferred because only standard-value capacitors are needed, and for that reason, they are called 'SVC' designs.

The SVC series of passive filter designs have been widely published in Amateur Radio handbooks and electronics trade and professional journals over the past 17 years[‡3-8]. Although these designs are, for the Radio Amateur, convenient to use for harmonic reduction, the designs are not optimised for this application. For example, of the designs listed by G3RJV in his Table 1, all but two, provide less than 42dB attenuation at the second harmonic.

To increase the second-harmonic attenuation, the simplest way would be to place a capacitor across the middle inductor and resonate this inductor to twice the centre frequency of the amateur band. I've shown this proposed configuration in **Fig. 1**, and I've named it the 'WB6BLD low-pass filter' for reasons I'll explain later. However, if L4 is resonated while still using the original component values, the resulting pass-band s.w.r. becomes unacceptably high.

An explanation of the component numbering of the layout of the circuit in Fig. 1 may be in order at this point. It is 'usual' to label the inductors and capacitors of a filter according to the notional 'pole' (broadly the number of components) occupied within the filter. The filters described here are '7-pole' types so, have capacitors in sections 1, 3, 4, 5 and 7 and inductors in sections 2, 4 and 6. In the previous designs there would not have been a capacitor in section 4, only an inductor. (G1TEX)

To maintain an acceptable pass-band s.w.r. of preferably less than 1.2:1, different component values must be used. Although s.w.r. was used in the listed references as an indication of filter pass-band performance, another related parameter called 'return loss' is more commonly used. Return loss is easier to measure more accurately than s.w.r., and most computer analysis software uses return loss to characterise filter pass-band response.

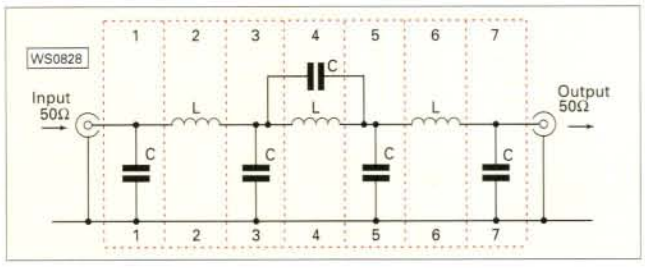


Fig. 1: The generalised circuit layout of the of the WB6BLD designed filter. See text for component numbering and values.

Band (m)	Freq. (MHz)	C1 & 7 (pF)	C3 & 5 (pF)	C4 (pF)	L2 & 6 (µH)	L4 (µH)	F4 (MHz)
	1.00	2986	4556	680.1	9.377	8.516	2.091
		1659	2531	378			3.76
160	1.80	1450+220	2100+470		5.21	4.73	
		1500+150	2200+330	330+47			3.78
		853	1302	194			7.32
80	3.50		1150+150		2.68	2.43	
		470+390	1200+100	150+47			7.27
		427	651	97.2			14.6
40	7.00				1.34	1.22	
		330+100	330+330	100			14.4
		296	451	67			21.1
30	10.1				0.928	0.843	
		150+150	470	68			21.0
		213	325	48.6			29.3
20	14.0				0.670	0.608	
		220	330	47			29.8
		165	252	37.6			37.8
17	18.068				0.519	0.471	
		82+82	100+150	39			37.1
		142	217	32.4			43.9
15	21.0				0.447	0.406	
		150	220	33			43.5
		120	183	27.3			52.1
12	24.89				0.377	0.342	
		120	180	27			52.4
		107	163	24.3			58.6
10	28.0				0.335	0.304	
		100	82+82	27			55.6

Table 1 WT0830

The factors of s.w.r. and return loss (RL) are related by the following equations:

$$RL(dB) = -20 \times \text{Log}_{10}\left(\frac{\text{s.w.r.} - 1}{\text{s.w.r.} + 1}\right)$$

and

$$\text{s.w.r.} = \left(\frac{1 + p}{1 - p}\right)$$

where $p = 10^{\left(\frac{RL}{20}\right)}$ (RL is the dB figure)

As an illustration, if you have an s.w.r. of 1.222:1, the corresponding return loss is 20dB. In the remainder of this article, I'll use return loss as an an indication of pass-band response.

Commercial filters are frequently advertised as having a maximum s.w.r. of 1.5:1, which corresponds to a minimum return loss of 13.98dB. However, a minimum return loss of 20dB (s.w.r. of 1.222:1) is preferable to minimise reflection loss. For example, a filter with a pass-band return loss of 20dB will cause only one percent of its incident power to be lost due to mismatch between the source and filter.

For maximum second-harmonic attenuation, it's preferable that any low-pass filter used has a minimum return loss of 20dB. Though, over the limited range of an amateur band it's possible to trade poorer return loss outside the amateur pass-band (where it is not needed) in exchange for increased attenuation within the filter stopband. This 'trade-off' can be realised by making C4/L4 resonate at the second-harmonic frequency while using specially selected component values that cause the filter pass-band within the amateur band to have a return loss of 20dB or more.

The normalised component values for the special low-pass filter designs were determined by **Jim Tonne, WB6BLD**, of Rowlett, Texas. He used his *ELSIE* filter design and analysis software to find the special filter component

The Edge

antennas in action

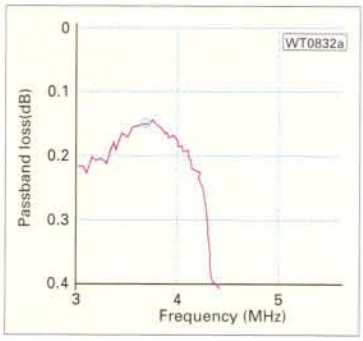


Fig 2a: Pass-band loss for the 3.5MHz band filter is less than 0.2dB within band.

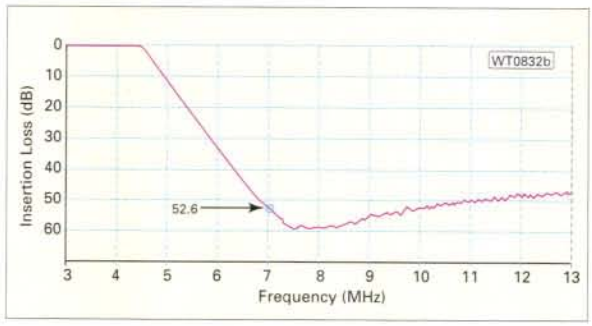


Fig. 2b: Through loss for the 3.5MHz version is at 52.6dB at 7MHz.

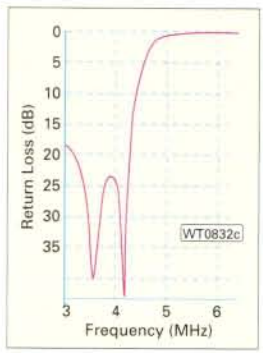


Fig. 2c: Return loss curve for the 3.5MHz band filter. (See text for an explanation of its significance).

values that provides the desired filter performance. Jim currently distributes his *ELSIE* software through his company of which he is president[‡9]. Because of Jim's efforts in making this special low pass filter design available to the amateur radio fraternity, it is appropriate to refer to this design as the 'WB6BLD design' to distinguish it from other similar ladder configurations such as the Butterworth, Bessel, Chebyshev, etc.

A summary of the WB6BLD 50Ω low-pass filters (l.p.f.) designed for second-harmonic attenuation in all the amateur bands below 30MHz is shown in **Table 1**. The first row of which (white background) shows the component values for a filter 'normalised' for 1MHz that Jim Tonne provided for me (and this article). By dividing these 1MHz values by the start frequency of the required band (in MHz), the values for any of the amateur bands can be independently calculated.

Band (MHz)	Turns L2 & 6	Turns L4	F_X (MHz) C1 & L2	F_Y (MHz) C1 & L4	Core No.	Wire Size mm	Wire Size s.w.g.	Length (mm)
1.81	31+	30	1.717	1.802	T50-2	0.50	25	560
3.5	22	21	3.437	3.610	T44-2	0.50	25	430
7.0	17	16	6.63	6.949	T44-6	0.56	24	330
10.1	14	13	9.54	10.01	T44-6	0.71	22	280
14.0	17+	17	13.11	13.76	T50-17	0.71	22	330
18.068	15	14	17.25	18.11	T50-17	0.71	22	295
21.0	14+	14	19.44	20.39	T50-17	0.80	21	280
24.89	13	12+	23.7	24.84	T50-17	0.80	21	260
28.0	12	11	27.5	28.87	T50-17	0.80	21	240

WT0831

Table 2

To derive a filter for a particular band, divide all of the various capacitor and inductance values by the starting frequency of the amateur band required. The calculated capacitor values are not all that critical and all can be realised with one (or two parallel) standard-value capacitors. For example, in Table 1 the value for C1, and C7, of 853pF in the 3.5MHz band filter is suggested as a parallel combination of 470 and 390pF capacitors. If however, the 390pF value is not available, a 330pF value may be substituted with no discernable effect on the filter performance.

The number of turns needed to make the various inductance values with Micrometals toroidal cores is shown in **Table 2**. By using the design information contained in Tables 1 and 2, a low pass filter with the maximum second-harmonic attenuation can be assembled for any amateur band.

To confirm the correctness of the design data in Tables 1 and 2, low pass filters for the 3.5 and the 7MHz bands were assembled and then measured with an H-P Network Analyzer And Plotter (provided and operated by **John Brosnahan W0IUN**), LaSalle, Colorado. (A photo of John's antenna towers appeared on the

Fig 3a: Pass-band loss for the 14MHz band filter is less than 0.2dB within band.

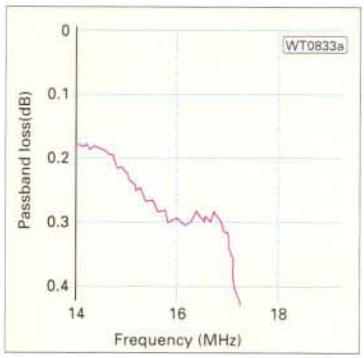


Fig. 3b: Insertion loss for the 14MHz version of the WB6BLD filter.

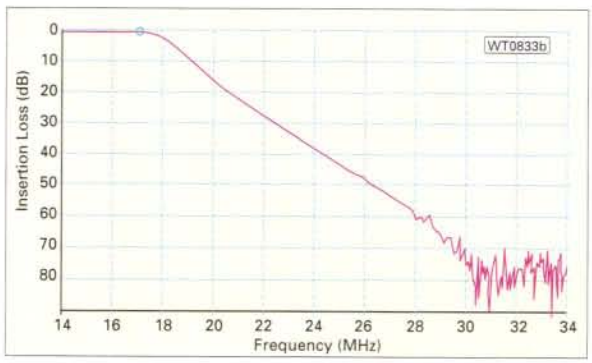
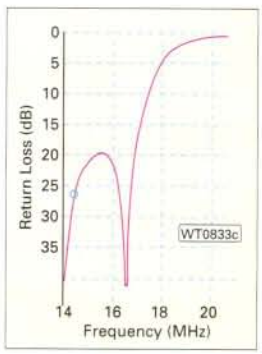


Fig. 3c: Return loss curve for the 14MHz band filter. (See text for an explanation of its significance).



front cover of the April 1996 issue of *Practical Wireless.)*

Copies of the plots are shown in **Fig. 2** and **Fig. 3**, illustrating the pass-band and stopband insertion loss and the pass-band return loss of the prototype filters. In both cases, the pass-band insertion loss is less than 0.2dB and the return loss is greater than 24dB, while the stopband insertion loss peaks near the second harmonic frequency. Similar satisfactory responses may be expected for all the other l.p.f.s listed in Table 1. The increase in second harmonic attenuation over that of the standard 7-element Chebyshev design can range from 14 to 25dB.

The photographs shows the filters assembled on pieces of perf-board. Shown in **Fig. 4**, a 3.5MHz l.p.f.and the 7MHz l.p.f. is shown in **Fig. 5**. I later installed my prototypes in an aluminium mini-box, in the case of the 3.5MHz filter, and in a miniature plastic box available from Farnell. The powdered-iron cores used in the filter assembly are listed in Table 2. The capacitors (470pF and less) used are from the Philips 683 Series: ceramic, NP0 low K with a 100 V(d.c.) rating and a two-percent tolerance. Because the 390pF value is not available in the Philips 638 series, the 330pF value can be substituted for the 390pF value with no noticeable effect on the filter performance.

"The Radio Amateur now has another series of low-pass filter designs to consider for providing better harmonic attenuation than was previously available with the standard Chebyshev designs".

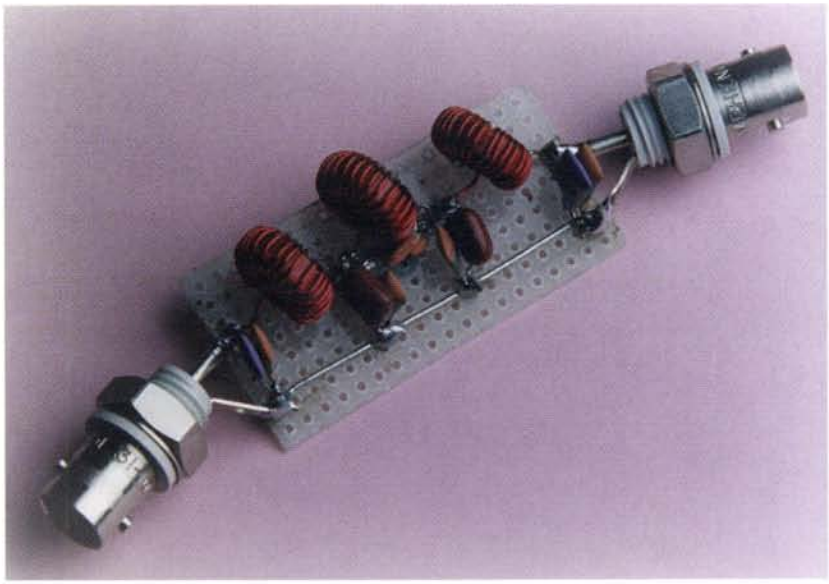


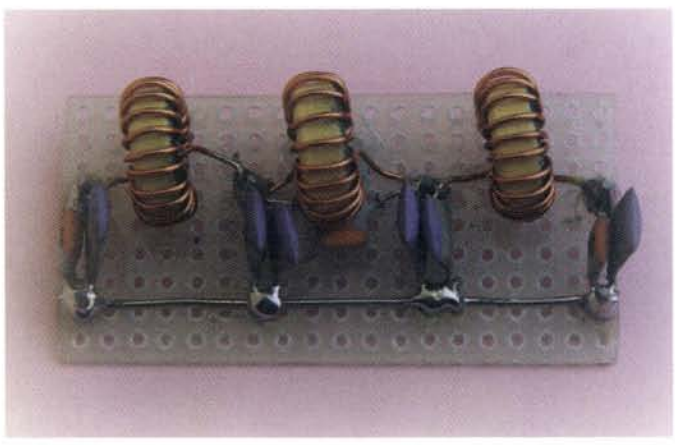
Fig. 4: The 3.5MHz version of the filter built up on perf-board.

The lead spacing of 5mm (0.20in) of many modern low value capacitors, makes it convenient to install these capacitors in the 0.1-inch grid of the perf board. For capacitance values greater than 470pF, the WIMA FKP2 polypropylene film series or the Panasonic polypropylene film capacitors (used in the 3.5MHz l.p.f. construction and obtained from DIGI-KEY) are recommended because of their excellent high-frequency performance and small size. They both have a 5mm lead spacing.

The WIMA series of capacitors have a 100 Vdc (63 Vac) rating with a tolerance of ±5%. The values that are available above 470pF are 680, 1000, 1500 and 2200pF. These capacitors should be adequate for power levels up to 20W. Both the Philips ceramic and WIMA film capacitor types are listed in the Farnell components catalogue.

The inductance ratings of the Micrometals cores, also known as the 'AL' values, are listed in Table 2 of George's article for the '-2' and '-6' mixes. These core ratings may be used to find the approximate number of turns to put on a core to obtain a particular inductance. However, the my experience has been that when using these ratings the number of calculated turns is usually one more than actually required. For example, to get the L4 value of 4.73µH for the 1.8MHz band design, the calculated number of turns using the T50-2 AL rating of 0.49µH-per-10 turns is: $10\sqrt{(4.73/0.49)}$ or 31 turns. However, when a more precise method of calculating the required turns is used, the number of turns required is one less, at 30 turns, as is listed in Table 2.

Fig. 5: The 7MHz version of the filter built up on perf-board.



Tuning Procedure

Here's a tuning procedure I've found that works. The procedure I used to obtain a more precise turn count for a particular inductance is to form a parallel-resonant circuit using a known capacitor and the inductor to be adjusted. Place the parallel-tuned circuit between a 50Ω variable-frequency signal source (the attenuated output of your transmitter may be suitable for the signal source) and a 50Ω detector having an output level indicator. Tune the signal source frequency for a sharp null at the detector output.

Note the frequency of the signal source and calculate the inductance using the equation:

$$L(\mu H) = \frac{25330}{C \times F^2}$$

where C is in pF and the frequency, F, is measured in MHz. See Table 2 for suggested values of C and F to find the number of turns required to obtain L2 and L4. C1, F_X and C1, F_Y are used to find the number of turns on L2 and L4, respectively. For example, if C1 = 1650pF (1500+150) and F_X = 1.717MHz, then L2 = 5.21µH. If the null frequency is above or below the F_X or F_Y frequency, then add or remove, or squeeze together (or spread apart) the turns

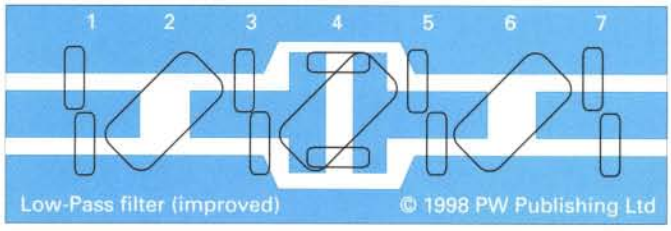


Fig. 6: Using a small p.c.b. can make construction of the filter much easier and neater.

on the core until the null frequency equals the F_X or F_Y frequency. When this occurs, the inductor value must be equal to the design value.

Summary

It is desirable, and a requirement, to minimise the harmonic output of radio transmitters, and the 7-element Chebyshev SVC low-pass filter is frequently used for this purpose because of the convenience of using standard-value capacitors. However, with some component value changes, and with the addition of a capacitor across the centre inductor, it's possible to optimise the attenuation at the second and higher harmonic frequencies of the amateur band being filtered.

I calculated 8-element low-pass filters, to the design described here, for each of the nine h.f. amateur bands. Although all the capacitors did not have standard values, this was shown not to be a problem as one or two paralleled capacitors could meet all the requirements in exchange for additional attenuation at the second and higher harmonic frequencies.

In addition to component values in this article, I've also suggested suitable capacitor and core types and provided coil winding information to simplify assembly of the filter for use in transmitters up to about 20W. Filters for the 3.5 and a 7MHz bands were assembled using the tabulated design information, and plots of the filter pass-band insertion and return loss and stopband insertion loss were made to verify that the performance of both filters was acceptable.

The Radio Amateur now has another series of low-pass filter designs to consider for providing better harmonic attenuation than was previously available with the standard Chebyshev designs. Whether or not these new designs will eventually replace the 7-element Chebyshev filters will depend on whether or not these new designs find acceptance within the Amateur Radio fraternity. I can only encourage you to try out these new designs and report on your experiences in building and using them.

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‡2. Wetherhold, W3NQN, 'Low-pass Filters for Attenuating RF Amplifier Harmonics, Parts I and II,' *Short Wave Magazine*, December 1983 and January 1984.

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‡4. Wetherhold, 'Low-pass Chebyshev Filters Using Standard-Value Capacitors,' Engineer's Notebook, *ELECTRONICS*, 19 June 1980.

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‡6. SAMS *Radio Handbook*, 23rd edition, edited by William I. Orr, W6SAI; Passive LC Filters, pp. 3-17 - 3-29; copyright 1987 by Howard W. Sams & Co., A division of Macmillan, Inc.

‡7. *Filters and Power Conditioning, Vol. 4*; Chapter 2, Electric Wave Filters for Communications Systems; published 1988 by Interference Control Technologies, Inc., Gainesville, VA.

‡8. *The ARRL Handbook*, 74th edition, Chapter 30, pp. 30.22 - 30.29, 'Passive LC SVC Filter design'; copyright 1996 by the American Radio Relay League, Newington, CT.

‡9. Trinity Software, 7801 Rice Dr, Rowlett, TX 75088; (972) 475-7132.

‡10. Philip J. Davis, *The Thread, A Mathematical Yarn*, 2nd edition, Harcourt Brace Jovanovich, Publishers, New York, copyright 1989, 1983; 124-page paperback, $10.95. A series of delightful yarns about mathematics and mathematicians with the spelling of Chebyshev's name used as the historical 'thread' to join the various yarns.

A SHORT HISTORY LESSON

I would like to correct an error that appeared at the bottom of p.48, second column, Part 1, of reference‡3 regarding the original application of the Chebyshev polynomials. Pafnuty Lvovitch Chebyshev (also spelled Tschebyscheff) (1821-1894) was a famous Russian mathematician and Academician. While touring Europe in 1852 to inspect various types of machinery, windmills, water turbines, railways, etc., he became interested in the mechanical linkage used in Watt's steam engine to convert the reciprocating motion of the piston rod into rotational motion of a flywheel that was needed to run factory machinery.

Chebyshev noted that Watt's piston had zero lateral discrepancy at three points in its cycle, and concluded that a somewhat different linkage would lead to a discrepancy of half of Watt's and would be zero at five points in the piston cycle. Chebyshev then wrote a paper, now considered a mathematical classic, that laid the foundation for the topic of best approximation of functions by means of polynomials. It is these same polynomials that were originally developed to improve the reciprocating to rotational linkage in a steam engine that now find application in the design of passive LC filters‡10! (W3NQN)

■ THROUGH THE DIAMOND WINDOW – A REPORT ON THE RECENTLY INTRODUCED FUNKTECHNIK PORTABLE G.R.P MAST AND LOOP ANTENNA BY JOHN HEYS G3BDQ.

tex topics

In the recent questionnaire at least two answers said that I should waffle less and allow others to use the space. So, for this month only (I think), I've asked John Heys G3BDQ to have a look into a portable mast and loop antenna system from Germany.

(G1TEX)

I've recently had the opportunity, through *PW*, to try out the Funktechnik Loop Antenna, a new product intended for portable work. The received package consisted of two parts. There was a 10m telescopic black glass fibre reinforced material (g.r.p.) mast made up from ten 1.23m sections and a balun box which has arms to hold in place two g.r.p. cross arms (also telescopic) each being 3.9m long. There was also a length of insulated wire with connectors, to make the loop.

The assembly and collapse details of the telescopic mast were adequately described on an enclosed instruction sheet but information relating to the loop antenna and its assembly was very sketchy indeed. This slowed erection of the antenna.

Just four lightweight items to carry along with a rig and mini-a.t.u. to get you going on portable operation.

The lightweight 1.5kg mast has no provision for guying and its base must be lashed to a vertical support.

I have a permanently positioned aluminium tube which has been hammered into the ground and also a 'spare' length of 50Ω coaxial cable that runs from that pole to the station shack. It was therefore easy to 'walk up' the mast and tie it to my support. This took just minutes after which it was then dropped to allow the assembly of the loop antenna. With the cross arms in place and the loop correctly positioned, I could single-handedly raise the complete system and with some difficulty tie it to the vertical support tube.

The antenna was fed with 35m of coaxial cable. When all was assembled the structure swayed rather ominously in the light breeze that was then blowing. The cross arms of the antenna are located half way up the mast where the 1:4 balun box sits feeding the diamond shaped loop. Incidentally, the loop doesn't operate as a 'quad loop' antenna.

The instruction sheets shows an a.t.u. and s.w.r. meter at the shack end of the feeder. An a.t.u. is a must, for the antenna is not resonant on any of the amateur bands. The loop has a circumference of 19.5m, to which must be added two 3.47m feed wires which connect the loop ends to the balun. I calculated that the antenna's natural frequency was around 11.6MHz.

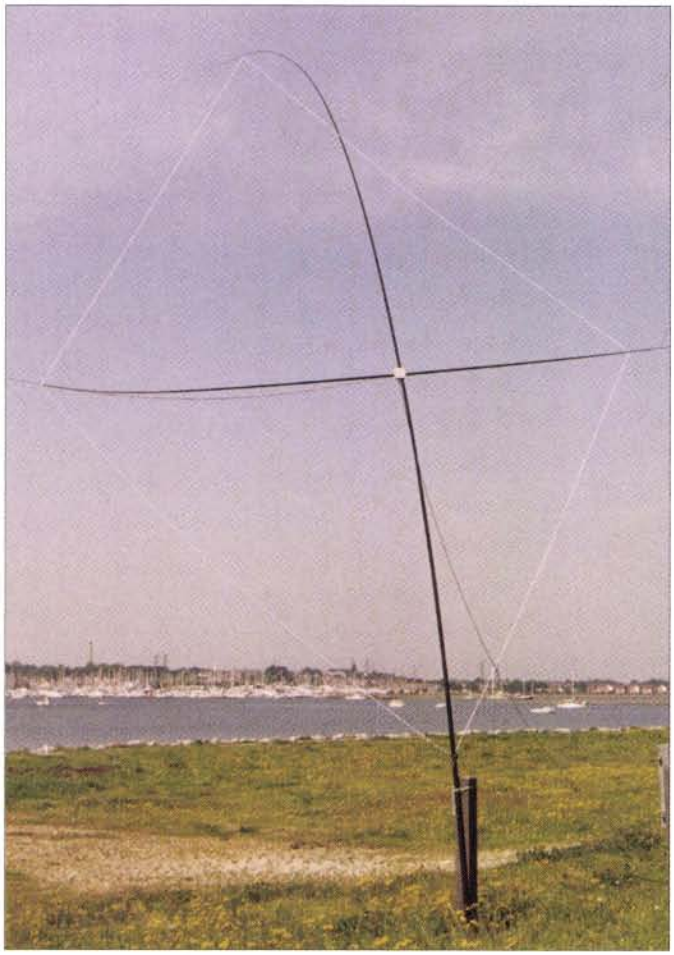
The instructions made no mention of the antenna's power rating but a look at the balun suggests that without heating a transmit power of 100W should not be exceeded. The makers say the antenna will work from 7 to 28MHz.

A few days after the antenna went up my QTH experienced strong winds. They were not up to gale force, but the extensive swaying and vibrations resulted in the collapse of two of the telescopic mast sections and the descent of the lower part of the loop wire to almost ground level. I then realised that the antenna, whatever its merits, was only designed as a very temporary portable arrangement.

The Results

The antenna was used on all bands from 7 to 28MHz and I must say that I was rather disappointed with the results. Signals coming in and the reports received were well down on my station antennas, which include dipoles, a long wire and a Windom antenna fed from a coaxial cable. On 7MHz s.s.b., my signals were between 10 and 20dB down on my other antennas.

On the higher bands I had contacts, mostly using c.w. with European, North America and African stations, but it was very hard going. Often my calls were ignored and then when contact was made I received poor reports, several S points down on my regular antennas.

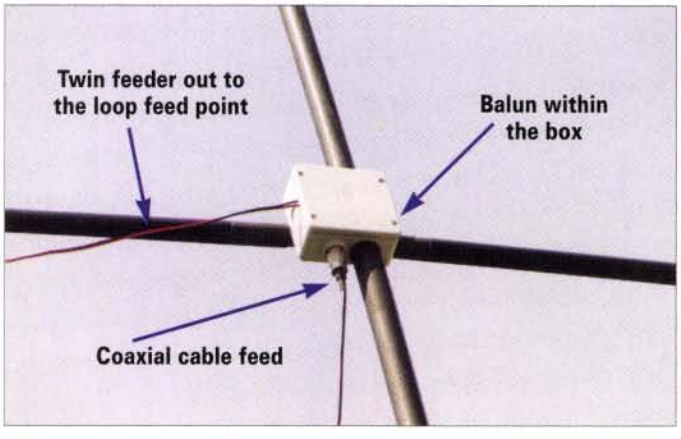


Down by the seaside - the mast and loop antenna ready for action at Poole Harbour.

Rare or unusual DX was impossible to work because of the competition from stronger stations. It was very frustrating to put in a lot of operating time and achieve so little.

The antenna I had, had to be 'force fed' from an a.t.u. Without an a.t.u., the s.w.r. was 'off the scale' on all bands. Such an arrangement means there are standing waves on the feeder and considerable power losses. Although the station end of the coax will indicate a low s.w.r., up at the antenna end there will be considerable mismatch. I feel that the 10m telescopic mast could be better employed as a support for a thin end-fed wire or to hold up a quarter wavelength vertical tuned against a counterpoise or resonant radials (*this is another suggested use of the 10m pole from Funktechnik*. G1TEX).

The feedpoint is from coaxial cable to a balun system inside the box where twin feeder goes out to the loop at end of one of the horizontal arms.



Under A Minute

With practice, the mast can be raised in under a minute and lowered even faster. Unfortunately, the mast sections are held in place just by friction and cannot be locked. This is not a real problem when operating portable, but it severely restricts its use as a permanent structure.

I can recommend the 10m g.r.p. telescopic mast as a useful item for portable work, including back-packing though unfortunately, I have reservations about the effectiveness of the loop antenna.

I would like to thank *PW* and Sycom (Syon Trading) for loaning me test Funktechnik mast and loop antenna. The 10m g.r.p. telescopic mast costs **£57.95** on its own, and the additional Vertical Loop Antenna components costs **£56.95**.
Both are available from **Sycom at 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel: (01372) 372587 FAX: (01372) 361421.**

Sycom Replies

*After discussing John's comment with **Robin G3NFV** of Sycom, he said, that the original design idea for the mast and loop antenna was purely as a reasonably light and portable antenna system. Robin apologised that he hadn't had time to take a mast out and try one out 'in anger', but he felt that by using only some 7-10m of coaxial cable to feed the loop might improve matters.*

The antenna system was designed to be fixed to the supporting upright first and then extended vertically, which as John remarked can be done very quickly. Robin also said that he would discuss John's comments about the loop not being resonant in any amateur band as soon as possible with Walther Speith DK9SQ, (and I'll let you know as soon as I hear the outcome. *Tex).*

The problems John experienced with the instructions were due to the very quick translation from German that was carried out to send the system out for review. A new comprehensive and complete set of instructions will be send out with all antennas. On the subject of using the mast to support a wire antenna, there is a W3DZZ antenna offered among the other options available from Funktechnik.

That's all I have time for this session. See you all in the next issue of A-i-A.

Tex

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5 ICOM IC-T8E

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RRP £1695 **ML Price £1595**
or £31.86 deposit & 60 x £40 p/m

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Yaesu's best selling HF Transceiver since the FT-101ZD. The ultimate R.F. performer now available on Interest Free.

RRP £2499 **ML Price £2199**
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4 FT-920AF

If it's good enough for the Spratly Island Dxpedition it's good enough for you. Excellent value HF + 6m at 100 Watts. Now fitted with AM/FM options.

RRP £1499 **ML Price £1299**
or £18.99 deposit & 54 x £35 p/m

5 IC-706mk11 DSP

Attention anyone out there that does not understand that this little box REALLY IS an HF, Six Metre & 2 Metre wireless. We won't mention the DSP, wide band FM and extended receive coverage and optional SSB and CW narrow filters. Still doesn't make Tea.

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Although at our No. 10 slot this is primarily due to its non-availability until the end of '98. Once again we're asking for a £25 deposit to secure earliest delivery, just like all of you that placed a deposit for the FT-847GX and got ahead of the rest of the suppliers! HF + 6m + 2m + 70cm (4m ?? Don't know!) All in a package the size of a Dual Band mobile.

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A Flick of The Tail

Your Kenwood TS-570D transceiver could be just at the end of your mouse's tail!

We asked Roger Cooke G3LDI to look at the RCP570 software program, which is designed to make control of the Kenwood TS-570D easy to do from the computer. Here is what he found....

This review is not so much about the actual Kenwood TS-570D transceiver, although I will make a few comments of my own, but the way in which the rig performs when it's computer controlled. The Kenwood TS-570D was first reviewed by **Rob Mannion G3XFD** in *Practical Wireless* (January 1997 issue), and it may be worthwhile looking at that review at the same time as you read this one. Unlike many reviews, where time to evaluate a product may be fairly short, I was fortunate enough to collect this transceiver, together with its controlling software, from the London show at Picketts Lock in March.

After getting the rig home, my first impression of the transceiver was that it's more suitable for a mobile situation, as it's smaller than my own rig (Icom IC-751). But after using the TS-570 transceiver for some time, my early impression soon disappeared.

The liquid crystal display (l.c.d.) on the Kenwood rig is larger than the one on the my own rig. The controls are all very easy to use, and I was soon using the TS-570D for contacts on 14MHz, running my regular 'sked' with some of my friends in Sydney, Australia.

Control Software

Next, I installed the Radio Control software, *RCP570*, on my computer (a Pentium-120 running Windows95). The software comes on two disks with an install program, so it was an easy task.

Connection to the transceiver is via the usual serial (Com:) port, and an RS232 lead to the rear of the TS-570D. The parameters of the computer communications to the TS-570D are configurable, so any serial (Com:) port can be used, with a choice of baud rate.

Once the configuration has been carried out, allowing the computer to 'talk' to the rig, it's a good idea to 'play' for a while, and get used to the layout on the screen. It was at this point however, that I noted that the picture of the transceiver had a blank display.

I had to click the mouse on the **RUN** button on the 'Toolbar' (it's a red lightning flash at the top left of the program window) brings the display to life. I think this could be slightly confusing, even though the rig looks 'ready-to-go', nothing happens until you click the **RUN** button.

First set the communications parameters.

Spinning Dials

After many years of controlling rigs by spinning dials and clicking real switches, I find using software to control the normal functions of a transceiver very alien. I have to admit that I prefer the tactile feel of the dial and

This is the blank screen of the 'rig' before pressing the 'RUN' button on the toolbar.

controls on the front panel!

When using this type of controlling program, the computer mouse is the main controlling element. By clicking on the top half of the tuning control you tune higher in frequency and clicking the bottom half tunes lower.

The 'point and click' method of control also applies to the other 'virtual' rotary controls on the front panel. I felt it would be easier to have sliders for some of the controls. However, the software engineers have considered this option, as you can actually 'design' your own front panel on the rig and I'll go into this in more detail later.

After pressing the run button on the toolbar the display springs into brightness. Now choose the (American) licence class - or ignore it.

Initially Slow

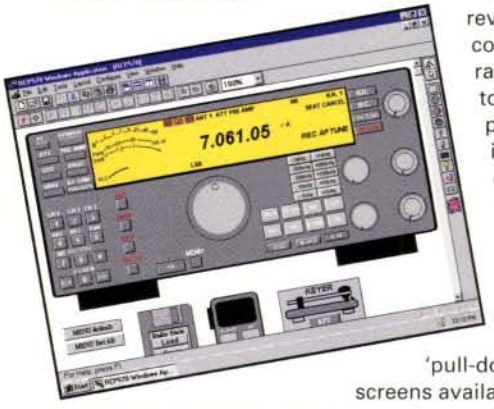
The main tuning I found initially very slow, but using the main transceiver with its various functions for setting tuning speed I found much easier. I spent some considerable time looking for a way in which to increase tuning rate from within the software.

There is no way that I found (from within the software) to control the tuning rate. And if a move up the band is anticipated, it's easier to make use of the **MULTI-CH** control on the TS-570 rig itself. This is, I think one drawback.

"The 'point and click' method of 'virtual' controls"

Previously I've had the opportunity to review, the completely computer controlled Kachina, where the tuning rate was selectable (variable from 1Hz to 1MHz per step). However, the present lack of a variable tuning rate is a relatively minor criticism of an otherwise very versatile transceiver control software.

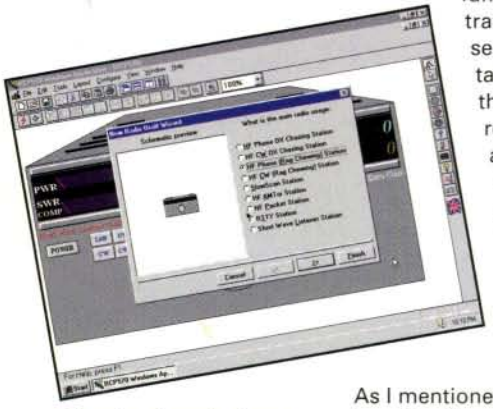
Despite my one complaint, the software is very easy to use. The program in use is self explanatory, and there are sufficient 'pull-down' help-screens available to solve any other problem the you might have.



I 'got rid of' some buttons I felt I didn't need underneath the S-meter.

There is also a menu function on the transceiver itself from which one can select all the parameters, such as audio tailoring, processing, and so on. Once these have all been set up, the rig is ready to use. I had no problem on the air, talking to my regular skeds, in both VE7 and VK. The general comments on the rig were favourable, providing the necessary tailoring and setting of parameters had been done first!

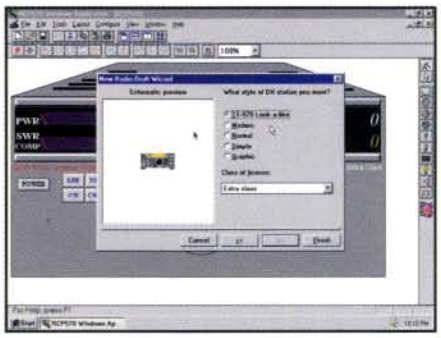
"It's possible to 'construct' your own preferred radio"



Now to set up the type of rig I'm going to use.

Construct Your Own

As I mentioned earlier, it's also possible to 'construct' your own preferred radio. Your personal choices can be catered for, so if you are a dyed-in-the-wool c.w. operator, you can customise a c.w.-only transceiver, with the necessary parameters set at switch-on. You can even pick what type of design of the front panel you would like and the colour and background!



And the look that it's to have.

If you do not like the 'on-screen' rotary knobs, then it's possible to have sliders, and to position them where you like on the front panel. You can apply this 'now-would-I-like-this-to-go' technique to just about every control. The 'customise' capability extends to a variable type of S-meter display, dial and even the colour of the dial.

After having 'constructed' the various types of 'rig' you'd like, you can then jump immediately from a c.w. rig to an s.s.b. contest operator's rig and have all the necessary parameters set for you.

To set up the various 'virtual rigs' takes a fair amount of time to set all the parameters properly and, to be fair, I only made a couple up. I felt I knew the system well enough having already spent several hours 'playing'.

Design-A-Rig

However, the same principle of design-a-rig, I've just outlined, can be applied to other modes, and you can end up with many differing types of radio to suit your tastes. The choices range from a commercial broadcast band a.m. receiver to a Pactor or Clover-only transceiver.

The ability to change the virtual rig, in conjunction with the associated memories, makes for an extremely versatile managed system. Each transceiver layout option, can be saved to disk, displayed in a different format if desired, and provides the optimum operating parameters for the mode selected. It would appear to an on-looker that you have a different transceiver for each mode, and it makes life interesting!

There's no limit to the number of variants, just your imagination. It's much easier than having all modes on one display at the same time and then trying to sort them out from there. Once programmed into the transceiver, the choice is the yours, whether to use the software to control the rig or revert back to the real front panel.

This type of equipment management seems to be common to most of the more modern transceiver, and although it will not appeal to everybody, I think the technology has to be admired. There probably are several scenarios in where a separation of transceiver and computer are mandatory.

You may have to separate rig and computer due to lack of space in the shack or, you may have to share a computer with other members of the family in another room. The ability to use front panel or computer control will, in these circumstances, prove extremely useful.

The maximum number of memories built into most modern transceivers is usually around the 100 in total mark. On my 15-year old rig, I have but 32 memories! With the *RCP570* software and this type of memory management, using around 10 different displays, it's possible to have over 1000 memory locations.

Additional Software

By making use of the multi-tasking capability of computers, it's possible to use additional software at the same time. The additional computer controlling software I tried with this transceiver, was called *RIG-EQF*.

The program *RIG-EQF*, written by **Tom Dandrea N3EQF,** can be used in a similar way to *RCP570*, the TS-570D control program. The *RIG-EQF* program produces a less exciting display than *RCP570*, but does have all the necessary control functions.

"Technology has helped them work the DX a lot faster"

With *Rig-EQF* there are separate screens for programming memories and it's also possible to transfer memories from rig to disk and vice versa. I felt that, whilst the functionality of the program is adequate, the display is not very attractive.

However, there are many people who feel that it really isn't necessary to have a pretty display so long as the controls all work, but I feel it would add to the desire to use the program.

Another program written by Tom Dandrea is *LOG-EQF*, a comprehensive logging program. This can be set for use in either manual or automatic mode. Details of the station entered include their beam direction in degrees, and if a *QRZ CDROM* is detected in the computer (as it was in my case because I run that on the BBS) the rest of the details, full name and address etc., are all automatically entered.

"There's no limit to the number of variants, just your imagination"

The full facilities that *LOG-EQF* has to offer as well as access to the database held on the *QRZ CDROM*, include, such things as printing of address labels, running a contest log, full 'WAS' database, the full DXCC database, auto display from the DX Cluster.

One visual option.

Other Features

Other features of *LOG-EQF* include the ability to send and receive files, update databases, print out contest logs, keep checks on dupes, score and run serial numbers. You can also program memories for using the c.w. keyer, and the s.s.b. digital recorder. It is possible now to run an s.s.b. contest without speaking a word! As for the c.w. keyer, I think most c.w. operators would prefer their own programmable keyer, at least I do, as this is a more personal thing, rather like using your own pen!

Another simple front panel layout option.

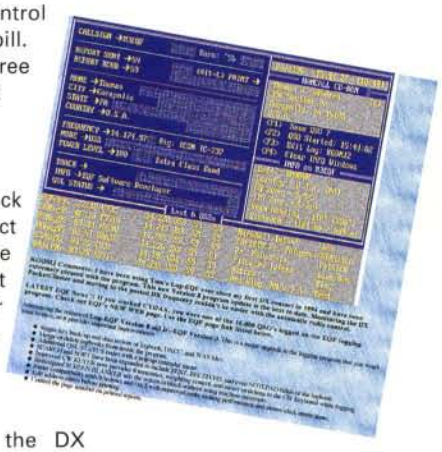
Optional accessories include the digital voice recorder facility. This is useful for running contests from the logging program, recording other amateurs on-air and playing back on-air. A voice synthesiser is also available, and this can be very useful for the visually impaired, announcing the displayed information.

Now just a few more buttons to look good.

If you are looking for a state-of –the-art transceiver, with 16-bit DSP processing, triple conversion and sophisticated computer control software, then this software would fit the bill. You will need a 386 or better PC with one free Com: port, and many hours to while away!

Back in '56

Logging programs were not available back in 1956, when I obtained my licence (in fact neither were computers)! But I can see their advantages, especially when used by the DX-er hooked up to the DX Cluster with audio warnings running all the time. It's so much easier now, in my early days, one had to spend countless hours with headphones on, searching the bands, looking for the DX.



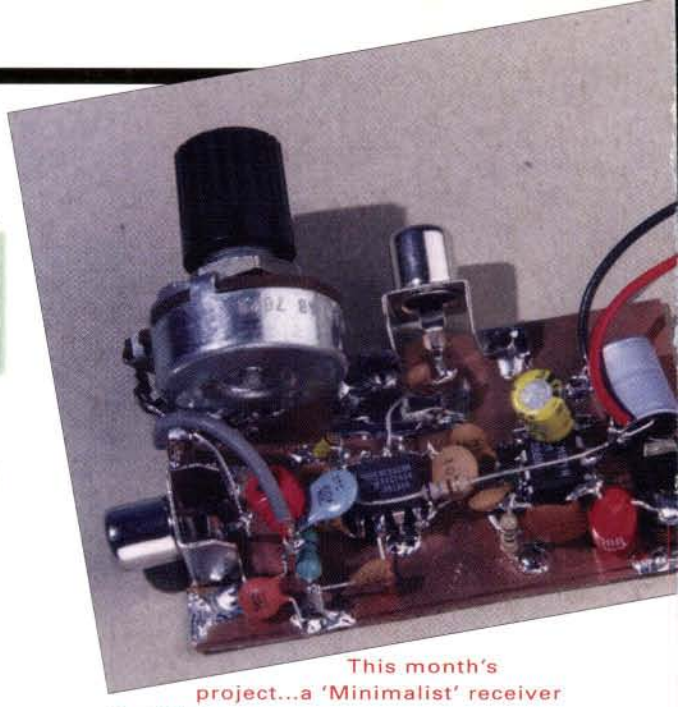
Two screens of the LOG-EQF program 'grabbed' from an internet site http://www.win.bright.net/~colebdjr/eqf.html or you can start from www.itis.net/eqf

Contemplating on this comparison, the modern amateur might rightfully say that technology has helped them work the DX a lot faster, in a shorter period of time. However, that seems to be the target for most things these days, and I think, with the hindsight of experience, that the modern amateur might just be missing something! Or am I dreaming?

My thanks go to **Kenwood UK Ltd.**, for the loan of the rig and the *RCP570* and other software, unfortunately I shall have to pack it all up and return it! The software is available **free** direct from Kenwood UK, or any approved Kenwood dealer. Or from **http://kenwood corp.com/software/ts570.html** *PW*

This month the Rev. George Dobbs G3RJV describes what he calls a 'Minimalist receive board'. Build it and add it to a transmitter and you've got a transceiver... after you've read the appropriate quote of course!

Carrying on the Practical Way



This month's project...a 'Minimalist' receiver for 7MHz.

Many people begin Amateur Radio construction by building a small transmitter, probably crystal controlled, which can be used alongside a station receiver or the receive portion of an existing transceiver.

In recent years I have described several such little transmitters; the most recent being the 'Utility Transmitter' described in this column in *PW* April 1998. These little transmitters are only a short step away from a complete transceiver.

Adding a direct conversion receiver board will produce a simple, but complete, station. The oscillator of the transmitter then becomes the local oscillator for the receiver board.

"Entities are not be multiplied without necessity"
William of Occam 1290-1350

Direct Conversion

In a direct conversion receiver, a mixer receives the input signals from the antenna and mixes them with a local oscillator at the same frequency. The mixer products will include audio frequency signals either side of the received signal: upper and low sidebands. Thus both c.w. and s.s.b. signals can be heard as audio signals which can then be amplified to drive a loudspeaker or headphones.

The basis of a direct conversion receiver requires only a mixer and an audio amplifier. However, of course it does require input tuned circuits to reject unwanted signals.

The circuit, **Fig. 1**, shows a very basic, but effective, direct conversion receive board. The 40 metre (7MHz) band has been chosen for this board, as it is a popular band for QRP transmitter designs.

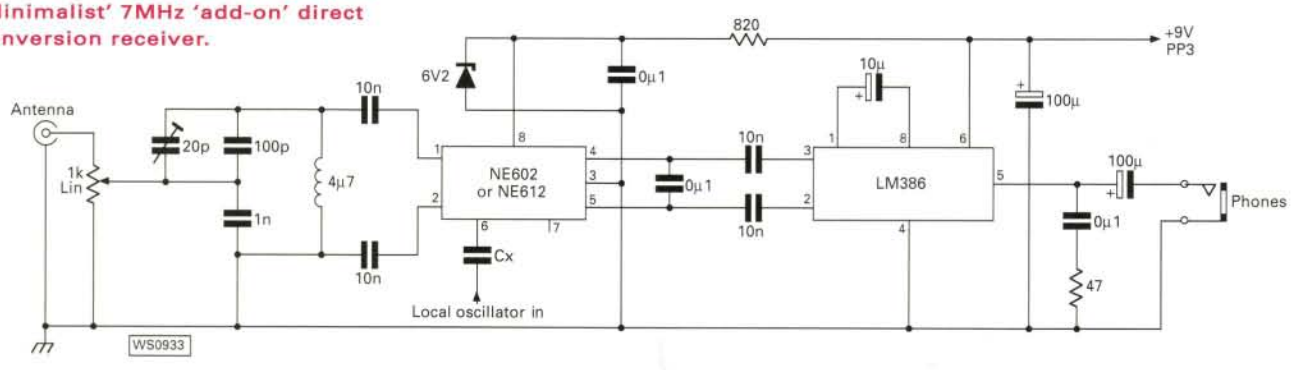
The mixer is an NE602 (or NE612) oscillator/mixer i.c. and the audio amplifier is the well-known LM386 chip. This combination has been the stuff of many Amateur Radio designs including the *PW* Sudden.

Incidentally, the NE602/612 includes an oscillator circuit but in the version shown in Fig. 1., this is not utilised. So, down to business....let's follow the signal path.

Low Impedance

The receiver is designed for low impedance (50Ω) input. In this design the signal from the antenna is fed to a 1kΩ linear potentiometer. This provides a simple r.f. attenuator which, in this receiver, is

Fig. 1: Circuit diagram for G3RJV's 'Minimalist' 7MHz 'add-on' direct conversion receiver.



the only gain control.

It may seem odd not to have an audio gain control and to rely solely upon an input attenuator to control the overall gain of the receiver. However, in reality, this is quite a sensible approach, because the NE602 is not the most robust of r.f. mixers and can be susceptible to cross modulation and a.m. broadcast break-through.

The gain control is therefore placed in front of the most vulnerable part of the circuit. This approach works remarkably well with simpler receivers on the 7MHz band.

A single tuned circuit tunes the input signal, which is a miniature axial 4.7µH r.f. choke tuned with capacitors. There are no inductors to wind in this circuit!

The impedance matching is achieved by inserting the signal in the centre of a capacitive divider: Two series capacitors, the top one of which has a trimmer capacitor in parallel to bring the tuned circuit on to frequency.

The NE602/612 is used as a balanced mixer. The input is fed in to pins 1 and 2 and the local oscillator is coupled to pin 6 via a capacitor (Cx) the value of which is used to control the amount of injection.

If the oscillator source is the oscillator stage of a simple transmitter, the value will be quite low, in the order of 10-50pF. (The only real way to determine this value is by experimentation with the particular oscillator source).

The balanced output is taken from pins 4 and 5. A 6.2V Zener diode provides the required voltage.

The balanced output is fed into pins 2 and 3 of the LM386, which is configured for high gain with a 10µF capacitor between pins 1 and 8. A 9V supply is required for the LM386 and the prototype used a PP3 battery. (The output from the LM386 is sufficient to drive portable cassette player headphones or a small loudspeaker).

My prototype receive board was built 'ugly' style on a piece of printed circuit board material. The two chips were mounted above the board on small pieces of foam. I tried the receive board with several little 7MHz transmitters. In each case a very acceptable receiver option was the result.

Complete Receiver

The constructor may wish to use the board as a complete receiver without adding it to a transmitter. If that's the case all you need to provide is a suitable local oscillator. This could be an external oscillator or the oscillator portion of the NE602 may be used.

I had good results using my bench signal generator as the local oscillator. But to help you...here are two suggestions for using the internal NE602 oscillator.

The diagram, **Fig. 2**, shows a variable crystal oscillator (VXO) circuit with the NE602. This is a very simple way to provide a local oscillator.

The usual technique is to configure pins 6 and 7 (the oscillator circuit access pins) as a Colpitts Oscillator. And in this circuit a crystal on the required frequency is made frequency variable with a variable capacitor and an inductor.

The inductor is a small axial fixed value choke, which tends to 'pull' the frequency lower while the variable capacitor tends to move the frequency higher. Depending upon the actual crystal used, some 10 to 20kHz of frequency shift will be obtained providing a useful coverage on the c.w. end of the 7MHz band. (A small capacitor connected to pin 7 could provide an oscillator source for a transmitter board).

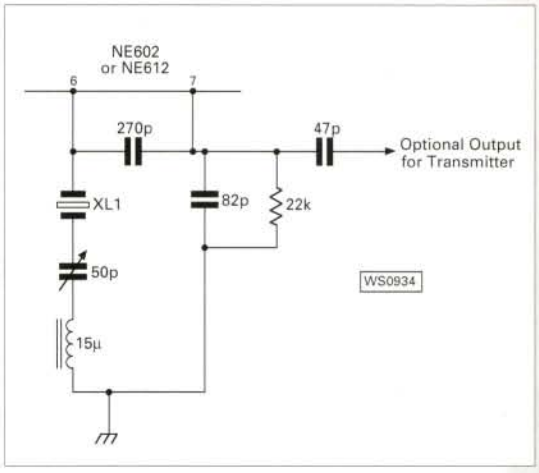


Fig. 2: Circuit for the variable crystal oscillator (VXO) option (see text).

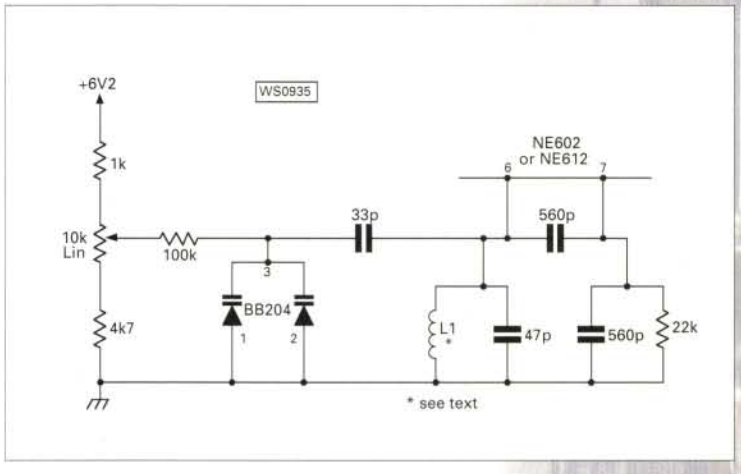


Fig. 3: Optional circuit for varicap diode tuning (see text for setting up advice).

Another Approach

Another approach is shown in **Fig. 3,** which is somewhat more complex but provides greater frequency coverage. Here a Toko inductor and a 47pF capacitor form the tuned circuit in the Colpitts oscillator which is Varicap tuned.

A BB204 double varicap diode allows tuning without having to provide a variable capacitor. As you may know...these can be difficult to obtain or expensive to buy.

The tuning control is a 10kΩ linear potentiometer which is in a potential divider circuit used to provide an appropriate voltage shift for the Varicap diodes.

The two resistors at the top and bottom of the potential divider may require some adjustment in values to allow the required frequency shift. The simplest way to do this is to only use the 10kΩ potentiometer when first testing the circuit.

Firstly, check what voltage swing is needed to obtain the required frequency coverage. Then you need to calculate what resistance is required above and below the potentiometer to obtain this swing.

So, there you have it! This little board, driven from a transmitter, or its own local oscillator, provides a more than acceptable little receiver for 40 metres. Have fun and I look forward to hearing you on the band!

PW

Chris MacLeod GM6TYX says that we're truly in the age of 'supe
v.h.f., u.h.f. and microwave work are considered. And to use a p

SUPER

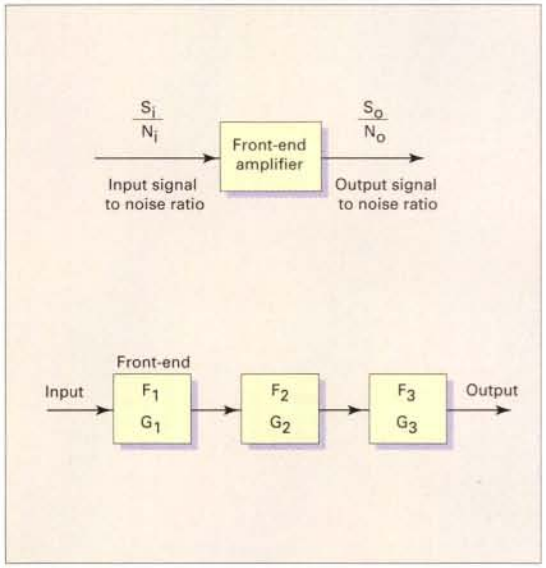


Fig. 1: Considering the signal-to-noise ratios (see text).

Fig. 2: Block diagram illustrating process of front-end gain and noise factors (see text).

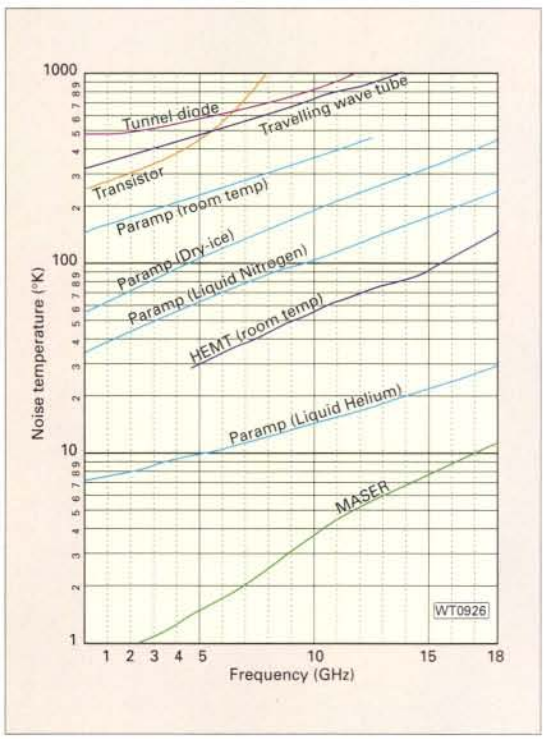


Fig. 3: Comparative noise temperatures of amplifying devices from transistors to MASERs. Note how much more superior the MASER is (see text).

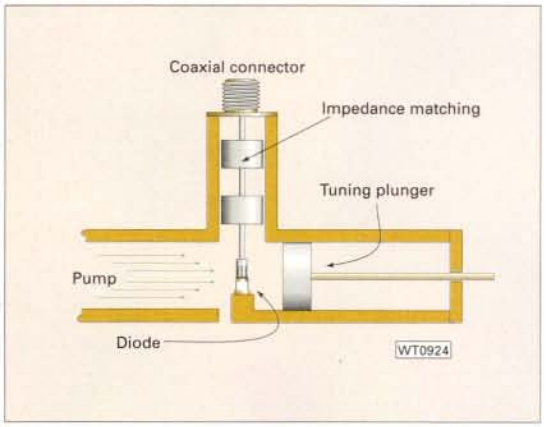


Fig. 4: A microwave cavity is the home of the varactor diode forming the Paramp. Lowering its physical temperature lowers the noise temperature dramatically.

Amateur Radio is a multi-faceted hobby. The technology available to amateurs has never been more sophisticated, and we can now even indulge in satellite communications or moonbounce operation.

However, the special modes require specialised equipment and one important item is a sensitive receiver. So, with this in mind I'm going to take a look at the techniques involved in the design and operation of low noise receivers, in particular receivers operating at v.h.f. and above.

Of course a good receiver is also important to the amateur who just wants to communicate or listen on under difficult conditions. And as such it will also be of interest to those who have considered trying Amateur Radio astronomy.

The Front-End

Firstly I'm going to discus the front-end of the receiver - that is the first amplifier or mixer. You might ask, why be so concerned with this one item? Well in answering, it's because the noise performance of the whole receiver depends heavily on this circuit. So, let's now consider some important definitions which will help in understanding low noise receivers.

To get a good signal you must have two important items. Firstly, a good antenna, which allows as much of the signal to be picked up as possible. Secondly, a low noise receiver because you need to amplify the signal as much as possible and the noise as little. Not only that but this stage must add as little extra noise as possible. That is, we would like a high signal-to-noise ratio (SNR)...lots of signal and little noise.

$$SNR = \frac{\text{Signal}}{\text{Noise}}$$

Now there's not much you can do about the signal-to-noise ratio when it's in your antenna and feeder. Of course...you would like to put your amplifier as close to antenna as can practically be managed and use high quality coaxial cable over as short a length as possible to the receiver, and this will minimise the effect of noise generated in the cable. If these precautions have been taken, then any extra

rcharged receivers' - particularly when equipment for opular phrase...the techniques used are 'really cool'!

CHARGED RECEIVERS

They're Really Cool!

IN THIS, THE AGE OF SUPERCHARGED RECEIVERS, CHRIS GM6TYX SAYS THE TECHNIQUES USED ARE REALLY COOL!

noise is due to the electronics of the circuitry itself. This is best expressed as the noise factor (F), see **Fig. 1**.

$$\text{Noise Factor (F)} = \frac{\text{Input signal to noise ratio}}{\text{Output signal to noise ratio}} = \frac{S_i / N_i}{S_o / N_o}$$

Noise factor is a measure of how much noise was introduced into the signal by the amplifier itself; it is sometimes expressed in decibels and called the noise figure (NF).

$$NF = 10 \times \log(F)$$

Noise is generated by temperature, the lower the temperature, the less the noise. Professional systems are often immersed in a liquid gas, such as Nitrogen or Helium to lower noise. Noise in a circuit is sometimes given as the Noise Temperature (T_e), which is related to noise factor by:

$$T_e = 290\ (F-1)$$

Even the sky itself can be considered to have a noise temperature and this is a measure of noise picked up by the antenna. The higher noise temperature and larger the noise factor is...the noisier your system will be.

Now, lets say you have a system comprising of three stages. The first stage has a noise factor of F_1 and a gain of G_1. The second stage has a noise factor of F_2 and a gain of G_2 and so on (see **Fig. 2.**).

It can be shown that the F for the whole system is:

The noise factor of the first stage (F1) is

$$F = F_1 + \frac{(F_2 - 1)}{G_1} + \frac{(F_3 - 1)}{G_1 G_2}$$

dominant. The contribution of the noise factor (F2) from the second stage is divided by G_1 which could be a large gain figure. So in a receiver with a large gain in the first stage, only the noise factor of that stage really contributes to the performance of the system.

Now let's take a look at some of the devices which give high gain with a low noise factor. And these include all sorts of exotic items!

Lowest Noise Device

The lowest noise device of all was traditionally the MASER (Microwave Amplification by Stimulated Emission of Radiation). Unfortunately, although it operates at very low noise levels it has to be cooled to an extremely low temperature, a few degrees above absolute zero. (Hardly an inviting prospect even for the most adventurous amateur!). I've also provided a comparative display of noise temperatures in **Fig. 3**, for various amplifiers.

However, I'm including the MASER in this description because it sets the standard by which other devices are measured. Incidentally....MASERs are still used in such high sensitivity situations as radio telescopes although High Electron Mobility Transistors (HEMTs) are now taking over.

The parametric amplifier, **Fig. 4**, is a better option for the keen constructor. Even when its not cooled it exhibits very low noise characteristics. Here (generally) a varactor diode is used effectively as a mixer to transfer power from one signal (the pump) to another signal (which is being amplified).

In recent years, new semiconductor devices have become available, these exhibit very low noise characteristics, rivalling even the MASER. One of the most important of these devices is the previously mentioned HEMT

Editorial note: *See 'The HEMT - a very high performance microwave device' by Brian Dance, page 77 PW January 1990 . (Magazine sold out but photocopies of article available from PW Book Service).*

Although presently not available in large quantities and expensive, you can expect to

"Cooling circuits will improve noise performance"

"... all the electrons 'jump' down by the same energy amount ..."

SUPERCHARGED RECEIVERS

see a reduction of price and an increase in availability of HEMTs. These devices represent one of the most interesting developments for amateurs looking for extremely good performance.

Several other devices may be considered as low noise amplifiers. These include Travelling wave tubes (TWTs) and tunnel diodes.

Quantum Mechanics

The principle underlying the operation of the MASER belongs to the branch of modern physics called quantum mechanics. Electrons can exist only at certain, defined energy levels and not inbetween. They can move between these discrete energy levels by emitting or absorbing small packets of electromagnetic energy called photons.

In the MASER, an external signal (the pump) is applied and this 'excites' electrons (in a crystal) up into a higher energy level. When the signal comes along it stimulates all the electrons to 'jump' down at once.

Because all the electrons 'jump' down by the same energy amount, they all release radiation at the same frequency. So, a small input signal can stimulate the release a much larger one.

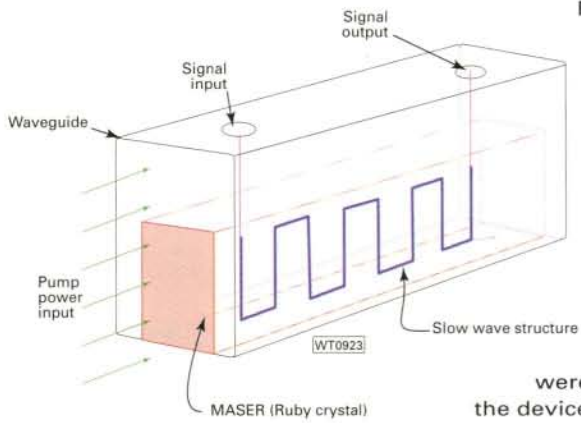


Fig. 5: Diagram showing (very basically) the layout of a MASER. The whole package is normally immersed in liquid Helium for best noise figures (see text).

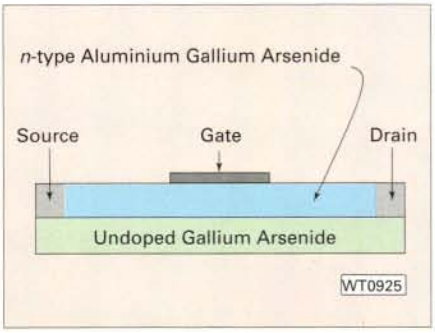
Modern MASERs operate using several different energy levels (usually three or four), but the process is essentially the same. The diagram, **Fig. 5**, shows a very basic diagram of a typical MASER.

Early MASERs were cavity devices, the device material was placed in a resonant cavity with the pump signal and signal to be amplified. However, cavities have small bandwidths and so the travelling wave MASER was developed and Fig. 5 shows the basis of a travelling wave MASER.

In the travelling wave MASER device the 'slow wave' structure allows interaction of the pump and signal over a large area of the crystal. The whole device is placed in a magnetic field (which causes the energy levels of the electrons to slit into three or four levels).

Next, the amplifier is then placed in liquid Nitrogen or Helium. The low temperature of operation is not just for thermal noise; it stops electrons spontaneously jumping to a lower energy level before stimulation by the signal has taken place.

Fig. 6: Diagrammatic cross-section of a HEMT device.



In operation MASERs have an extremely low noise temperature and high gains, and they can have bandwidths of Megahertz and are not easily damaged. Their major problem is the necessity of operating at very low temperatures.

The Paramp

The Parametric Amplifier or 'Paramp' is a more practical proposition for the amateur. At room temperatures it operates at lower noise levels than other amplifiers and cooling also improves performance.

Basically the Paramp is a mixer: it transfers power from a pump signal to the signal frequency during the mixing operation. Typically a varactor diode is used as a non-linear capacitance; that is, as a device whose capacitance varies with applied voltage (the pump signal). The result of this non-linearity is the ability to mix signals.

There are several different modes of operation: energy can be extracted from the sum or difference frequencies which the mixer generates (the third frequency in these systems is usually called the 'idler'). Probably the most common in low noise applications is the difference frequency reflection amplifier, shown in **Fig. 6**.

For low noise operation it's important that the diode has no current flowing (as this generates noise) and this consideration limits the maximum capacitance the diode can have. Because the diode has a high resistance it also generates Johnson noise. These facts mean, that although the system has less noise than most semiconductor amplifiers, it generates more than a MASER.

New FETs

Recently a new class of f.e.t. type devices have appeared, these are called HEMT (High Electron Mobility Transistors) and they represent a revolution in the noise performance of three terminal semiconductor devices. The previous high frequency f.e.t., called a MESFET, although having good noise characteristics, cannot compare with these newer devices.

Although currently expensive, HEMTs are gradually becoming available on the market. And in the next few years they will represent a method whereby the amateur can achieve noise levels only available by MASERS or Paramps (which can be tricky to set up).

The structure of a HEMT is shown in **Fig. 6**. In use HEMTs work by generating electrons in one layer, but actually use them in another (such multi-layer structures of different materials, are called Hetrostructures). The result of this is higher electron mobility (higher frequency) and lower scattering (lower noise) and in practice HEMTs can be used in a similar way to normal f.e.t.s

Cooling the circuits will improve noise performance. Options include ice (273°K), water + salt (263°K), dry ice (198°K) and liquid nitrogen (78°K). And don't forget....always observe safety rules when handling dry ice or colder temperatures.

So, that's a quick round-up of some of the techniques for obtain the best results in v.h.f. and above. It's a fascinating world up there - and I wish you good (and improved) listening and operating!

PW

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Fig. 2: Photograph of Walter G3ESP's completed unit.

No, you don't need 'Extra Sensory Perception' for safer soldering. You only need Walter Farrar G3ESP's advice and the use of his safety unit!

Safer Soldering The ESP Way

When you have the misfortune to pick up a soldering iron to change the bit, without realising that it's switched on, you end up with burnt fingers! And having recently done this, I decided to make things safer, the result is a simple concept: run the mains cable via a plastic box fitted with an on-off switch and bright neon bulb.

In my case I noticed that the bottom of my old Antex iron stand was the same length as a double 13A mains outlet, and slightly narrower. So, I went to a hardware shop and bought a 29mm deep plastic pattress and a plain cover-plate for £2.84.

Junk Box

The rest of the bits and pieces came from the junk box. My final circuit is shown in **Fig. 1**, with a photograph of the completed unit in **Fig. 2**. No measurements are given, because your soldering iron could be different in size and the idea of this article is to give you some ideas!

To fix the soldering iron stand to the cover of the box, I used two small self-tapping screws, because the stand must be removed to access the cover-plate fixing screws. I now know by looking, rather than by the ill-advised finger test, whether the iron is hot or not!

But before you start...here are some points to consider: The plastic pattress and cover-plate are very brittle and care is needed when making holes. A low voltage mini drill will cope well with up to about 3mm thickness. But beyond that a hand-brace is advised rather than a fast Black & Decker electric drill.

"The safety facility was fairly common in larger irons..."

The neon bulb I used has a resistor incorporated. If the neon you're to use is not so equipped, connect a 270kΩ in series with it.

You should also check the voltage rating of the miniature switch, as some are specified only for low-voltage d.c. usage. Finally, why don't manufacturers include an indicator light in the handle of the iron? The safety facility was fairly common in larger irons in the past. *PW*

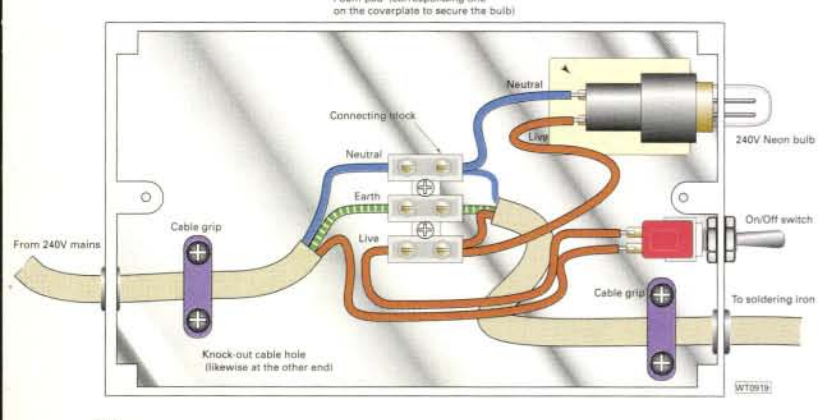

Fig. 1: Illustration showing the simple wiring lay-out for the G3ESP 'safer soldering box' (see text). Please note that an external 270kΩ resistor is required to operate the indicator neon, and that the neon bulb used in this instance uses an integral resistor.

Summer's He

& It's Antenna Weatherproofing Time!

Billy Williamson GM8MMA passes on some valuable weatherproofing advice gained from living in the rugged Shetland Islands off Northern Scotland. So, take Billy's tips... and get busy before the rain and gales return!

Antennas come in a vast variety of shapes and sizes but can generally be grouped into two types: the slung wire and the rigid metal tube. Wire antennas are very prone to wind damage and you should always leave a certain amount of slack. Remember that they will expand and contract to some extent with temperature variations in addition to the more obvious wind pressures.

A traditional way to relieve strain is to use a pulley and counterweight, but this introduces moving parts which is undesirable. If you do decide to use this system get a good quality pulley from a supplier of marine equipment. They are horrendously expensive but this is definitely a case of 'he who buys cheap, buys dear'!

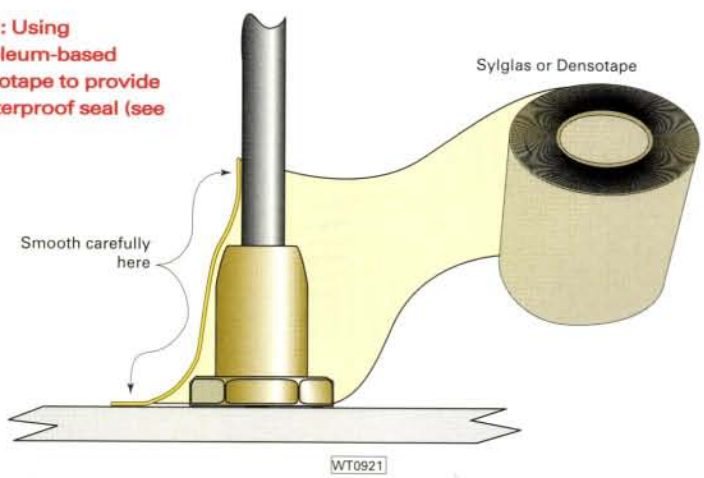

Fig. 1: Using petroleum-based Densotape to provide a waterproof seal (see text).

Particular Problem

A particular problem arises where the feeder joins the antenna. Here it's most important to reduce the strain on the joint to a minimum by suitable staying. (The small insulators made from the Tufnol material are useful for this job).

You should remember also that some movement of both antenna and feeder is inevitable. So, it's useful to realise that it will do little harm providing that the bending is, so to speak, spread over a considerable length of wire.

Wires connected to a fixed point must be carefully stayed, otherwise all the bending will take place close to the joint, which will soon fail.

Metal tube antennas are robust but don't forget to tighten the bolts holding the elements in place firmly before erecting the array. I say this because a common cause of failure is bolts working loose allowing the elements to move around in the wind and eventually break.

Good Coating

When everything has been mounted give all the bolts and clamps a good coating of Waxoyl or some similar product. It's mainly employed as an additional undersealing for cars, so you should be able to get it from a garage or car accessory shop. Put on plenty and make sure it runs into all the 'nooks and crannies'.

The protective coating will not only prevent corrosion but allow you to loosen the bolts years after. Incidentally, Waxoyl is one of the very few anti-rust products which can be applied to surfaces which are already rusted and prevent further deterioration. Just wire brush off the loose rust and brush it on.

Although antennas are very often mounted on chimney stacks this is not the best place for them. All fuels produce corrosive gases when they are burned, which will tend to attack the metal and this is another good reason for providing extra anti-corrosion measures.

Coaxial Cables

Coaxial cables are notoriously prone to damage. They are usually connected to the

ere

antenna either in some sort of box or using a plug and socket arrangement.

Some form of sealing is usually provided but I think it's wise to take no chances here. If water gets into the cable it can ruin the whole length because the moisture will 'creep' by capillary action. This will not only destroy the cable, making it very 'lossy' but also damage the plug at the far end and even, in the worst case, the socket on your beloved transceiver! So...be warned!

The most versatile product for additional sealing on the coaxial entry/exit points is the petroleum based tape sold under the name of Densotape or Sylglas. All your antenna junction boxes and plugs should be completely wrapped in this material

However, when using Densotape be sure to smooth it carefully to the surface as shown in **Fig. 1**. It never hardens or deteriorates and can be easily removed at any time.

Unfortunately, it has to be admitted that Densotape is unpleasant stuff to work with. It sticks enthusiastically to your hands and is very difficult to remove.

You can try using disposable gloves but these usually adhere better to the tape than they do to your hands! Applying a barrier cream before you start does help.

Protecting Coaxial Cable

Protecting coaxial cable is a necessity and it must be firmly fixed to prevent it flapping about. If it can rub along something it won't be long before the outer cover is worn through, allowing water to enter and destroy it,

Damage which is discovered when it happens, e.g. if you damage it when working with it can be repaired by wrapping it tightly with self-amalgamating tape. This material amalgamates with itself (in other words the edges 'flow together' after it has been unrolled and stretched). And very soon after being wound on, a seamless waterproof joint is formed (it's available from many advertisers in *PW*).

Personally, I don't think it's worthwhile attempting repairs with self-amalgamating tape on damage which has been present for some time, except perhaps as a temporary measure. Even if it hasn't rained during the period, moisture will have been drawn into it from the air, and capillary action spreads the problem and will eventually cause the braiding to corrode, rendering it useless.

So, take my advice...strap the cable firmly with plastic cable ties to prevent it moving. Remember to use the ultra violet resistant type (these are usually black).

Rotator Problem

Rotators present a special problem. A loop has to be left between mast and antenna to allow for the latter's movement. Everything depends on the size of this loop.

If the loop is too small and it will rub against the rotator body - too large and it will swing about in the wind. The correct size can only be found by experiment. If you have difficulty you may consider running it through a short piece of hose to give it some protection and extra rigidity.

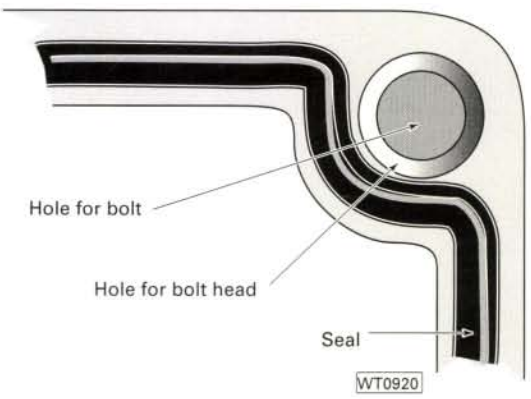

Fig. 2: Sealing a waterproof box (see text).

Classification Of Metals

Most readers will probably be familiar with the classification of metals as anodic or cathodic and the electrolytic corrosion which occurs between the two. To refresh your memory here is a list of the most common metals in order from the most anodic to the most cathodic.

Anodic: Aluminium, Zinc, Cadmium, Iron, Stainless steel and Solder.

Cathodic: Nickel, Brass, Copper and Silver solder.

Most books leave the classification as I've shown it. But in fact the situation is not quite so simple as other factors are involved.

Two particular exceptions are as follows. One would think from the 'table' that brass and iron or steel would be incompatible but in practice I have not found this to be so. Some sort of protective coating has to applied to the iron anyhow and the presence of brass bolts in it seems to have little effect.

"Protecting coaxial cable is a necessity and it must be firmly fixed to prevent it flapping about"

More seriously however, is my advice that you shouldn't accept the assurance that aluminium and steel are compatible. At one time it was common practice to use aluminium boxes, the lids of which were held on with steel Allen screws. The problem is that aluminium expands as it corrodes so that the screws soon became seized.

None of the releasing fluids I have encountered seem to have the slightest effect on this kind of corrosion. The screws cannot be drilled out as the drill will always wander off into the much softer aluminium.

You end up using increasingly desperate measures, hacksaws, hammers, cold chisels and a good deal of bad language! Needless to say the box, and often its contents are usually destroyed in the process.

It often happens that boxes have to be mounted outdoors to house antenna tuners, matching units or preamplifiers, etc. And I'm pleased to say that the IP system is in place to

Summer's Here

help you select what's needed.

Some readers may be already familiar with the IP system of ratings for environmental protection. This usually consists of a two digit number; the first digit indicates the degree of protection from dust, the second protection from water ingress. Anything designed for outdoor use will have a first figure of 6, the second will vary from 4 to 7, the higher the better.

A third figure is sometimes added. This indicates degree of resistance to impact and need not concern us here. I've not quoted the specifications in full, as in practice I have found that it's unwise to take these too literally.

Remember that connections will have to be made to the box and these may prove to be the weak spot. On the other hand the rating of any fitting can be very greatly improved by appropriate additional sealing.

Sealed Boxes

Sealed boxes are available which have the holes for the mounting bolts outside the seal as shown in **Fig. 2**. A disadvantage of these is that the heads of the bolts cannot be made much larger than the holes.

If corrosion occurs between the two surfaces it will not be long before the holes become enlarged to such an extent that the bolt heads can pull through. This can cause the box to fall off and dangle embarrassingly on its cables.

The problem can be avoided by using a plastic box. But please don't make the mistake of equating something made of plastic with being inferior. Strong plastic boxes are available which are impervious to the weather and will cause no worries. They do not normally of course provide electrical screening and so may not be suitable for all purposes.

"...strap the cable firmly with plastic cable ties to prevent it moving"

If you do use a metal box it should be mounted vertically so that water can drain away and not become trapped between the two surfaces. Seal around the top and sides of the joint between the box (and whatever it is bolted to) using Densotape or clear silicone mastic and leaving the bottom unsealed.

Use watertight glands and take the cables in from below if possible. If you take them in from the side bend the cable downwards to form a 'drip' loop.

Warning: Don't forget that when bending cables not to exceed the manufacturer's recommendations on the minimum bending radius. If you must take them in from the top seal...it's essential to seal them thoroughly with Densotape as shown in Fig.1.

A friend of mine, who was a ship's electrician, once said that he had never seen a watertight fitting that could keep water out, but they could certainly keep water in! So, to avoid this situation bore a 3mm hole at the lowest point of the box to help the box 'breath'.

Coat the screws heavily with grease before assembly. Special anti-seize compounds are available but do not seem much more effective than general purpose grease. Petroleum jelly (Vaseline) is old fashioned, but not to be despised and the neutralising jellies used to protect battery terminals are also excellent.

Whatever you use try to obtain it in tube form. Aerosol cans are extremely awkward to use on small parts. You'll end up with your hands covered in the stuff and not a single drop on the screws!

When you have fitted the box lid apply a layer of Densotape, folding it in neatly at the corners and remembering to cover the screw heads. This sort of tape always remains sticky and can't be painted over. You won't worry about this if it's up the mast but if it is mounted low down in the garden it may be undesirable.

A foil backed version of Densotape which can be overpainted is available but the backing makes it too inflexible for our purposes. You can use clear silicone mastic as a substitute but remember that it's extremely difficult to remove when it has set.

Dry Weather

Sealing should, of course, always be done in dry weather. If it is also warm, tapes and mastics will be more flexible and easier to work with. **Beware of frosty conditions!** Everything may seem perfectly dry but moisture from your hands or breath will inevitably condense on the cold surfaces and prevent you getting a good seal.

If you are mounting a printed circuit board (p.c.b.) in the box varnish it first to protect it from the corrosive effects of the air. Mount it vertically and leave 6mm clearance all round. You can't drill holes in the back of the box without compromising its watertight seal...so use adhesive mounts.

Be sure to 'stand off' the p.c.b. buy at least 6mm from the back of the box otherwise water may become trapped between the two surfaces by capillary action. (This is an extremely common cause of p.c.b. failure).

In 'sealing off' my notes (in waterproof tape of course!) I should emphasise that everything is based on my experience on marine equipment. If you live in a sheltered spot inland it may not be necessary to go to such extremes.

However, it's always better to err on the safe side. And living in the Shetland Islands I can tell you that Mother Nature always wins in the end. But if you follow these instructions at least 'Mother' will know that She's been in a fight!

PW

June 14: The Nunsfield House Amateur Radio Group present the 29th Elvaston Castle National Radio Rally taking place at the Elvaston Castle Country Park on the B5010, five miles south east of Derby. There will be all the usual traders plus Special Interest Groups, a grand Bring & Buy and a huge flea market. Over 48,000 square feet of marquees makes this the largest outdoor rally in Europe. With crafts, bands, a museum farm, children's entertainment and woodland walks, there is something for all the family. The venue also has a Caravan Club approved site. Talk in is provided by GB2ECR on S22 and SU22. **Brian Reid G1CUH** on **(01332) 751412** (combined telephone and FAX number).

June 14: The Bangor & District Amateur Radio Society are holding their major radio and computer rally at the Clandeboye Lodge Hotel (formerly The George), Estate Road, Bangor, County Down starting at 12 noon (11.30 for disabled visitors). This year's event will feature a full range of trade stands, including major UK traders, a Bring & Buy and computer software, etc. Free parking, facilities for the disabled, full range of meals and bar services available throughout the day. Morse tests available on demand, operational stations and GI3XRQ/P running all day. Admission is £2, under 16s go free. Talk-in on Ch22. **Roy GI0WVN** on **(01247) 460716** or **Stuart GI4OCK** on **(01247) 454049**.

June 21: The Newbury & District Amateur Radio Society will be holding their 12th Annual Amateur Radio Car Boot Sale at Cold Ash playing field, near Newbury. Sellers/Traders should arrive at 0830, no earlier please. The sale will be open from 0900 to 1500. **Ian Trusson**, Secretary NADARS on Tel/FAX: **(01635) 826019**.

June 28: The Horncastle Rally is to be held at Horncastle Youth Centre. This Rally is held as a joint venture between the Youth Centre and the Fenland Repeater Group. The Rally is held on one level with very good access for disabled visitors. Food and drink is available, including the now legendary Horncastle Bacon Butties. Tables are only £2 for six foot table (bookable and payable in advance). Cheques should be made payable to the Horncastle Youth Club, sent to: **Area Youth Office, Cagthorpe, Horncastle, Lincs LN9 6HW**. Entry fee for customers is £1. Please call **Tony Nightingale G6CZV** on **(01507) 522482** or E-mail Tony at: **antony.n@virgin.net** for further details.

July 5: The Harlow & District Amateur Radio Society are holding their Rally and Car Boot Sale (free entrance and parking) at a new and better venue, Mark Hall School, Harlow (A414), First Avenue. Tables inside £15, car boot plots, £7. For the best plots, book early! Talk-in on S22 & SU22. Morse tests on demand. **Len G7UFF** on **(01279) 832700** or FAX on **(01279) 864973** or E-mail: **len.brackstone@virgin.net**

July 5: The 9th York Radio Rally will be held in the Knavesmire Building, York Racecourse, York. Doors open at 1030 and admission is £1.50. Children accompanied with an adult go free and there is ample free car parking. There will be Amateur Radio, electronics and computers, Morse tests and repeater groups, refreshments and a licensed bar. Talk-in on S22. Further details from **Pat Trask G0DRF** on **(01904) 628036**.

July 12: The 18th Sussex Amateur Radio & Computer Fair will take place at the Brighton Race Course from 10.30am to 4pm. There will be free on-site parking and admission to the event is £2. The rally is one of the largest in the South of England with well over 100 trade stands covering Amateur Radio and CB radio, computer and electronics, etc. There is also a large Bring & Buy display area. Refreshments and bars at reasonable prices and a picnic area with views over the South Downs makes this a rally not to be missed! Further details on **(01323) 485704**.

July 19: The McMichael Mobile Rally will be held at the Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Doors open at 1000. There will be trade stands, car boot sale, food and licensed facilities. Talk-in on S22. There will be disabled facilities also. **Dave Chislett** on **(01628) 625720** or for information on bookings, ring **0118-972 3504**.

July 26: The Colchester Radio & Computer Rally is to be held at St Helena School, Sheepen Road, Colchester, adjacent to the Colchester bypass, Avenue of Remembrance. Doors open 10am till 4pm. There will be a wide range of radio and computer traders, amateur radio, car boot sale and a Bring & Buy. RSGB Morse Tests on demand - don't forget to bring two passport size photos. Admission is £1.50. There will be ample free parking and disabled parking which is adjacent to the entrance with full access for wheelchair users. **David 2E1FRO** on **(01206) 369226**.

July 26: The Rugby Radio Rally will take place at the BP Truckstop, A5 Watling Street, Nr Rugby. **Arthur M0ASD** on **(01788) 550778** or **(0966) 433497**.

***August 9:** The Flight Refuelling ARS Hamfest 98 will take place at the Flight Refuelling Sports Centre, Merley, Wimborne, Dorset. The event will run from 10am till 5pm and will include the usual mix of traders, a Bring & Buy, craft exhibitors, car boot sale and field events. Overnight camping facilities are available for Saturday 8th. Talk-in will be on S22. **Richard Hogan G4VCQ** on **(01202) 691021**.

August 14: The Cockenzie & Port Seton Amateur Radio Club are holding their 5th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, East Lothian. Open from 1830 to 2130. Bring along your 'junk' and sell it yourself. Tables will be provided on a first come first served basis (no charge for the table). A raffle will be held at approx. 2100. Refreshments will also be available, and there is access for any disabled visitors. Entry fee is £1 for all persons. All money will be donated to the British Heart Foundation. Further details from **Bob Glasgow GM4UYZ @ GB7EDN** or telephone on **(01875) 811723**.

August 16: The 9th Great Eastern Radio & Computer Rally is to be held at Wallington Hall, Nr Kings Lynn. Doors open at 1000 (0945 for disabled visitors). The event will feature Amateur Radio, computer and electronic component exhibitors, a Bring & Buy, and lots more. Food and drink is served all day. Talk-in on S22. There is also ample free parking. For further details or trader information, contact **Ian G0BMS** on **(01553) 765614**.

August 16: The 3rd Cardiff Amateur Radio & Computer Fair will be held at The Star Sports & Recreation Centre, Splott, Cardiff. Doors open 10.30am till 3pm. **Stuart Robinson GW0WMT** on **(01222) 613070**.

August 16: The Stroud Radio Society Rally will be held at Archway School, Stroud, Glos. Doors open 1030 (1000 for disabled visitors). There will be a talk-in on S22 and admission is £1.50. There will also be a Bring & Buy. **Stuart G0GNM** on **(01453) 752411** or **Steve G7EUW** on **(01453) 758032**.

August 23: The Telford Rally will be held this year at the Telford International Centre. There will be major dealers, a flea market, Bring & Buy, all in purpose built exhibition halls with good disabled access and plenty of space to move around. There will be catering, Morse testing and good local attractions including the famous Ironbridge Gorge Museum. **Jim G8UGL** on **(01952) 684173** or **Tony M0AMP** on **(01743) 235619**, E-mail: **zeroamp@hotmail.com**

August 30: The Galashiels and DARS are holding their Open Day and Rally in the Volunteer Hall, St Johns Street, Galashiels, Scottish Borders from 11am to 4pm. There will be traders, refreshments, Bring & Buy, etc. **Jim GM7LUN** on **(01896) 850245** or pkt @ GB7JED.

August 31: The Huntingdonshire Amateur Radio Rally Annual Bank Holiday Monday Rally is to be held at Ernulf Community School, St Neots, Cambridgeshire (near Tesco Superstore on A428). Doors open 1000 to 1400 and admission is £1. There will be hot and cold refreshments available and a hall and car boot sale on hardstanding. Talk-in on S22. **David Leech G7DIU** on **(01480) 431333** (between 0900 and 2100).

September 6: The Bristol Computer & Radio Rally will be held at the Brunel Centre, Temple Meads Station, Bristol. Doors open 10.30am until 4pm (from 10.15am for disabled visitors). Admission is £1, accompanied children under 12 go in for free. There will be a large Bring & Buy, under £30 bring & Buy, refreshments, 150+ tables, table hire at £15 each and parking opposite in the NCP for £1. **Muriel Baker, 62 Court Farm Road, Whitchurch, Bristol BS14 0EG**, or telephone on **(01275) 834282** (24 hour answerphone).

September 6: The Coleraine & District Amateur Radio Society will be holding their annual Radio Rally at the new venue of the Bohill Hotel & Country Club, located a short distance outside Coleraine on the main road to Bushmills and the Giants Causeway. Doors open at 12 noon and admission is £1.50. Further information from **John MI0AAZ** on **(01265) 54930** or by E-mail **john@mi0aaz.force9.co.uk**

September 6: The Annual Wight Wireless & Computer Rally will be held at the National Wireless Museum, Arreton Manor, Newport, Isle of Wight. Admission is free and so is the parking. **Douglas G3KPO** on **(01983) 567665**.

September 6: The Bury Radio Society's 14th Annual Rally will be held at the Castle Armoury (TA Centre), Castle St., Bury. Doors open 10.30am (10am for disabled visitors). Talk-in on S22, Morse tests, Bring & Buy and all the usual traders. Further information and booking forms from **Alan G0RFE** on **(01706) 621263** or via E-mail **g0rfe@zen.co.uk**

September 13: The Milton Keynes & District Amateur Radio Society are holding their Annual Rally and Boot Sale in Bletchley Park. More information from **Dave White G3ZPA** on **(01908) 501390**.

***September 13:** The 13th Lincoln Hamfest will be held on the Lincolnshire Showground. This is on the A15 just five miles North of the City. Talk-in on 70cm. There is extensive parking available on the day and overnight on the 11/12th for caravans and tents. There will be many trade stands, a Bring & Buy, Flea Market and Car Boot Sales. Morse tests will be available by arrangement, there is also catering and a licensed bar. Admission is £2, (free for those 14 and under). **John & Sue** on **(01522) 525760** or John (mobile) on **(0385) 738976**.

**** PRACTICAL WIRELESS & SHORT WAVE MAGAZINE IN ATTENDANCE.***

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

Valve & Vintage

The glowing tuning dials, warm wooden cabinets and the smell of wax polish tells us it's Charles Miller's turn to look after the vintage 'shop' recalling the time wireless went to war accompanied by some often weird and wonderful regulations!

It's good to be 'back in the shop' again so I can share an interesting story with you ! The other week I heard about someone who moved into an old cottage in the North and while renovating it they discovered a Second World War German transmitter-receiver bricked up in a thick wall. Could the equipment have been used by a wartime enemy agent?

My mind then turned to the weird and wonderful legislation passed by various British Governments to prevent spies from using wireless for nefarious purposes. So for a spot of light relief, let's take a look at some of them, starting off in 1914.

Enter DORA

One of the first things the Government did in 1914 was to pass something called the Defence of the Realm Act, known for short as 'DORA'. This strait-laced 'lady' of an act empowered the Government to make things as miserable as possible for the public by stopping them from doing almost anything they liked doing!

DORA's powers included things such as imposing strict closing hours on pubs and banning private ownership of valves. The act was supposed to expire as soon as the war ended **but in fact lingered on into the 1980s**.

Fortunately wireless constructors didn't have to wait quite so long to be able to buy valves, but as late as 1919 the Government of the day continued to ban them from hopeful radio experimenters. This was presumably on the grounds that the country might still be full of enemy spies anxious to intercept vital wireless messages that could influence the course of the First World War which had ended in 1918!

Unfortunately though, no one appears to have told the Government that spies worked under their own 'guidelines'. I say this because all the rules designed to stop them using radio equipment were founded on the premise that spies would 'play the game' and obey the law without question - which they didn't of course!

Working on the well established principle that it's far easier to bully law-abiding citizens than villains, the Government then also made it extremely difficult for ordinary citizens to operate even a humble crystal receiver.

It was normally almost impossible to obtain a formal licence to use a set. But someone **might** be given grudging temporary permission...if they agreed to be submitted to a stiff security check.

British Of Course!

Being 100% British was, of course, a pre-requisite. Our hopeful wireless enthusiast had to produce written evidence of this, supported by the testimonies of two referees. It was also helpful if the latter could supply a birth certificate, but this was not insisted upon provided that the referees could state unequivocally that they were known to be of British birth.

If all the precautions failed to filter out a spy, the applicant was required to sign a declaration that they wouldn't tell anyone about any of the messages they might pick up. (There's nothing like being thorough!).

The intending listener also had to promise not to put up an antenna that was longer than 30 metres or more than the same height above ground, nor to use any valves unless the Postmaster General (PMG) personally gave him permission so to do. The applicant also had to agree to possible searches by the Post Office.

If the procedure left our hopeful undeterred, they had to

In practice the ferocious DORA (the Defence of the Realm Act) seemed to specialise in trying to stop people enjoying anything pleasurable. On the other hand Government legislation seemed to assume that spies would 'play the game' and obey the rule...which they didn't!

send the PMG everything previously mentioned **plus another sheaf of documents** giving a full description of the "wireless apparatus" that was to be used.

If the applicant wanted to buy the apparatus rather than construct it he had to give the name and address of the firm with which he intended to deal. At this stage it probably would have been unwise to answer (let's say) Messrs Telefunken, GMBH of Berlin!

Outwitting Legislation

What the PMG didn't realise (or maybe he did) was that the average British citizen delights in outwitting what they consider to be stupid or unjustifiable legislation. Thus we find in the December, 1919 issue of *Everyday Science* a full description of how to make a valve!

Making your own valve could be done without having to go through all the performance of applying for, and probably being refused, permission to buy one. (Incidentally in the same issue, there's an article entitled *Making Flying Machines,* by a young man called F. J. Camm....before he found his true niche as founding Editor of *Practical Wireless*).

I've already written elsewhere about how *Everyday Science* described the construction of thermionic diodes from automobile head-lamp bulbs with strips of copper fastened around them as an external anode. These were stated as giving excellent results, but just in case of official repercussions the author of the article invited readers to let him know how they got on with their home-made bottles only **after** the regulations had been relaxed.

A year or two later, with the broadcasting boom under way, those anti-listening, anti-valve regulations had to go by the board...but whoever framed them did not give up the fight easily. If they couldn't prevent people from obtaining and using valves they could at least try to stop them from hearing anything that smacked of entertainment.

'They' contrived to get the early experimental broadcasts from the Marconi works at Chelmsford, Essex, banned for the better part of two years from 1920. This was on the excuse that they interfered with vital Royal Navy wireless messages.

When Chelmsford was eventually permitted to resume its odd half hour or so a week of transmissions they had to be interrupted every three minutes in case any other station wished to get a word in edgewise. This ridiculous ruling was relaxed a little when the famous 2LO went on the air; it only had to shut down every seven minutes for three minutes. No other station ever did take advantage of the opportunity to speak and the whole thing soon was quietly dropped. This defeat might have daunted lesser men, but not our local friendly 'ban everything' experts.

Finest Hour

The experts simply bided their time until the opportunity came for their finest hour. This came in the Second World War when the renewed fear of spies and 'fifth columnists' provided the excuse for some regulations so ludicrous as to be almost inspired.

As before, there was a fear that spies might hear highly secret messages on their radio sets. So to prevent this, in July 1940 all aliens were ordered to dispose of their wireless sets, and they weren't given any rebate on any unexpired portions of their licences!

Obviously no gentlemanly spy would be such a cad as to use an unlicensed receiver. But just in case any ill-bred agents were around who resorted to listening out of doors in motor vehicles ...the entire population was banned from using car radio sets.

Just why there was this great phobia about listening in cars is unclear - why on earth was it so different from listening at home? Somebody in high circles must have dreamed up a pretty fantastic justification.

So the Post Master General solemnly announced that "no person shall use or have in his possession or under his control any radio receiving apparatus in any road vehicle". Just in case that wasn't clear enough, the PMG pointed out that for a set to be 'installed' in a motor vehicle did not mean that it had actually to be fixed in position.

No exceptions were to be made. Not even for persons whose job it was to collect and deliver sets between an owner's houses and the radio dealer's workshop.

At this point someone should have tapped the PMG on the shoulder and said that this was patently nonsensical, and what was all the fuss about anyway? Unfortunately no one did and things descended from the comical to the farcical.

Radio dealers were instructed that they must make radio sets unusable before they were carried in delivery vehicles. However, since the usual reason for collecting a set from a customer's house was that it **wasn't** working in the first place - part of the order was superfluous anyway.

As regards returning a repaired set, there wasn't much difficulty about mains sets being used in the vehicle. Unless they were furnished with exceptionally long and flexible mains leads.

But in the case of battery sets dealers were told to remove the batteries and to parcel them up in some stout material. It was also preferably to deliver them in a different vehicle, which must have brought a cynical smile to motorists who were being told that petrol was too precious to be wasted on non-essential journeys.

Rigidly Enforced

In November 1940 the authorities demonstrated that the nonsense about carrying radio sets would rigidly be enforced. It came about when fearless police officers in Norfolk captured a motorist who had wantonly carried in his car a set **in working order**.

When the case came up before magistrates in Norwich the local Superintendent of Police alleged that the motorist had carried his set by hand to the dealer. But had then dared to collect it without first applying to the police for an official permit to carry it in a car.

(Just in case anyone has joined us late....yes, we are talking about Britain and our lovable bobbies, not Nazi Germany and the Gestapo).

Presumably the police were hoping for suitable punishment for this deplorable behaviour **but they didn't get it.** The defendant was fined the minimum amount of half a crown (twelve and a half pence). Reporting this in *Practical Wireless* F. J. Camm did not mince his words. "...the Bench apparently took a dim view of the attitude of the police by imposing such a small fine. They [The police] were evidently anxious to stretch the law in order to make a case. It is monstrous that the time of courts should be wasted in this way".

Officialdom's response was to turn its attention to caravans. If radio sets were carried they could only be used when the caravan was off the road, with no motive power and its wheels removed.

Since few ordinary citizens were caravanning in wartime the hardest hit must have been gypsies. They, after parking up their traditional 'vardo' for the night, obviously dared not listen to the nine o'clock news before tethering their horses a good long way off (minus nosebag of course in leu of removing the distributor rotor arm) to meet the requirement about motive power and summoning a local wheelwright to remove its wheels!

By now the greatest danger to a spy in Britain must have been from injury caused by falling about laughing, but better things were yet to come. A revised ruling stated that the motive power need not be removed for off-road listening, and no mention was made of wheels.

But the rest of the story will have to wait for next time I'm looking after the 'shop' - and it's worth waiting for! So cheerio for now. PW

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!

Trader

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ICOM IC-228H 2m Mobile.....**£185.00**
ICOM IC-W2E HF - 2m Mobile.....**£199.00**
ICOM IC-706 HF 2m Mobile.....**£650.00**
ICOM IC-728 HF Transceiver.....**£629.00**
ICOM M-56 Marine Mobile.....**£225.00**
ICOM R-72 + Options.....**£599.00**
JRC 525 HF Receiver.....**£675.00**
JST 100 Complete Line Up.....**£499.00**
KENWOOD AT-230 ATU.....**£185.00**
KENWOOD AT-250 ATU.....**£225.00**
KENWOOD DFC-230 Frequency Controller..**£65.00**
KENWOOD R-2000 + VHF.....**£399.00**
KENWOOD TH-28 2m Handie **£169.00**
KENWOOD TH-75 2m 70cm Handie ..**£159.00**
KENWOOD TH-215E 2m Mobile.....**£145.00**
KENWOOD TM-201 2m Mobile.....**£189.00**
KENWOOD TM-451E 70cm Mobile **£265.00**
KENWOOD TM-732E 2/70 Mobile **£349.00**
KENWOOD TR-751E 2m All Mode **£425.00**
KENWOOD TS-440s HF Transceiver.....**£525.00**
KENWOOD TS-680s HF+6m.....**£599.00**
KENWOOD TS-850 .....Choice from - **£999.00**
KENWOOD TS-940 HF Transceiver... **£899.00**
LOWE AP 150 Audio Processor **£155.00**
LOWE HF 225 + Extras **£395.00**
MFJ 986 3kW ATU.....**£245.00**
PALSTAR KH-6 + Options **£125.00**
REALISTIC PRO-2042 1000 Channel..**£179.00**
REXON RL-402 70cm Handie.....**£99.00**
ROBERTS RC-828 RX + Cassette.....**£129.00**
SANGEAN ATS-803A Receiver **£85.00**
SENTEC 20m Handie.....**£195.00**
STANDARD C78 70cm Mobile + AMP**£199.00**
STANDARD C500 2m/70cm Handie....**£185.00**
STANDARD C8800 2m Mobile.....**£175.00**
STANDARD C8900 2m Mobile.....**£189.00**
TEN TEC CORSAIR II HF 100W **£450.00**
TOKYO HC-200 ATU **£99.00**
TOKYO HL-1KGX AMP.....**£699.00**
TOKYO HL-130U 70CM AMP **£275.00**
TOKYO HX-640 6m HF Transverter....**£175.00**
TOKYO HX-650 6m HF Transverter....**£199.00**
TRIO TS-830S HF Transceiver **£399.00**
TRIO TS-930S HF Transceiver **£695.00**
YAESU FL-2000B HF Linear **£345.00**
YAESU FRG-9600 Scanning Receiver **£299.00**
YAESU FT-77 FM HF Transceiver + PSU**£399.00**
YAESU FT-107M 100W HF Transceiver**£425.00**
YAESU FT-208 2m Handie + EXTRAS.....**£179.00**
YAESU FT-290 R .....Choice from - **£225.00**
YAESU FT-290 II 2m All Mode.....**£325.00**
YAESU FT-470 2m/70cm Handie + Accs ..**£179.00**
YAESU FT-650 24 - 56MHZ BASE **£599.00**
YAESU FT-707 HF Transceiver + PSU **£425.00**
YAESU FT-726R 2m 70cm HF.....**£799.00**
YAESU FT-757 AT HF Transceiver **£225.00**
YAESU FT-840 + FM HF Transceiver..**£575.00**
YAESU FT-980 HF Transceiver **£699.00**
YAESU FT-1000D HF Transceiver **£1699.00**
YAESU FT-2500M VHF Mobile CTCSS**£249.00**
YAESU FT-3000M VHF Mobile **£225.00**
YAESU FT-5100 2m/70cm Mobile **£329.00**
YAESU FTV-700 2m Transverter.....**£189.00**
YAESU FV-700DM Mem/VFO **£69.00**

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MAKE	MODEL	PRICE
AEA	PIC900 DUAL PORT	£295.00
AEA	DSP 232	£275.00
AEA	PIC 232	£100.00
BNOS	50mhz AMP 100 watts LPM 50/10/100	£120.00
BNOS	144mhz 50 WATT AMP	£75.00
FDK	MULTI 750E MULTI-MODE	£175.00
ICOM	IC 737 HF BUILT IN ATU	£650.00
ICOM	IC R72 0-30 RECEIVER	£400.00
ICOM	IC R7100 25-2000 RECEIVER	£650.00
ICOM	IC 726 HF/6M	£525.00
ICOM	IC 726 HF/6M	£550.00
ICOM	ANTENNA TUNER 160 ATU	£160.00
ICOM	IC 706 MK11	£750.00
ICOM	IC WE31 2/70 HANDIE (NEW)	£225.00
ICOM	SM20 DESK MIC (AS NEW)	£90.00
JRC	JST 135D 150w 0-30 WITH BASE MIC	£650.00
KENWOOD	TS 850 SAT	£900.00
KENWOOD	TS 850	£800.00
KENWOOD	TS 680S 50/HF	£600.00
KENWOOD	TS 790E 2/70	£875.00
KENWOOD	TS 570D	£895.00
KENWOOD	TS 450 SAT	£695.00
KENWOOD	TS 870 SAT DSP	£1400.00
KENWOOD	TS 870 SAT DSP	£1500.00
KENWOOD	TS 830 S	£375.00
KENWOOD	TS950 SD DIGITAL	£1600.00
KENWOOD	TR 751E MULTI-MODE	£350.00
KENWOOD	TR 9130 MULTI-MODE	£250.00
KENWOOD	TM 451E 70 cm NEW	£250.00
KENWOOD	TM 251E 2M	£225.00
KENWOOD	TS 530 SP	£275.00
KENWOOD	TS 50S	£525.00
KENWOOD	PS 50 POWER SUPPLY	£120.00
KENWOOD	TL 922 AMP (LATE MODEL)	£1000.00
KENWOOD	SM 230 SCOPE	£500.00
MANSON	SUPPLY 20-25 amp	£75.00
MFJ	2 OFF 1272 TNC MIC INT SW	£30.00
MFJ	1276 PACKET CONTROLLER	£100.00
MFJ	784 DSP FILTER	£150.00
MICROWAVE MODULES	2M 100 watt AMP	£120.00
MICROWAVE MODULES	2M 50 watt AMP	£75.00
PACCOM	TINY 11 INTERFACE	£100.00
STANDARD	C528 DUAL HANDIE	£150.00
TIMEWAVE	DSP 59+	£150.00
YAESU	FT 990 AC	£1050.00
YAESU	FT 840 FM with cw filter	£525.00
YAESU	FC-10 TUNER 840	£185.00
YAESU	FT 726 2/6/70 SAT	£650.00
YAESU	FT 726 2/6/7	£650.00
YAESU	FT 102	£350.00
YAESU	FT 920 AM/FM (NEW)	£1100.00
YAESU	FT 920 AM/FM	£1050.00
YAESU	FT 736 2/70/6/ with cw Filter keyer	£975.00
YAESU	Ft 8500 2/70	£350.00
YAESU	FC 757 AT	£180.00
YAESU	FRG 7700 with FRT 770 ATU	£225.00
YAESU	FT 270 RH 45w 2M	£150.00
YAESU	FT 23R 2M HANDIE	£100.00
YAESU	MD 1 WITH INSERT	£50.00
YAESU	FL 2100Z WARC	£475.00
YAESU	FP 757A H EAVY DUTY	£100.00
YAESU	FT 50R HANDIE	£210.00

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's Table

YOUR GUIDE TO SECOND-HAND EQUIPMENT

ARC EARLESTOWN 01925 229881

HF TRANSCEIVERS

2 x Yaesu FT-757GXI + boxed	£TEL
Yaesu FT-980	£799
Yaesu FT-101ZD MkIII + FC-902/FCV-901R incl 2m/6m	£799
Yaesu FT-747 + FC-700 boxed	£475
Yaesu FT-102	£375
Yaesu FT-101Z	£299
Yaesu FT-757GX + FC-750SAT	£650
Yaesu FT-767GX + 2m/70cm/speaker	£899
2 x Icom IC-765 VGC	from £1300
Yaesu FC-700 boxed	£99
Kenwood TS-520	£275
Kenwood TS-930 vgc	£750
Yaesu FT-840	£550

MOBILE/BASE VHF/UHF TRANSCEIVERS

Kenwood TS-711E +SP430 boxwd	£TEL
Alinco DR-112 + book/microphone	£115
Navico AMR-1000 2m mobile	£160
Yaesu Ft-480R boxed	£250
Kenwood TS-700S	£450
Icom IC-229 - boxed	£225
Icom IC-290D	£300
Yaesu FT-230	£175
Kenwood TR-751 - boxed	£350
Icom IC-251E	£TEL
Yaesu FT-290RII boxed	£325
Yaesu FL-2025	£99
Icom IC-240 + MB/mic/hand book	£99
Kenwood TR-9130	£275

RECEIVERS/SCANNERS

Yupiteru MVT-9000 - mint condition	£TEL
Yaesu FRG-8800 + FRT-7700	£525
AOR AR-7030 PLUS - vgc	£TEL
Icom IC-R8500 - as new	£TEL
Icom IC-R70	£350
Trident TR-1200 - boxed	£135
Drake R-8E - vgc	£650
Bearcat UBC-860XLT	£TEL
Icom IC-R71E boxed	£599
Regency MX-7000	£TEL
Lowe HF-225	£299
Icom IC-R7100 boxed	£TEL
Icom IC-R100 - mint condition	£275
Yaesu FRG-7700M + ATU	£325
Pocom AFR-2070	£75
2 x Realistic DX-394	from £125
Icom IC-R7000 + book	£TEL

HANDHELDS

Alinco DJ-G5 Dualband Handheld - boxed	£180
Icom IC-4E	£115
Yaesu FT-11R 2m handie	£150
Kenwood TH-27 - boxed	£125
Yaesu VX-1R - complete	£175
Icom IC-T7E - vgc	£175

MISC.

SDU-5000 Spectrum Display Unit - as new	£599
AT-230 - box	£175
MFJ-784 boxed	£175
SP-102 speaker	£50
Datong FL-3	£TEL
Adonis AM-308 Desk Microphone	£25

SHORTWAVE SHOP 01202 490099

HF TRANSCEIVERS

Index QRP PLUS HF 5W CW/SSB All Bands **£350**
Kenwood TS50 & AT50 Mobile HF and ATU **£675**
Trio TS830M HF with Valve PA **£275**
Yaesu FT77 Basic HF with FM Board **£325**

ATUs

Diawa CNA1001 - Auto ATU **£145**
JRC NFG97 Matching ATU **£135**
MFJ-956 SW/MW/LW Receive ATU **£30**
MFJ-941D Compact Manual HF ATU **£65**

VHF/UHF

Icom IC-P4ET 70cms Handheld with AI **£145**
Iret PRC-638 30-80MHz FM 4W 25KHz Spacing **£175**
Kenwood TM751E 2M Multimode Mobile 25W **£395**
Kenwood TH22E - 2M H/Held c/w Keypad **£185**
Kenwood TH22E Basic Spec **£135**
Trio TR9130 2M Mobile Multimode 25W **£295**
Yaesu FT4700RH 2M/70cms 50/40W Mobile **£295**
Yaesu FT480R 2M Multimode Base 10W **£225**
Yaesu FT290RII - 2M M/mode Bracket & Amp **£395**
Yaesu FT290RII - 2M M/mode Mobile **£325**

RECEIVERS

AOR 950 VHF/UHF Mobile Scanner **£135**
Lowe HF125 HF Gen Cov RX Adjustable FIlters **£199**
Lowe HF225 HF Gen Cov RX Adjustable Filters **£325**
Sony 2001D HF/VHF/Air Receiver **£145**
Trio JR500S Ham Band HF Receiver **£85**
Yaesu FRG8800 with VHF **£495**

SCANNERS

Alinco DJ-X1E Compact H/Held Scanner **£135**
JIL SX400 20Ch Base Scanner **£165**
Lowe FS10 10Ch Marine Scanner **£75**
Realistic Pro38 10Ch FM H/Held Scanner **£45**

MISCELLANEOUS

Diamond SX-400 VHF/UHF 200W SWR Meter **£59**
Diawa CN620A 1.8-150MHz 1Kw SWR Meter **£35**
Diawa AF606K Active Audio Filter **£75**
Diawa DK210 Keyer **£85**
Garmin GPS38 8-Track Handheld GPS **£89**
Icom AG-25 2M Masthead Preamp **£89**
Kenwood MC60 Deluxe Base Microphone **£65**
Microset R432-90 - 90W 70cms Amplifier **£349**
Microwave Modules 30W 70cms Amplifier **£95**
Optoelectronics 3300 - Frequency Counter **£95**
Scopex 4S6 6MHz Scope - As New **£65**
SEM QRM Eliminator Filter Unit **£50**
Spectrum TRC6-10 10M->6M Transverter **£155**
Tokyo Hy-Power HX240 - 2M->HF Transverter **£145**
Welz SP400 130-500MHz 150W SWR Meter **£85**
Yaesu FP700 Heavy Duty 20A Matching PSU **£95**
Yaesu G500A Elevation Unit - VGC **£165**

Visit our WEBSITE! http://www.shortwave.co.uk
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HF TRANSCEIVERS

Icom IC-761 100W General Coverage transceiver with built-in auto ATU and PSU.	£999.00
Icom IC-751 HF General coverage Transceiver 100W all mode.	£499.00
Icom IC-756 (SUPERB) 100W HF General coverage + 6M + VDU + DSP All Mode Still has 18 months warranty	£1250.00
Icom IC-720A 100W HF General coverage Transceiver c/w PSU	£399.00
Yaesu FT-757GX HF General coverage transceiver ALL MODE	£459.00
Icom IC-745 100W HF General Coverage transceiver c/w desk mic	£349.00
JRC JST-135 100W HF General Coverage transceiver ALL MODE fitted with BWC (Variable Bandwidth Control) and PSU (MINT)	£899.00

SHORTWAVE & SCANNING RECEIVERS

Icom IC-R7100 Wideband HF/VHF/UHF Receiver ALL MODE (SUPERB)	£629.00
AOR-7030 General Coverage receiver ALL MODE (SUPERB RECEIVER)	£549.00
Icom IC-R7000 Wideband HF/VHF/UHF receiver ALL MODE, built-inPSU	£499.00
Yaesu FRG-100 General coverage receiver (MINT COND) with PSU.	£349.00
Lowe HF-150 General coverage receiver (AS NEW) c/w inteface &software	£299.00
Trio R600 General coverage receiver. (Ideal starter rig)	£199.00
NRD-535 General coverage receiver. (AS NEW). Top of the rangereceiver.	£699.00
Icom IC-R71E General coverage receiver, built-in PSU. (SUPERB UNIT)	£479.00
Kenwood R5000 General coverage receiver fitted with VHF unit (ALL MODE). C/W box & manuals	£649.00
AOR-3000 Wideband receiver, ALL MODE, computer controllable	£429.00
AOR-3000A Wideband receiver, ALL MODE, computer controllable	£529.00
Realistic DX-394 General coverage receiver, ALL MODE.	£99.00
Yaesu FRG-7 General coverage receiver c/w Digital Display.	£99.00
Yupiteru VT-125II Airband handheld receiver. (EXCELLENT RECEIVER)	£109.00
Alinco DJ-X1 Wideband handheld scanning receiver	£139.00
WIN-108 Civil Airband handheld	£89.00
Nevada MS-1000 Wideband receiver AM/FM/WFM (Mobile/Desk)	£179.00
AOR-1500 Wideband handheld receiver (ALL MODE)	£149.00

VHF/UHF TRANSCEIVERS

Yaesu FT-290RII 2M Multimode c/w matching 25W linear, carry case box & manual	£439.00
Yaesu FT-290RII 2M Multimode	£375.00
Yaesu FT-290RI 2M Multimode	£239.00
Yaesu FT-4700 2M/70cms mobile	£279.00
Kenwood TM-431E 70cms mobile	£239.00
Kenwood TM-701E 2M/70cms mobile	£299.00
Kenwood TM-411E 70cms mobile	£189.00
Alinco DJ-580E 2m/70cms handheld, wideband receive	£199.00
Alinco DJ-F1E 2M handheld	£149.00
Alinco DJ-180E 2M handheld (AS NEW)	£139.00
Kenwood TH-215E 2M Handheld c/w speaker mic	£129.00
Kenwood TH-28E 2M handheld c/w speaker mic, case	£129.00
Trio TR-9000 2M Multimode 10W.	£199.00

ACCESSORIES

200W Dummy Load	£49.00
TM-1000 1kW antenna tuner.	£85.00
LAR VHF ATU	£39.00
Datong FL-3 Filter	£95.00
Starmaster Automatic Keyer	£39.00
Daiwa CNW-419 500W ATU with SWR meter	£85.00

MULTICOMM 2000 01480 406770

HF TRANSCEIVERS

Drake TR-7A	+ PSU £575
2 x Icom IC-706 MkI	As new £599
Icom IC0725	As new £479
Icom IC-728	As new + CW filter £599
Icom IC-735	Boxed £499
Icom 756	Ex-demo, new £1299
Kenwood TS-680S	HF + 6mtrs £499
Kenwood TS-180S	Good condition £325
Kenwood TS-450S	Clean condition £649
Kenwood TS-450SAT	Great condition £695
Kenwood TS-570D	+ CW + TXCO, ex-demo £995
Kenwood TS-850SAT	Mint condition £869
Kenwood TS-850SAT	Mint condition £899
Swan line up including 2-Tx/Rx	£375
Yaesu FT-1000D	All options fitted £1649
Yaesu FT-1000MP AC	New on show £1850
Yaesu FT-890	With all options as new £799
Yaesu FT-900	1 week old £659
Yaesu FT-980	HF txvcr. Great condition £599

VHF/UHF TRANSCEIVERS

Alinco DJ-191	2-mtr h/held £110
Alinco DJ-580	New, boxed £175
Icom IC-290E	2m multi-mode 25W £249
Icom IC-290E	2m multi-mode 25W £199
Icom IC-2E	2m h/held £90
Icom IC-2UE	2m h.held £100
Icom ICU-16T	70cm h/held as new £110
Icom ICW-21ET	Dual-band handie £199
Kenpro KT-22	2m h/held £70
Kenwood TH-26	+ accessories dual-band £169
Kenwood TH-28E	2m h/held £89
Kenwood TH-28E	Dual-band £175
Kenwood TH-48E	70cm h/held £140
Kenwood TH-78E	Dual-band + extra battery £179
Kenwood TH-79E	H/held £245
Kenwood TM-201A	30W 2m FM £129
Kenwood TM-2550A	Mobile £175
Kenwood TR-751	2m multimode £325
Kenwood TS-730	VHF/UHF base £399
Standard C-508	Ex-demo £199
Yaesu FT-10R	2m h/held £129
Yaesu FT-211	2m mobile £115
Yaesu FT-230	30W 2m FM £89
Yaesu FT-23R	2m h/held £110
Yaesu FT-290R MkII	+ nicads, boxed, as new £245
Yaesu FT-290R MkI	Multimode £190
Yaesu FT-3000M	three weeks old £335
Yaesu FT-480R	Mint condition £269
Yaesu FT-480R	Boxed £259
Yaesu FT-480R	Mint condition £239
Yaesu FT-690R MkII	Plus linear £350
Yaesu FT-726	2/70/HF £569
Yaesu FT-726	2/70/HF/SAT £550
Yaesu FT-727R	Dual-band + accessories £199
Yaesu FT-736R	6/2/70/23 six months old £1350

ACCESSORIES

BNOS	6m 100W linear £119
Datong D-70	Morse tutor £25
Datong FL-2	Audio filter £39
Dewsbury electronics morse tutor	£15
Icom AT-100 auto	ATU mint £145
Icom HS-51	Headset/mic £29
Icom IC-SP3	Speaker £60
Icom PS-15	20 amp PSU £70
Icom RC-12	Remote £35
Icom RM-3	Remote £49
JPS NTR-1	DSP filter, ex-demo £110
Kenwood AT-250	Auto ATU £185
Kenwood HMC-2	Hands free speaker mic £18
Kenwood PS-31	PSU £109
Kenwood SMC-31	Speaker mic £15
Kenwood SMC-34	Speaker mic £15
Kenwood SP-21	Speaker £45
Kenwood SP-31	Speaker £51
Kenwood TL-922	Linear £999
MFJ-247	HF antenna analyser £95
Microwave Modules	30/3/144 linear £89
Revex WS-70 1.6-1300MHz SWR/PWR meter	£90
Shure 444 mic	As new £55
Tokyo HF linear	Cost £1779 6mths ago £749
Watson dual-band linear	2/70 3W input £95
Watson morse key	Basic £15
Welz SP-122	HF SWR power meter £50
Welz SP-15	SWR PWR + AC38M ATU £55

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PW'S REGULAR REPORT SECTION - FULL OF TIPS, IDEAS AND INFO ON THE VERY LATEST IN THE AMATEUR RADIO SCENE

RadioScene

VHF REPORT

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

**DAVID BUTLER G4ASR,
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PACKET RADIO: @ GB7MAD

UK DX CLUSTER: @ GB7DXC

THIS MONTH DAVID BUTLER G4ASR HAS DETAILS OF THE PHASE-3D SATELLITE AND HOW YOU CAN MAKE A 2.4GHZ DOWN-CONVERTER THAT WILL RECEIVE IT.

The latest news on the much delayed Phase-3D (P3D) satellite is that despite the very good progress made in the most recent integration effort, a definitive launch date remains unsure. According to the Amsat News Service negotiations with the European Space Agency (ESA) for a ride to orbit are continuing in earnest. Everyone at the P3D Integration Laboratory in Orlando, Florida remains optimistic that this advanced amateur satellite will be successfully launched later in the year.

Although P3D will have a 144MHz transponder most of the operating will be on the u.h.f. and microwave bands. To get a better idea of what frequencies are going to be used take a look at the table, **Fig. 1**. This gives details of the uplink (the band you transmit on), downlink (the band you listen on), beacon frequencies and the associated band letter designations.

For example, 1269MHz is 'L' band and 2.4GHz is 'S' band. If you combine the satellite uplink and downlink bands you get an operating mode or configuration for the satellite. In this example it would be mode L/S.

The P3D satellite will also be able to run multiple uplink and downlink pairs at the same time such as UL/VS Many combinations will be possible as any transmitter can be linked to any receiver as long as the two are on different bands.

Don't let the progression towards the microwave bands put you off though. Microwave technology is no longer the exotic realm it used to be!

Much microwave equipment is available 'off the shelf' or in kit form for you to build. (I mentioned in the May issue that the RSGB Microwave Committee organise a series of events at various venues around the country to help microwave builders align and check their equipment). Sometimes items of surplus equipment become available that can be pressed into service on the microwave bands.

At the Microwave Round Table held recently at the Rutherford Appleton Laboratory you could, for example, have picked up (very cheaply) a 4GHz downconverter that can be modified for the 3.4GHz (9cm) band. Recently the **R. L. Drake Company** (yes..the one that made the Drake 2B!) abandoned a product line that was designed for the domestic television market in the USA and the Far East.

As a result of Drake's decision a huge number of microwave downconverters have become available that are exceedingly easy to modify for use as a 2.4GHz (13cm) receiver for satellite usage. They can also be modified for use on the 2.3GHz (terrestrial) amateur band and one enterprising American amateur has even extracted the local oscillator (l.o.)signal and is proposing to use the unit as a basis for a 2.3GHz transverter (transmit/receive converter).

In their unmodified state the unit (measuring approximately 9cm square by 2cm deep) converts the band 2.4-2.7GHz down to 120-420MHz. To alter the unit to convert from the 2.4GHz (amateur satellite band) to the 144MHz band requires simple modifications to the i.f. amplifier, l.o. and d.c. supply. These should take no more than one hour to complete.

The i.f. amplifier modification only involves the removal of two air wound coils and two chip capacitors. This increases the i.f. gain by approximately 15dB at 144MHz. The l.o. frequency is shifted to provide a 2.4GHz/144MHz translation by changing the on-board crystal and adjusting a trimmer.

The d.c. power (between 12-24V at 190mA) is supplied via the coaxial cable downlead, just like the low noise blockconverters (l.n.b.) on your satellite receiver. If this arrangement is inconvenient (which it probably will be) then another simple modification can be made that allows d.c. power to be supplied via a separate lead. The downconverter can then be used at masthead, with a suitable antenna (Yagi or dish), to receive various orbital satellites such as DO-17 (Dove), Oscar 11, Oscar 16 (Pacsat) and P3D when it is launched.

Although these surplus (but brand new) downconverters have already been available for some months the good news is that there should still be time to obtain one. **Peter Day G3PHO** (the Editor of the RSGB *Microwave Newsletter*) has been able to set up a supply chain from Japan for an all inclusive price of £25. However, before sending off your money to G3PHO you **MUST** check with him first as to the availability of the Drake downconverters.

Peter can be contacted via E-mail at **p.day@virgin.net** or via the telephone on **(0114) 2816701.** Modification details are on his website at **http://www.qsl.net/g3pho** and copies are also available via post. Don't delay though as the stock of these surplus units will eventually run out.

Up-to-date information regarding the amateur satellite scene is best obtained from the national organisation **AMSAT-UK**. Details of membership can be obtained from the Hon.Secretary, **Fred Southwell G6ZRU, 40 Downsview, Small Dole, Henfield, West Sussex BN5 9YB. Tel: (01273) 495733**.

MARITIME MOBILE

Now back down to earth (well water actually!) and a report from **Andy Adams GW0KZG/MM** aboard the Royal Research Ship (RRS)*Charles Darwin*. On April 20 he sailed from Southampton to Fairlie on the River Clyde to pick up some scientific equipment (and co-incidentally his 144MHz amplifier which had just been returned from repair).

Leaving Fairlie on April 22 Andy arrived at his first working area (IO37) on April 24, remaining there for nearly 4 days. During this period a total of 18 meteor scatter (m.s.) contacts were completed by GW0KZG/MM with the best DX being DL5MAE at 1900km.

During the afternoon of Sunday April 26 a satellite 'phone call was received from PA3BIY who informed Andy that an aurora was in progress. Fortunately being a weekend there was a large amount of activity on the 144MHz band and between 1521-1753UTC a total of 50 stations in 10 countries were worked.

Andy's best DX in a northerly direction was SM5BSZ and to the south ON5NY (JO00). Furthest west was EI3GE and to the east it was the station of DL0DET (JO52). A total of 25 UK stations were worked. This list includes G0EVT, G0OFE, G3GNR, G3IMV, G3JHM, G3KEQ, G3LTF, G3NVO, G3PJW, G3RHH, G3WZT, G4AEQ, G4DHF, G4FVP, G4HGI, G4LOH, G4RGK, G4SWX, G4KUX, GI3PDN, GM0GMD, GM4CXM, GM4ISM and GM4JJJ. (What! No Class-B operators? Sorry but you really must use c.w. to work the real DX on the v.h.f. bands!)

Andy reports that in his opinion the best conditions were before 1620UTC. No great DX was worked because of the ensuing 'pile-up' and he had to resort to working stations on a country by country basis. On the following day, April 27, the RRS *Charles Darwin* set sail to the next working area in IO27 approximately 550km off the west coast of Scotland. He remained there until April 30, making another 10 contacts via m.s. during the period.

Andy mentions that solar flare activity in the period May 2 to May 4 caused trouble for many stations trying to work him during his evening rest periods. This was because European stations had to beam west towards the setting sun and were receiving large amounts of sun noise. During this period he was active on m.s. from locator square IO43 and managed to complete contacts with the stations of DL8EBW, G4YTL, PA2DWH, PA3BIY, PA3BZL and PA3FOC.

By the time you read this Andy would have sailed through IO12, IO27 and IO37 before returning to Fairlie on May 15. On May 19 he was scheduled to sail to a working area to the west of the Shetlands oil field.

Andy will be out in the Shetlands until returning to Fairlie on June 24. This trip should provide even more DX contacts, as not only will it coincide with three meteor showers but it will also occur during the peak of the summer Sporadic-E (Sp-E) season.

The meteor showers by the way are the Arietids (May 29 to June 19), the Zeta Perseids (May 20 to July 5) and the June Lyrids (June 10-21, which peaks on Monday June 15 around 0400UTC). Andy is using a Trio TR-9130 transceiver, a 3CX800A7 amplifier running 500W output, (the valve is a bit 'tired' so he can't take advantage of his 1kW permit!) and an 11-element F9FT Yagi. To 'top-up' the receive system he uses a Landwehr Electronics low noise mast-head preamplifier.

Listen for Andy during his rest periods which are normally 0300-0600UTC,1100-1200UTC and 1700-2000UTC. Subject to workloads he will also be active on Saturday and Sunday

Uplinks

Band	Digital (MHz)	Analogue (MHz)	Centre (MHz)
HF	N/A	21.210 - 21.250	21.230
V	145.800 - 145.840	145.840 - 145.990	145.915
U	435.300 - 435.550	435.550 - 435.800	435.675
L (1)	1269.000 - 1269.250	1269.250 - 1269.500	1269.375
L (2)	1268.075 - 1268.325	1268.325 - 1268.575	1268.450
S (1)	2400.100 - 2400.350	2400.350 - 2400.600	2400.475
S (2)	2446.200 - 2446.450	2446.450 - 2446.700	2446.575
C	5668.350 - 5668.550	5668.550 - 5668.800	5668.675

WT0940a

Downlinks

Band	Digital (MHz)	Analogue (MHz)	Centre (MHz)
HF	29.330 MHz ±5kHz	(To be used for digitised voice bulletins)	
V	145.955 - 145.990	145.805 - 145.955	145.880
U	435.900 - 436.200	435.475 - 435.725	435.600
S	2400.650 - 2400.950	2400.225 - 2400.475	2400.350
X	10451.450 -10451.750	10451.025 -10451.275	10451.150
K	24048.450 -24048.750	24048.025 -24048.275	24048.150
All downlink pass-bands are inverted from the uplink pass-bands.			

WT0940b

Beacons

Band	Beacon-1	Beacon-2
U	435.450	435.850
S	2400.200	2400.600
X	10451.000	10451.400
K	24048.000	24048.400

WT0940c

Fig. 1: The Phase 3D frequency plan (see text).

afternoons from 1200-1600UTC. His working frequencies are 144.120MHz for c.w. schedules via m.s., 144.125MHz for random m.s. and tropo c.w. work and 144.240MHz for s.s.b. during tropo or Sp-E conditions. Don't forget though that Andy is not on an expedition and that he has a living to make on the ship as an engineer. He does however try to be active as much as possible via tropo, aurora, Sp-E and m.s. propagation.

ON THE AIR

The period from April 26 through to May 5 saw much geomagnetic activity from the sun. There were coronal mass ejections (c.m.e.), X-class flares, proton events and coronal holes giving rise to short wave fade-outs and aurora. As luck would have it I was reviewing the Titan h.f. vertical (see 'Antenna Workshop' this month) when a fade-out occurred which resulted in virtually no ionospheric propagation above 3.5MHz for several days!

As mentioned in the report from GW0KZG/MM there was a good auroral opening on April 26. **Colin Smith GM0CLN** (IO85) reports that he was alerted to this event by his father GM0BWU who first heard signals via auroral backscatter early in the afternoon on the 50MHz band.

Unfortunately Colin was busy at the time and because of local thunderstorms was unable to participate in the opening until it was virtually over. On the 144MHz band he made c.w. contacts with DK1KO (JO53) and G4LOH (IO94) before the event completely faded out. Colin runs an Icom IC-275E, 100W and a 14-element MET Yagi.

A few days later, at 0230UTC on May 4, an extremely strong solar wind shock wave was observed at the SOHO satellite. An observatory in Ottawa, Canada recorded extremely severe storming between 0300-0400UTC with the geomagnetic A-index jumping from 58 units to 148 (severe storm approaching very severe storm).

During the 3-hour interval between 0300-0600UTC several observatories recorded a K index of 9 and the planetary A-index leapt to an amazing 317 units. It should be noted that such values are only recorded during the most powerful disturbances. You have to go back to 1991 and 1992 to find similar values and all the way back to the great storm of March 13-14 1989 for a disturbance that was significantly stronger than this one.

Although the European magnetometers went 'off-scale' in the early morning of May 4 the intensity of the openings was nothing compared to that encountered in North America and Australia. These continents were in a good geo-effective position and bore the brunt of the solar shock wave.

At the station of **VK3OT**, for example, many contacts were made on the 50MHz band with other operators up to 2200km away. Steve reported the aurora as the biggest event since 1989 with all Australian states being heard between 0400-1300UTC.

Television signals from New Zealand were also heard and later in the day the station of ZL2TPY was worked via Auroral-E. In the North American continent many stations reported making contacts on the 50, 144, 220 and 430MHz bands in the period May 3-4.

The station of **WA3WUL** (FM29) running 150W into four 5-element Cushcraft Yagis reported widespread aurora lasting for two days. Bruce made contact with stations located in 20 locator squares on the 50MHz band.

Other propagation modes were also observed in Europe during the month of April. The first real signs of the Summer Sp-E season were noted with openings being recorded on the 50MHz band on April 1, April 9 and on all days between April 18-26. Most if not all of the openings were to the south of the UK with many operators reporting contacts with stations located in CT, I, IT9, S5, YO, YU, 9A and 9H.

Alan Doherty GI0OTC (ex-GI8YDZ) is back on the band after a long absence having moved QTH to locator square IO65. On April 21 he caught his first Sp-E opening of the season working SQ9CXT (JO90). At the same time as some of the Sp-E openings there were link-ups into the southerly trans-equatorial propagation (t.e.p.) zone enabling a few UK stations to work into central and southern Africa.

I've got reports of these Sp-E + t.e.p. events taking place on April 1, 9, 18, 19, 23 and 26 although there may well have been more. The opening on April 1 was quite extensive throughout Europe with stations in DL, EH, F, GJ, HB9, I, ON, SV, S5, YU, 9H (and no doubt more) making contact with TT8JE and 3C5I.

Geoff Brown GJ4ICD (IN89) mentions that he first heard TT8JE on c.w. at 1300UTC and 30 minutes later he changed to s.s.b. when signals were S9+. Geoff said the opening lasted some 90 minutes at his QTH on the island of Jersey. His location situated to the south of the UK is in an ideal spot for these types of openings.

On April 7 at 1818UTC Geoff heard the V51SIX beacon and on the following evening around the same time both the beacon and the station of V51E were heard very strongly. Another good opening on the 50MHz band occurred on April 9 from around 1230UTC. The stations of ZS6AX, ZS6PJS, ZS6WB and ZS6XJ had propagation into much of Europe including G, GJ and PA.

At the QTH of **Ken Osborne G4IGO** (IO80) the 7Q7SIX beacon in Malawi was heard peaking 579 on April 18 between 1638-1703UTC and on the following day TT8JE was heard in the UK, around the same time, as far up as locator IO83. However, he had to wait until April 26 before making his first G contacts. The lucky stations were G3NVO and G3OIL who were worked on c.w. around 1405UTC.

STATION ACTIVITY

Congratulations to **Jim Martin** (previously MM1BGI) who has recently passed the Morse test and now holds the new callsign **MM0BQI**. Jim mentions that it will be hard letting go of the old callsign as he has worked hard to get it known during contests on the 50 and 144MHz bands. Look out for him pounding away on the key in the next aurora!

The so-called **Ugly Expedition Group GS7UEG/P** will be active from the island of Barra (in the Western Isles) between July 5-12. Although they will set up their main station in locator IO66 they also plan to operate portable from locator square IO67 at various times.

The main station will run 100W and a 5-element Yagi on the 50MHz band and 180W into two 13-element Yagis on the 144MHz band. Operators will be G0NES, G4YQW, G7BXA and G7HSP. QSL cards go via their manager G7DKX (QTHR).

Look west if you want to contact **Graham Dawes EI/M0AEP** on the 50MHz band. He will be active from County Kerry (IO41) between July 18-August 1 running 10W into an HB9CV antenna. Graham has received a permit from the Irish authorities allowing him to operate between 50.0 to 50.5MHz with a maximum of 20dBW e.r.p. and horizontal polarisation only.

John Peters PE1OGF has forwarded details of an expedition by the Eindhoven Student Radio Amateur Club (ESRAC) to Liechtenstein this summer between July 1-14. The group consisting of PA3EZL, PA3FXW, PA3GFE, PA3HCW, PE1NVK, PE1OGF, PE1PRG and s.w.l. Diana will be active from a QTH some 2010M a.s.l. They will use the callsign **HB0/PI4TUE** on the 50 and 144MHz bands and will also be QRV on h.f.

On the 50MHz band the ESRAC group expect to run 100W into a 4-element Yagi. The group will really be concentrating on making DX contacts via moonbounce, m.s. and tropo on the 144MHz band. To help in this they will be running 1kW from a GS35B amplifier into four 11-element F9FT Yagis. The group will also operate on the 430MHz and 1.3GHz bands from a QTH in Augstenberg at 2350m a.s.l. especially for television (a.t.v.) contacts.

DEADLINES

That's it again for another month. Good luck in the *PW* 144MHz QRP contest being held on Sunday June 21 between 0900-1600UTC. Please forward any news, views, comments or photographs of your activities to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS (KEEP WRITING) AND GOOD LUCK WITH THE SPORADIC-E DX. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR

LEIGHTON SMART GW0LBI'S POSTBAG SHOWS THAT CONDITIONS APPEAR TO BE ON THE 'UP' AGAIN!

RadioScene

HF FAR & WIDE

REPORTS & INFORMATION (& PHOTOGRAPHS) BY THE 15TH OF EACH MONTH PLEASE.

LEIGHTON SMART GW0LBI,
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TRELEWIS,
MID-GLAMORGAN,
CF46 6DB WALES
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FAX:(01443) 710789 (9AM - 6PM)

LEIGHTON SMART SAYS THAT CONDITIONS REALLY SEEM TO BE ON THE 'UP' NOW!

Amateur radio has taken somewhat of a back seat for me of late due to the emergency hospitalisation of my XYL and the subsequent running of the home, looking after two young sons, washing up, and playing housewife for a month! However, I'm happy to say that all is now well, and Cindy made a full recovery.

Nevertheless, I've been reliably informed by our reporters that radio propagation conditions during the month of April have continued to improve rapidly, thereby allowing h.f. enthusiasts of both the transmitting and receiving kind to hear and work all parts of the world regularly.

Indeed, as the weather has improved and as the light evenings are with us again, the bands are staying 'open' longer and longer. I was hearing north and south America coming through strongly on the 18MHz band last night as late as midnight and beyond, with just a simple dipole antenna.

So, the good news for h.f. operators is that if the trend continues, pretty soon we'll all be working DXCC in a single afternoon with a single watt into a dummy load!

COUNTRY LOCATED

The matter of the location of the unusual 'country' Seborga mystery has been solved. A number of readers wrote to 'fill us in' on Seborga following the request from **Brian Leach G3DXY** in the May issue.

Well Brian, it appears that Seborga is an extremely small self-proclaimed republic (total population 362!) situated in Italy, very close to the French border. It seems that **Seborga is not a recognised DXCC country** despite the inhabitants claiming independence from Italy. But nevertheless operations from there with T0 calls are not necessarily pirates! Confused? (So am I!).

Looks like Seborga one of those anomalies that are thrown up from time to time. Come to think of it, I wouldn't mind declaring Trelewis an independent republic - with just three licensed amateurs here, imagine the pile ups we'd get eh?

Thanks to **Dereck Brown G4XKF, Alan Jubb G3PMR, Don McLean G3NOF** and **Bill Abrahams G0MEU/ON6CGB** for the information on Seborga.

DX NEWS

On to more serious things now, and some DX news and snippets from the pages of the RSGB's *DX Newsheet*.

There's news that Jose FO5QG is still active from French Polynesia, often using s.s.b. on 14120 or 14190 from 0500 with slow English. (QSLs should go to XE1L).

Next comes Jim SV5EFB and George SV5DZG who will be active from Rhodes Island in the Dodecanese group every weekend on 24MHz s.s.b. As it's a narrow band they should be easy to find if conditions allow (QSL via the bureau).

For IOTA fans, there's news that Tony G3LAA will be operating from Goteborg Island from the 27th of July to the 25th of August as G3LAA/MM. (QSL to his home call).

The *DX Newsheet* is a weekly publication for h.f. enthusiasts edited by **Chris Page G4BUE**. Details of subscriptions can be obtained from **RSGB Headquarters Lamda House, Cranbourne Road, Potters Bar, Hertfordshire EN6 3JE, England.**

YOUR REPORTS

On to your reports now. It looks as though our reporters are concentrating on the higher frequency bands mostly and so this month we'll start with 7MHz.

First comes **Carl Mason GW0VSW** of Skewen in West Glamorgan. He's 'all QRP' this month, using an Index Labs QRP Plus rig at 5W output and a half-size G5RV inverted 'V' dipole.

Carl's log shows c.w. contacts with VE3EJ (Canada), 8P9IF (Barbados), ZF1WD (Cayman Islands) and Special Event station ON50RCA celebrating the 50th anniversary of the Union of Belgian Amateurs.

Next up is **Ted Trowell G2HKU** on the Isle of Sheppey in Kent. Ted remarks that there's been an improvement in band conditions lately, but it has coincided with an increase in band noise, making things difficult at times.

Fig. 1: Now here's someone who really does operate from a 'broom cupboard! Gordon Kings G4VFV's truly compact shack - from which he works exclusively on QRP using indoor antennas.

Nevertheless, Ted hooked up with HK7QMF (Colombia) at the unearthly hour of 0300, and K7QQ (USA) at 0500. Later operation during the evening brought in 4S7/DK3DW (Sri Lanka) and VU2TES (India) at around 2000, while 2200UTC saw contacts with TK5XN (Corsica) and 7X2RO (Algeria). All Ted's contacts took place on c.w., and he uses a Ten Tec Omni-V rig at 70W output into a HF6 vertical antenna and a G5RV dipole.

Time it seems, was limited this month for s.w.l. **Derek Blunden BRS-171057** of Swindon in Wiltshire. A wedding and 'A' Level study got in the way of the 'wireless' says Derek! Still, he was able to dig out 4Z1GY (Israel) at 1955, as well as K1PL (USA) and CU3AD (Azores Islands) at around 2230UTC.

A welcome to **Robert Adlington** of Romford in Essex now, who is the proud new owner of the callsign **M0BOB.** Robert has been active on 7MHz quite a bit of late, and has listed s.s.b. contacts with CU2CE (Azores Islands) at 2121, VR6YL (Pitcairn Islands) at 0601, CO6XN (Cuba) at 0538, YV5MJ (Venezuela) at 0535, XE0BD (Mexico) at 0545, and CP6VP (Bolivia) at 0552UTC. Not bad for a morning's work Bob!

PROPAGATION REPORT

Don McLean G3NOF, in Yeovil says in his monthly propagation report that on 14MHz signals have been good on the long path to Australia and New Zealand from 0730 onwards. Don says "There were openings to Asia between 1400 and 1700, while north America came in from 1100 until the band closed, sometimes around midnight. South America was heard from around 2000".

"On 18MHz, the band has been opening around 0730 with the long path to VK/ZL. This changed later to the short path at around 0830. Between 0830 and 1200 the band was open on the short path to Asia, Alaska, and the Pacific islands".

"Up on 21MHz, the short path to the Pacific was sometimes open from 0900 to 1100, with short path to Asia between 1000 and 1500. North America came in usually between 1200 and 2000, while south America was heard up until the band closed, normally

around 2200".

"Some signs of propagation on 28MHz meant that north America came through sometimes during the afternoons, while most signals came from south America and Africa during both morning and afternoons. This band was usually closed by 2100".

THE 14MHZ BAND

The report from Don includes his 14MHz band s.s.b. contacts with amongst others DU1SSR (Philippines) at 1600, KG4WD (Guantanamo Bay, Cuba) at 2200, (QSL via W4WX), and OX3LG (Greenland) at 1938, QSL via OZ2ELA.

Meanwhile, down in Milton Keynes, **Sean Gilbert G4UCJ** is yet again having fun with the low power. Using 5 and 25W output into a half-sized G5RV antenna in the loft, Sean reports c.w. contacts with VK1LF (Australia) at 0800, plus 8P9IF (Barbados), V26XX (Antigua), ZF1WD (Cayman Islands) at around 2000, ZL1AZE (New Zealand) at 0826, BV7WB (Taiwan) at 1720, K6ERT (California) at 2224, CO8ZZ (Cuba) at 2249, with A45XR (Oman) at 2346, and HF0POL (South Shetland Islands) at 2341UTC. **Absolutely stunning results for such a simple set-up eh?**

Editorial comment: *Congratulations Sean - just shows what can be done with a simple set-up!* ***G3XFD.***

Talking of low power, Carl GW0VSW has been busy here too. He lists 5W c.w. contacts with VK1FF (Australia) at 0700, CU2HI (Azores Islands) at 2000, LU9AUY (Argentina), and FY5YE (French Guiana) at around 2200. Also hooked, but this time using QRP s.s.b. were Z38/NN6C (Republic of Macedonia) at 0700, and VY2LI (Alberton, Canada) at 1332UTC.

The log from Ted G2HKU shows that he's been 'bashing the key' and having some success with V26XX (Antigua), 9J2BO (Zambia), 7Z5OO (Saudi Arabia), VR2KF (Hong Kong) and BV7FF (Taiwan) at around 1600UTC.

Meanwhile **Eric Masters G0KRT** in Worcester Park, Surrey, has been using s.s.b. for a change. Eric is normally a c.w. man, but he's got himself a Yaesu FT-7 10W rig, and using it with a modified W3EDP antenna, worked IT9STX (Sicily), and 5B4AGC (Cyprus) at around 2000, while SP7SEW came in at 0800, and EA3AR (Spain) was worked at 2000UTC.

THE 18 & 21MHZ BANDS

The 18Mhz band is where **Charlie Blake M0AIJ** of Milton Keynes has spent some of his radio time this last month. Using a 'nest' of three dipoles for the 21, 18, and 14MHz bands, and using s.s.b. he hooked up with Z38/NO6X (Rep. of Macedonia) at 1233UTC.

However, mobile operating with a whip antenna brought Charlie contacts with 7X2DG (Algeria), CT3/PA3GIO/M on Madeira Island, and ZD7WRG (St. Helena Island) at around 13-1400. On 21MHz, he mentions 5B4AGC (Cyprus) at 1617, KP4/W4OC (Puerto Rico) at 1322, JA3EY (Japan) at 0800, and PT7AZ (Brazil) at 1042UTC.

The 21MHz band has been 'where it's at' for new reporter (and regular *PW* author) **Gordon King G4VFV (see Fig. 1).** Gordon's single - band report shows that he's been busy here, working a maximum of 5W of c.w. into a 'compressed trap dipole' mounted in the loft of his house. (Perhaps you can compare notes with our other 'attic antenna man' Sean G4UCJ, Gordon!).

Gordon's log shows that he's been working consistently across the Atlantic, with WA1FX in Jonesboro giving him a 579 report! Other contacts include K4NK in South Carolina), plus VE2KN and VE3ST (Canada), and a host of European countries on the band. Keep up the good work, Gordon!

THE 28MHZ BAND

Another single - band report now, this time from the pen of **Jon Wheeler G0IUE** in Melksham, Wiltshire, who has been taking advantage of the improving conditions on 28MHz using a simple dipole antenna.

Contacts include HI3/DL1GKG (Dominican Republic), HC4/VE3LAJ (Ecuador), VQ9KK (Chagos Islands), 5Z4RL (Kenya), VK6LG (Australia) and VU2DK (India). Seems like he's had the band all to himself, I reckon!

Seriously though, Jon mentions that Argentina has a low power allocation between 28.900 and 29.100MHz where they can use no more than 25W. This may be a Novice allocation, and Jon reckons they are always pleased to work Europeans there, so put out a call he advises!

SIGNING-OFF

Well that's it for this months folks, time for me to be signing-off! Thanks once more for your support for the column, it's good to read about your daring exploits on h.f. every month as I'm sure that many of our readers are new to h.f. operating, or are interested in getting onto the bands.

YOUR WORDS AND ACHIEVEMENTS ARE CERTAINLY A GREAT INCENTIVE TO THEM I HAVE NO DOUBT, SO KEEP UP THE GOOD WORK, AND GOOD OPERATING!

73, Leighton GW0LBI

PW LISTENING & OPERATING WATCH LIST

All times in UTC

Charlie Blake M0AIJ listens and operates:
0500 - 0700 on 7.061MHz s.s.b. with an NRD-525 receiver & Sloping Wire antenna.

Steve Locke GW0SGL operates: 1100 - 1500 most days around 14.180MHz s.s.b. using a Kenwood TS-940 (beam antenna temporarily out of commission due to damage).

George Woods G3LPT (Suffolk) operates: an open Net on 29.570MHz n.b.f.m. every weekday morning except Monday at 0930.

Don McLean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna.

John Wheeler G0IUE monitors: 28.5MHz s.s.b. every evening between 1700 and 2200 regardless of conditions using an Icom IC-706 and a 2 -element TET triband beam antenna.

Leighton Smart GW0LBI operates: Some weekday evenings at around 2100 - 2330 on 1.949MHz s.s.b. using a Yaesu FT-747 transceiver at 5/30W and a long wire Marconi antenna.

Rob Mannion G3XFD listens and operates: (weekdays & weekends) 1800 - 1830 on 3.7MHz 100W s.s.b., & 3.560 and 7010MHz QRP c.w. (using home-brew 'OXO' VXO 800mW transmitters & Eddystone EA12 receiver) or an Alinco DX-70 transceiver and a Long Wire antenna on QRP or QRO. (All operation dependent on *PW* workload and commitments!).

Sean Gilbert G4UCJ operates: around 0700 to 1100 and 2100 to 0000 seven days a week on 14MHz and 7MHz using an FT-307 and Alinco DX-70 transceivers at 5/25W output and a G5RV dipole antenna in the loft space.

T Ibbitson G0VTI operates : each evening between 1900 - 2000 on or around 7.020MHz c.w., or 14.035MHz c.w. using a Ten Tec Scout at 50W.

SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE OCTOBER COLUMN BY 15TH JULY.

ED TAYLOR N0ED,
PO BOX 261304,
DENVER,
COLORADO 80226, USA

E-MAIL:
N0ED@radiolink.net

EVERYONE KNOWS THAT ELECTRONIC EQUIPMENT COSTS LESS IN THE USA ... OR DOES IT? ED TAKES A LOOK AT THE REALITIES, THEN INVESTIGATES THE PRACTICALITY OF PRIVATELY IMPORTING RADIO GEAR FROM AMERICA. HE ALSO VISITS A 'HAM' RADIO SHOP TO FIND OUT HOW BUSINESS IS GOING ACROSS THE 'POND'.

In researching 'Scene USA' this time, I talked to amateurs about equipment prices in Britain and America. I expected disparate opinions, and got them, in some cases, expressed with vehemence. Do rigs cost less in the USA and can they be easily imported into the UK or are there good reasons to go to a UK dealer, even if prices are a little higher?

Let me begin by quoting **Dave Wilson AA0RS**, a Brit who has been on both sides of the counter and on both sides of the Atlantic.

Dave says: "A lot of people forget the following things:

* The market in the US is perhaps 250 000 English-speaking amateurs, so a single-page radio magazine advertisement reaches a lot of people. In Europe you have to advertise in many magazines to get that kind of coverage and to be effective, translation is needed.

* Regulatory differences mean non-standard products for different countries. In Europe, the voltages vary, there can be language problems, and tests have to be done to meet differing standards.

RadioScene

ED TAYLOR NOED LOOKS AT THE ADVANTAGES AND DISADVANTAGES OF BUYING EQUIPMENT ABROAD

The Ham Radio Outlet, Denver. Joe KD0KGA, John N5EHP and Roger K0YY get ready to open the store.

* Component sizes vary, some are metric and some conform to American standards.

* Spare parts and service are a major investment. If you only sell 20 units in a country, these costs are included in the basic price of each unit sold.

* Add customs duties and shipping costs you can see it all mounting up. Of course, the local country dealer wants his mark up as well".

I would add that to get a fair comparison, be aware that prices in the **US radio press do not include tax (up to 10% depending on state)**. Additionally, many basic services are less expensive in the USA, leading to reduced costs of doing business, and lower prices. This results from a number of factors, including the low cost of land (there's plenty of it) and generally lower taxation.

Needless to say, other views do exist! **Chris G3VBL**, told me "Importing gear to avoid the high prices in this country is a subject dear to my heart. I have hand-carried stuff and had items shipped to me.

It's true that US prices do not include tax, but if you buy out of state you don't have to pay. Electronic goods, in general, are overpriced in most of Europe, it's the same with cars".

I also found the following comment in *Radio Communication*, March 1998: from **Nick G8NAV** who made the following comment: "My experience is that equipment can be imported from the USA at a significant saving in cost, compared with the same equipment on sale in the UK. However, the weight can have a bearing for example anything much above 120lbs and the total costs can be more than the UK price. Exchange rate fluctuations can be good or bad."

Don G3OZF, also had an interesting story for me. Don says: "In 1992 I bought two FT-890s (for me and a fellow amateur) from San Diego. I paid VAT and duty on arrival at Heathrow (£300) on a bill of $2548. The dollar was then about two to the pound.

"The total cost was therefore about £787 each, when they sold here for about £1150. Seemed a good deal to me, and it's hard to explain the difference resulted from a bigger market. (The margins on most equipment from big manufacturers are enormous.) However, I chose a good time, just after the dollar had dropped like a stone against the pound". Don G3OZF's experience was clearly a case of taking advantage of the situation.

Equipment prices in the UK and USA could be getting closer. This Icom IC-746 h.f./v.h.f. transceiver is available for £1187 plus VAT, not much different from the $1830 charged in the USA.

Don G3XTT, has also done well, but adds a note of caution: "I needed to buy a Cushcraft beam for the new h.f. (WARC) bands a few years back and I ordered by 'phone from the USA, using a credit card.

"The service was great, and the price (even with import duty and delivery) was less than from the UK dealer who used to sell them. However, within a few months, there was a new UK supplier, with prices **lower** than the cost the way I did it. So, it was handy while there was no UK source but, in retrospect, not a money saver".

I know of people who have brought rigs from the USA. A friend bought his FT-1000D there before they became commonly available in the UK and got a great deal, even after paying duty. Of course, he carried it in his baggage, so didn't have to pay carriage".

BUYING SNAGS

So, are there snags with buying equipment in the USA and then carrying it back to the UK yourself? Chris G3VBL says: "Be prepared for problems when you get the radios! A TS-830 I imported a while back had two faults, an incorrectly set capacitive divider and a dry joint in the microprocessor.

"I have also had a problem with a TS-850 I imported. Modern rigs are more difficult to deal with and I find I am getting to my limit in servicing these radios"!

Don G3OZF also had this comment to offer: "There is now a big problem in importing from the US. Much equipment is **not** 'CE' marked. If you declare it, there is a good chance that the customs will 'kick up' a fuss.

"I think this could be a technique which manufacturers will use to prevent buyers operating trans-nationally. Oddly enough, I have found equipment from the Far East is more likely to be CE marked. And given the current currency roller-coaster in Singapore, Malaysia and Thailand there must be bargains to be had".

By the way the CE regulations came into effect in 1996 and relate to electromagnetic compatibility. It's illegal to import any equipment which is not properly certified. Passive components (antennas and tuners, for example) are exempt. Good luck in explaining all that to the customs officials!

RATES & DUTY

It seems that the rates of duty charged are not always consistent. Don G3OZF has this interesting comment: "Take care over describing the equipment. Airport customs are not always smart at selecting the right import duty tax. It helps if you know the answer beforehand.

"I think it is around 4% for mobile transmitting equipment and the easy way is to look over the shoulder of the officer checking rates. **You**, however, look down the percentage line and when you find a description roughly resembling your equipment, say that is what it is! It's worked for me, otherwise the rate might be 10% or more. Don't forget to add VAT too".

Let's try to summarise the various facets of this question. Generally speaking, you might save some money by importing from the USA, either by having equipment shipped, or by bringing it in yourself.

But be careful of exchange rates, size and weight, and customs charges. The major disadvantage, even if you have time to deal with the people and paperwork, is that you lose the benefit of using a UK dealer.

You have to know in advance what to buy and you cannot 'test drive' beforehand. A problem occuring on an imported item may be hard to repair. But equipment bought in the UK that fails can normally be exchanged at the dealer you bought it from.

Saving money isn't everything, and the differences in price appear to be reducing. I would suggest caution, weighing-up the likely benefits against the possibility of something going wrong, or of not being able to import equipment legally.

LARGER RETAILERS

If you are planning to bring in equipment from abroad, you may want to seek out a retailer in one of the larger US towns. So, I thought it would be interesting to visit an American radio store and check the 'ins and outs' of selling to Amateurs and to try and answer the following questions: How is business and what do they think of the market? What are some of their best-selling items?

There are often complaints to be heard about how badly things are going for Amateur radio shops in the UK. Perhaps this is part of the British character, after all, it wouldn't be right to admit that business is booming!

I get the impression that a downturn in sales is slowly being reversed and that a shakeout of retailers has led to greater strength for the survivors. So, I wondered if this was also true in the USA?

My local store and now the only one in Denver specialising in selling to Radio Amateurs, is **Ham Radio Outlet** (HRO), part of an operation which has twelve stores in the USA. I visited them just before they opened one morning. The manager is **Joe KD0GA**, assisted by **John N5EHP** and **Roger K0YY**.

I asked Joe if sales were going well in the USA and this was his reply: "Yes, business has been good this year. I think this applies to the whole industry. Although the price of equipment is coming down gradually, we are selling a greater volume. And the features available on new radios are increasing all the time. Some hams just have to have the latest gear"!

Joe continued: "The facilities on new rigs are just fantastic!" Of

course, he was perhaps a bit biased, but I could understand his point.

He then showed me a whole case full of different hand-held v.h.f. and u.h.f. transceivers and offered the following comments: "There are now two and three-band radios doing things you wouldn't have thought possible a decade ago. The prices are lower than similar rigs with fewer features from two years back. Since these radios are now the usual entry-level purchase for a newly-licensed amateur, the cost of getting on the air has really dropped".

I then asked Joe about the entry of new members into amateur radio and how did he view the changes taking place in our hobby? Joe replied:"They are going to continue and I'm very positive. Locally, we have initiatives to bring in younger people, showing them the many enjoyable aspects of radio.

"My personal favourite activity is working on the h.f. bands, but there is an inherent attraction to v.h.f. and u.h.f. You can always get on the air, using repeaters and inexpensive equipment. Apart from that, there are technical activities which some amateurs will take up and of course there are social benefits".

ENTHUSIASTIC JOE

If I had thought that Joe was enthusiastic about hand-helds, it was nothing compared to his excitement for h.f. rigs. Joe continued by saying "Actually, it's no longer true to say they only cover h.f. The latest radios cover 6m, 2m and sometimes, 70cms as well.

The number of 'bells and whistles' is amazing. Naturally, not everyone will use everything, but you can choose which features you want. The value for money is incredible, especially when you compare prices with 20 or 30 years ago."

I had to agree with Joe's comments. Much as I liked the all-valve s.s.b. transceivers of the late 1960s and the 1970s transistor equipment, they were expensive (allowing for inflation). And I couldn't imagine how we were satisfied with all that tuning-up, the lack of memories (or even a second v.f.o.!), and all the facilities we take for granted now.

Joe continued by saying that "Even bottom-of-the-line h.f. radios are remarkable. For example, you get an exact frequency read-out and rock-solid v.f.o. stability without any warm up".

Next Joe showed me the h.f. rig demonstration area of the HRO where customers can run five radios at a time. He explained that "A recent trend is the transceiver consisting of a board in a computer with a remote unit, everything being controlled by software. Kachina have brought out an interesting model and we expect to see more soon".

I had often wondered if they ever saw any Brits in the shop and the answer was a postitive "Yes, particularly in winter, in fact, we actually see amateurs from all over Europe. After a skiing vacation, amateurs will drop in on their way to the airport, to see what we've got. A lot of our sales are made by 'phone, sometimes from people who have visited a year or two before".

DEALER ADVANTAGE

What, I asked in closing, did Joe consider the advantages of using a dealer? Joe replied"Even though we **do** make a lot of sales by mail-order, I would recommend going to a dealer as the best way for Amateurs to buy.

"The amateur population is segmented, there are so many activities nowadays for a radio amateur. This has resulted in so much equipment being available that it's hard to know about everything on sale. A good dealer will be able to recommend a rig to fit in with your interests".

So, how should a prospective purchaser use such a dealer? Joe's advice follows:

"Do some research, and decide what you want to spend. The more you pay, the more features you will get. But different equipment from different manufacturers will have different facilities, even though prices may be similar.

"The guys in the store should be able to advise which fits in better with your requirements. Use the knowledge of the dealer to make the right choice. I believe this is the main reason why our store is in business, when others have folded".

MANY THANKS

My thanks go to AA0RS, G3VBL, G3OZF, G3XTT, KD0GA, N5EHP and K0YY. I hope their views have enlightened and stimulated your thoughts. Let me know what you think.

THANK YOU FOR ALL YOUR CORRESPONDENCE ABOUT THE LAST 'SCENE USA', THE HISTORY OF RADIO FROM THE US PERSPECTIVE IN THE LAST CENTURY. I WILL CONTINUE THAT THEME IN OCTOBER, AND TALK ABOUT DEVELOPMENTS FROM 1900 ONWARDS.

73 Ed NoED

Joe is ready to demonstrate any radio at one of the HRO's operating positions.

RADIO 'SCAPE

REPORTS & INFORMATION TO ME PLEASE.
MIKE RICHARDS G4WNC,
PO BOX 1863,
RINGWOOD,
HANTS,
BH24 2ZD

E-MAIL: mike.elaine@btinternet.com

WEB SITE : http://www.btinternet.com/~mikespage

MIKE G4WNC BRINGS YOU AN UPDATE ON HIS WEB SITE, OFFERS SOME TIPS ON FINDING THE BEST DX AND SHARES HIS THOUGHTS ON INTERNET SURFING SPEEDS.

I've finally sorted out the passwords for my Web site and brought it bang up-to-date. However, I do owe an apology to a few readers.

The version of *GWinProp* that I uploaded was an update rather than a full version. As a result it wouldn't run properly and I know some of you were disappointed. The full version is now on the site and has been for some time now - sorry about that.

The author of GWinProp, **Gordon West**, has recently supplied a DOS version of the program which I'm sure will prove popular. The great advantage of the DOS version is that it will run happily on many of the cheaper surplus PCs that are used by so many people - well done Gordon!

STEERABLE ANTENNA

Anyone with a steerable antenna really ought to have some form of map program to help: a) point the antenna in the right direction and: b) work out the best place to look for that 'hot' DX. So, I've been taking a look around to see what's available and have noted a couple of new programs on the scene that you might like to take a look at.

The first mapping program I've come across is called rather obscurely *QRBQTE!* When you think about it I suppose it's not odd really as the name is actually two 'Q' codes bolted together. The translation being: QRB: 'The approximate distance between our stations is.....' and QTE: 'Your true bearing from me is .....' So perhaps the name is really quite ingenious.

Anyway let's get down to business. Regardless of the name, the *QRBQTE* program was written by **Anders Kvalvaag LC3HAT** and the review version 2.02e is the latest and is available in English, whereas those prior to version 2.0 were only available in Norwegian. The program is very compact and requires *Windows 3.1* or later to run.

Installation of *QRBQTE* is very easy thanks to the provision of the standard Windows SETUP program to unpack the files and put them in the appropriate places. I've included a screenshot of the main display in **Fig. 1** so you can see what it look like. It's really an automatic route distance and bearing calculator.

In addition *QRBQTE* it will also calculate Maidenhead locators from Lat/Lon and vice versa which is quite handy. If you don't want to get into to all this you can just choose the two station locations from the built-in city or callsign database. You can also get it to produce a print-out showing the bearing to all the locations in the database from your home location.

So, as you can see*QRBQTE* is really very versatile and well worth a look, especially as its available as shareware and the author is only asking US$7 for registration. The best place to find the program is at the **ftp.funet.fi** archive where it can be found in the **/pub/ham/hf-work** directory with the file name **qrbqte2.zip**.

The second mapping program I've found is *AZMAP* written by **Paul Burton AA6Z**. This is rather more resource hungry than QRBQTE and requires *Windows '95* and all that goes with that, i.e. at least a top-end 486 processor with a good stack of memory.

The extra resource is justified with a very neat graphical display that shows a full projection of the Earth's surface. By the side of the display is the main information panel where you can change and update a wide range of parameters. The distance can be displayed in miles/km or even nautical miles. You can also centre the map on any location you like - so you can really get the world to revolve around you!

If you use the information panel to enter a distant station, the path can be displayed on the map

MIKE RICHARDS G4WNC HELPS YOU FIND THOSE RADIO RELATED INTERNET SITES

RadioScene

whilst the panel will report the bearing from your location. One of the really great extras in this program is the daylight tracking option.

With the daylight tracking option enabled the main display is supplemented with a Sun icon showing the position of the Sun. However, the really interesting bit is the inclusion of grey-line shading. This comprises, literally a grey-line, that spans the globe. If you're a serious Dxer you will find that operating along the grey-line will generally provide enhanced transmission and let you get to places you didn't think you could reach.

If you want to get your hands on a copy of *AZMAP* you could try **ftp.funet.fi/.pub/ham/misc/azmap.zip** If you know of any other interesting mapping programs please drop me an E-mail.

ACCESS SPEEDS

I think the quest for ever greater access speeds in the Internet is going to be with us for a long time to come. It seems that as soon as someone comes-up with a faster modem or connection system, some other bright company develops a software package or web format that requires an even greater flow of data.

I currently use a Motorola ModemSurfer 56k for my access and manage to achieve a reliable 42k when connecting the British Telecom (BT) Internet service. But even with this fast rate I seem to spend a lot of time waiting rather than surfing.

One of the ways to help with the speed problem is to use a direct digital connection to get to your Internet Service Provider and forget about all those fancy modems. So how can you do this?

The standard way is to use an ISDN2 telephone line. The ISDN bit stands for Integrated Services Digital Network and the 2 simply means that you get two channels. So, lets just look at that a little bit closer.

You're all probably aware that BT has just about finished modernising its switched network and that most customers have their calls connected by digital exchanges. At the heart of these digital exchanges is the use of standard digital building blocks and the lowest level of these is the 64kb/s block. This 64kb/s block represents the bandwidth required for a single speech telephone signal.

The figure of 64kbs comes about as follows. The part of the exchange that converts the speech into a digital signal does so by measuring the voltage on the line 8000 times every second - yes really!

The resultant string of voltage measurements are converted into digital numbers with just 8 bits. To send this information to another exchange the systems has to be able to send an 8 bit number 8000 times every second. Some simple multiplication shows that this would mean sending the information at the magic 64000 bits every second or 64kbs (8bits x 8000 times per second).

All this means that, at least in theory, your 'phone line is capable of handling data at 64kbs. What is required, however, is some clever electronics to extend the 64kbs data slot in the exchange down to your PC.

The electronics that extends the 64kbs data slot to your PC comes as part of the ISDN2 product - in fact the system is twice as smart, as it actually delivers two 64kbs slots over the one line! Not only is this very much faster that your modem, but it can handle 2 x 64kbs with no errors.

The system is therefore very much better than the 56k modem that struggles to make 42kbs and even then suffers local errors. The telecom operators are very keen to push ISDN2 so keep your eyes open for some interesting deals over the coming months.

Let's just hope that the Internet Service Providers get ahead of the game and start rapidly upgrading their backbone links so we can all make best use of these fast access systems when they arrive!

Fig. 2: AZMAP main screen display.

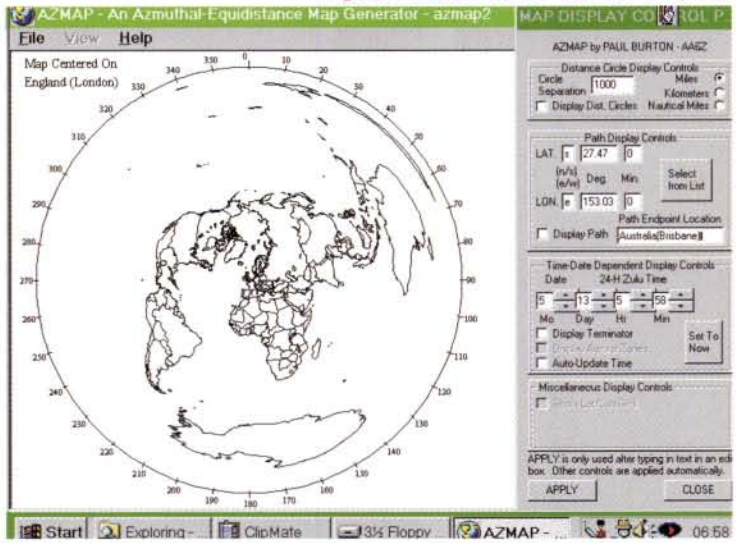
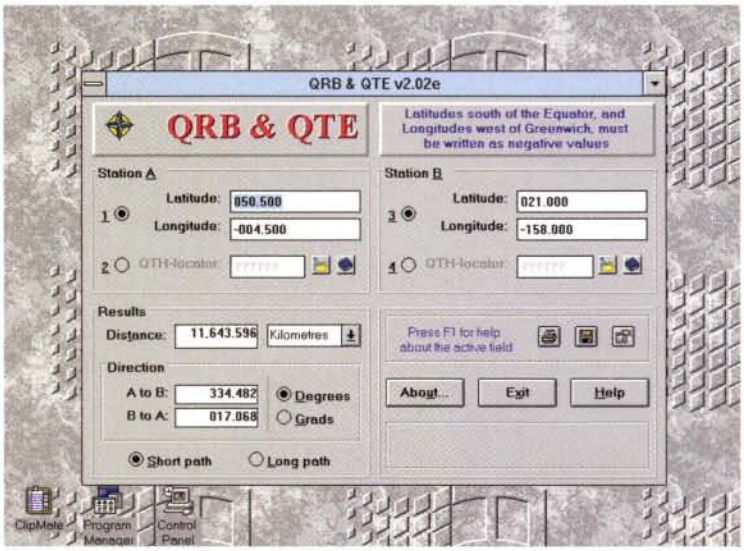


Fig. 1: Calculation screen of QRBQTE.



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: IBM PC Software (1.44Mb disks): **Disk A** - JVFAX 7.1, HAMCOMM 3.1 and WXFAX 3.2; **Disk B** - DSP Starter plus Texas device selection software; **Disk C** - NuMorse 1.3; **Disk D** - UltraPak 4.0 and **Disk E** - Mscan 1.3 and 2.0.

THAT'S ALL I'VE GOT TIME FOR THIS MONTH SO UNTIL NEXT TIME 'HAPPY COMPUTING'. PLEASE KEEP SENDING YOUR LETTERS AND IDEAS TO ME, (ADDRESS AT THE TOP OF THE COLUMN).

73 Mike G4WNC

BROADCAST

REPORTS & INFORMATION TO ME PLEASE.

PETER SHORE, C/O PW EDITORIAL OFFICES, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

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THIS MONTH PETER SHORE HAS NEWS OF A NEW PROGRAMME FROM VOA AS WELL AS LOTS OF FREQUENCY INFORMATION FOR YOU TO READ UP ON.

A revolutionary new approach to English-language programming on the **Voice of America** was announced on 28th April. **Evelyn Lieberman**, the Director of the

Washington-based broadcaster, said that from midnight UTC on 28th May, VoA would begin *News Now*, a 24 hour-a-day all-news service. *News Now* is to be transmitted on short wave and satellite world-wide, replacing the current output.

The new arrangement means that almost all the feature programmes would disappear, and that Voice of America becomes an all-news competitor to **BBC World Service** which has about 60% of its output devoted to news and current affairs. *News Now* reflects US-style radio, and the schedule allows more flexibility for rebroadcasters - local a.m. and f.m. stations - to join and leave VoA easily.

There was an immediate reaction from the principal union representing broadcasters at the Voice, which said that there was insufficient time for negotiations between the announcement and planned implementation date. And as this edition of *PW* goes to press, there is no confirmation as to whether the *News Now* service will begin as scheduled.

The format of *News Now* reflects public radio output in the USA, with a one minute programme preview immediately after the time signal at the top and bottom of the hour, followed by a five minute news bulletin. The exact schedule is:

Monday to Friday - even UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News in Depth
:45	Science/ Medicine/ Environment
:49	Business and Economic News
:53	Music Feature
:58	Station Break

Monday to Friday - odd UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News
:36	Dateline
:45	Science/ Medicine/ Environment
:49	Business and Economic News
:53	Women's Business Minute
:54	Feature
:58	Station Break

Saturday - even UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News
:36	Press Conference USA
:58	Station Break

Saturday - odd UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News
:36	Communications World
:45	Science/ Medicine/ Environment
:49	Business News
:53	Feature
:58	Station Break

Sunday - even UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News
:36	Encounter
:45	Science/ Medicine/ Environment
:49	Business News
:53	Feature
:58	Station Break

Sunday - odd UTC hours

:00	Preview
:01	World News
:06	World News in Depth
:10	Regional News
:14	US News
:18	Sports
:22	US Feature
:28	Station break
:30	Preview
:31	World News
:36	Issues in the News
:58	Station Break

A separate 24 hour-a-day music service, including news and short features, will be available globally via satellite to rebroadcasters as an alternative to the all-news format service.

This comprehensive shake-up at the Voice of America comes three years after the idea was first put to VoA management, and is also similar to an idea which BBC World Service was about to implement two years ago. The delay in implementation at VoA results from the change in senior management which occurred last year when Evelyn Lieberman succeeded **Geoff Cowan** as Director. Lieberman's background as a senior member of President Clinton's White House staff has probably also influenced the decision.

Listen out for the new VoA *News Now* service, and let me have your comments on whether the change is good, bad or indifferent.

ASTOUNDING NEWS

More astounding news emerged at the end of April when the Manx government announced that it had gained a long wave frequency assignment. The frequency 279kHz has been allocated, and a company led by former pirate operator **Paul Rusling**, called the **Isle of Man International Broadcasting Company**, has confirmed that it has applied to operate the station which will beam music programmes to the UK, much like Atlantic 252 from the Republic of Ireland.

However, before the station can be constructed, the Isle of Man's parliament, the Tynwald, will have to debate the matter and local residents won over, as huge antennas are needed for high power long wave transmitters (the masts for Atlantic 252 are over 300m high. Rusling claims to be well on the way to securing a funding package worth around 10 million to get the 500kW station on the air.

FREQUENCY INFORMATION

Some detailed frequency information now to help you tune around the bands, including the English-language service of **Vatican Radio** which carried news and comment of the murder of the Pope's chief bodyguard in early May: 0500-0520 on 4.005, 5.88, 7.25MHz plus 527 and 1530kHz medium wave; 0600-0610 on 4.005, 5.88, 7.25, 9.645, 11.74, 15.595MHz plus 527 and 1530kHz m.w. (weekdays only and combined with Italian and French); 1000-1010 on 5.88, 9.645, 11.74, 15.595, 21.85MHz (weekdays only and combined with Italian and French); 1600-1630 on 4.005, 5.88, 7.25, 9.645, 11.81MHz and 1950-2010 on 4.005, 5.88, 7.25, 9.645MHz. You can also hear Vatican Radio on the Internet at: **www.wrn.org/vatican-radio/audio.html**

Voice of Russia has English to Europe: 1700-1800 on 9.765, 9.775, 11.655, 12.07MHz; 1800-1900 on 7.29, 9.765, 9.775, 9.82, 11.655, 11.675, 12.07MHz and 1494kHz medium wave; 1900-2000 on 7.29, 9.45, 9.765, 9.775, 9.82, 11.655, 11.675, 12.07MHz and 1494kHz medium wave and 2000-2100 on 9.71, 9.765, 9.775, 9.82, 11.675, 11.93, 12.07, 15.485MHz plus 1323 and 1494kHz medium wave. Internet audio for Voice of Russia is at: **www.wrn.org/stations/vor.html**

Radio Vlaanderen Internationaal in Brussels broadcasts in English: 0730-0800 on 7.29 and 9.94MHz; 1030-1100 on 9.925 and 15.595MHz; 1230-1300 on 15.545MHz; 1630-1700 on 5.91 and 7.29MHz and 1730-1800 on 11.81 and 17.655MHz. For Internet listening, check out **www.rvi.be**

There is a rumour that the French-speaking broadcaster in Belgium, **RTBF**, is investigating a return to international broadcasting via short wave and satellite. As the story develops, you'll find the details here first so make sure you get *PW* each and every month!

CURRENT SCHEDULE

Finally, here's the current schedule for **Radio New Zealand International** which operates a single 100kW transmitter to reach the South Pacific but is often heard here in Europe.

Monday-Friday
1650 onwards on 6.145MHz
Sunday-Friday
1850 onwards on 9.875MHz
Saturday
1855 onwards on 9.875MHz
Sunday-Thursday
1950 onwards on 11.735MHz
Friday-Saturday
1958 onwards on 11.735MHz
Sunday-Thursday
2050 onwards on 17.675MHz

Friday-Saturday
2105 onwards on 17.675MHz
Daily
0459 onwards on 11.69MHz
Monday-Friday
0715 onwards on 6.10MHz
Saturday-Sunday
0758 onwards on 6.10MHz
Close down
1206 daily

WITH THAT, I'LL WISH YOU THE VERY BEST OF LISTENING UNTIL WE MEET AGAIN IN THE NEXT EDITION OF *PRACTICAL WIRELESS*.

Good Listening, Peter

SEND YOUR ADVERT TO PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

FREE ADVERTS

Now's your chance to send in a photograph of your equipment (a good idea if it's really unusual) to accompany your advert. Please note that **all photos** will ony be **published at our discretion** and are **non-returnable.**

When sending in your advert, please write **clearly** in **BLOCK CAPITALS** up to a maximum of 30 words, plus state your contact details. Please use the order form provided.

Bargain Basement

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 responsibiltiy of the buyer to ascertain the suitability of goods offered for purchase.

For Sale

Altron 40ft tower, new, electric winch, cage + 2 Aluminium 20ft poles, all mint, unused, £450, no offers. Tel: (01689) 845050.

Ando spectrum analyser AC8211 with type AC8281 display unit, 0.1-1700MHz, resolution 0.2-200MHz/DIV, excellent condition, complete with comprehensive manual, £750. Mike, Cirencester (01285) 860668.

AOR 2002 base scanner, up to 1300MHz, as new, £190. FT-707 mobile bracket, £12. Yaesu power lead 707/757, etc., £10. Microset RU20 u.h.f. amplifier with Gasfet pre-amp, unused, £55. Cushcraft R7000, £235. Tel: Norfolk (01953) 884305.

AOR AR8000, less than a year old, hardly used, boxed, power supply, 500kHz to 1900MHz, no gaps, all modes (a.m., f.m., w.f.m., u.s.b., l.s.b., c.w.), 1000 memory channels, full manuals, £275. John, evenings after 8pm. Tel: Essex (01708) 445961.

AR8000, six months old, all accessories, £225. Vega Selina 5 x s.w. plus l.w., m.w. and f.m., £25. Koyo multiband radio, l.w., m.w., s.w., v.h.f., airband, p.s.b., mains/battery, £30. Tel: Tyneside 0191-258 0522 evenings.

BBC C computer with 80/40 disk drive ATL ROM expansion board, 12 ROMS, books, literature and service manual, £35, colour monitor for BBC, £30. Tel: Bristol 0117-985 6253.

Boxed, unused valves, mostly wartime WWII, lots of 12V, 25V, 35V, 50V octals, few 6V types, s.a.e. for list please. Viceroy MkIII power pack, offers. Datong Morse tutor, £25. WWII American valve tester, shabby metal case and book of valve types, 100% inside, offers. G3HWD on (01841) 532723.

CobWebb h.f. antenna 20ft mast, all brackets, £90. Arthur G0EOM on 0161-494 7447.

Codar CR70A receiver in v.g.c., £55. Also small collection of transistor sets, *Radio Radio* book 1997, £12. Please 'phone for more info., three Denco coils with original catalogue, £10. Tel: (01450) 379217.

Copies of: *Radio & Electronics Conductor* (1976-81), *Radio & Electronics World* (1982-85), *Practical Wireless* (Jan 1964-December 1977), *Wireless World* (Dec 75), offers. Tel: (01453) 833985.

Eddystone 898 dial with home-brew 16 valve amateur band receiver attached, (mid 1960s) for spares or repair, offers. Tony, Worcester. Tel: (01905) 641759.

FLI Datong filter, excellent for s.s.b., etc. and contains audio amp and speaker, £25. CW filter YK88CN wanted for TS-530. GW3COI, Gwynedd. Tel: (01758) 712675.

FT-102, SP-102 speaker, FV-102DM v.f.o., £500. H/B a.t.u.s, £50 each. AMA3 and AMS5 mag loops, modified with position meter and tune-up devices, £150 the pair. All o.n.o. Prefer buyer collects. G4BKE, Broadstone. Tel: (01202) 697338.

FT-290, 2 of with case, NiCads, charger, £160 each. Dymar 2000, 2 of, 2m (144MHz), £45 each. Rexon EL102, RL402, 2m and 70cm (144/430MHz), boxed, £95 each. MML 70cm (430MHz) 30W linear, £65. CFX514 triplexer, £40. Neil G7VQA, QTHR. Tel: 0161-427 2486.

Gould oscilloscope OS4300, dual trace, 10-bit digital storage with analogue/digital option 4202, sample rate 800kHz, 100. Keithley digital multimeters (2), model 177 microvolt with IEEE 30. Model 176A TRMS 25. Tel: Hitchin (01462) 459713.

Heath HW101 h.f. transceiver, c.w. filter, HP23A p.s.u., speaker, SB650 display, manuals, v.g.c. but RX deaf, £110. AR88 spares, manual, £100. Eagle TT145 transistor diode tester, £15. AT5, £30. Tel: Glos (01453) 845013.

HF-150, SP-150, PR-150 + p.s.u., Philips 386SX computer with some games and Modemaster, £600. AOR 8000, Opto Scout, £500 o.n.o. All in good working order. Tel: 0181-384 9199.

Icom 275H multi-mode 2m (144MHz) TX/RX, 100W, FL83 filter, £725. Kenwood 850SAT plus filters, £880. Yaesu 726R 6/2/70 SAT BD, £660. All complete leads, mic., etc., original box and manual, buyer collects. Len G0RDV, QTHR. Tel: Northants (01536) 514544.

Icom IC-706 MkII h.f./v.h.f. transceiver, s.s.b. filter fitted, as new, boxed, £750. YK-88SN-1 1.8kHz s.s.b. filter, fits TS-690, 450 and 570D, etc., £25. Kenwood AT230, £100. Kenwood SP23 speaker unit, £30. Terry G4OXD on (01462) 435248 after 6pm.

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Lowe HF-150 with direct keypad entry, £250. Also Trio R1000, £175. Both good condition. Tel: Tyne & Wear 0191-565 2482.

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Circuit diagram JVC RCW44 radio cassette recorder. John on (01362) 638142.

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For spares Akai 1710L tape recorder. G3TLB on (01892) 655527.

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