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**Communication Receivers**

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**Scanners**

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<td>TH-GP</td>
<td>Dualband handheld</td>
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<td>SW-55 SW portable</td>
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<td>ATS-818 SW portable</td>
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<tr>
<td>R-828 SW portable &amp; case</td>
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<tr>
<th>Model</th>
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<td>TS-6905</td>
<td>HF + 6m</td>
<td>£699.95</td>
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<td>TS-711E</td>
<td>2m all mode base</td>
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<td>TS-850ST</td>
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<td>IC-706 MKII</td>
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<td>FT-8000IR</td>
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<td>TM-255</td>
<td>30 amp PSU</td>
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<td>4 way (N-type)</td>
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<td>CX-201</td>
<td>2 way (SO239)</td>
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<td>CX-201 'N'</td>
<td>2 way (N-type)</td>
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SCANNERS
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 'newsy' 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!
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 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.

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!

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 50 MHz bands means the Novice will be confronted with a 'wall of silence' for much of the time.

Admittedly, 50 MHz 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 144 MHz 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 144 MHz 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 70 MHz. 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 split battery sulphuric acid and later how the double cotton covered copper wire from the Ignaric coils was a source of wire for projects for many years. The long wave one (a No. 207) 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
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 '13m 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
radio hobby or be yet
another specialised area of
our hobby.

Callign Number Plates
Dear Sir
I have just read 'Keylines'
in the June issue of PW
and agree with your
comments on callign
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 callign 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 MOAOQ
St. Helens

Crystal Set Challenge
Dear Sir
With reference to the PW
'Redo 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 variale
 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

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

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

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.

Ideal Wireless. All other letters will receive a £5 voucher.
Practical Wireless, July 1998
Small But Perfectly Formed!
The latest tiny transceiver to join the growing trend of miniature communications is IC-07 from the Icom. The Q7 takes the shape of an f.m. dual-band handheld 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-07 boasts a large built-in speaker to provide clear audio especially in noisy environments, as well as push button band switching system and CTSS 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-07 include:
* Automatic squelch
* 200 memory channels
* Backlighting with timer
* RIT function

For more information on the IC-07 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-07 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: CO, '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 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 9.6km. This event has long been
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 Maran 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 original shore station. Trophies will be presented to the winning yachts from a shore station) and the National Maritime Museum.

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The special event station will be known as a "Novice" course and will be run by Chris Parnell GOHFX from the Trowbridge ARC. Their collaboration between local radio groups is believed to be unique.

Among those taking part 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 was run by Steve Hartley GOFUW 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.

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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 editions and contains the Annual Honour Roll list, articles on IOTA, Internet sites and new certificate holder lists. 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 colourful 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@gb7mmb.#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 getting 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 with 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 G7T2C all the very best as he takes over in the 'hot' seat as Editor of Short Wave Magazine.

Donna G7TZB
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 G3CA0), 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.

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.

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 Isiwyn Hughes GW4ZXL (Secretary) on (01267) 231359.

Hoddesdon's Events

The Hoddesdon Radio Club looks forward to the visit to 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.

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 GOGGU 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.
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 Collin 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

CLASS 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 the use of H.F., v.h.f., and u.h.f. equipment, etc. Visitors are welcome any time. More information from Harry Coote G7WJE on (01708) 746731.

The Plymouth Radio Club meet at The Royal Fleet Club, 12 Morrice 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 2OP.

The Craven Amateur Radio Group meet on Tuesday at the White Lion, Kildwick, which is located on the A629 between Keighley and Skipton. More details from Mr D. Perryman, 50 Bellingham Crescent, Plympton, Plymouth, Devon PL7 2OP.

Meetings take place every Friday night at 8pm at the Westbury Centre, 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. 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 Bamborough 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 Daytona HamVention. More details from Dave Shaw G0PUD, Club Secretary.

The Dundee Amateur Radio Club meet on Tuesdays at 1900 sharp at the Dundee College of Further Education, Graham Street, Dundee. The club tends to have a guest speaker every second Tuesday with various topics relating to radio. The other Tuesday is made up of 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 during the daytime.
Up until now, we've been using the 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 fitted 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. exercise 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.

**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 (too 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.
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Practical Wireless, July 1998
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'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

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 finds 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.

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 EUSHQ (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 EUSHQ and an instant response came back. Achim EUSHQ 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 EABAZY 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 GODDYR 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!

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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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? 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 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 reinforced 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 Wellingsons.

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 nearer to 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 received pulses have been strobed which removes signals and leaves the calibration pips as in Icl. From this display the fine reading can be taken. On returning the main time base (c) the whole number of units may be noted.

At worst this meant that the Germans had recovered 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 had 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

the accuracy of the GEE system could be measured in yards, but at extreme range this deteriorated to somewhere in the region of 3km. 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!

**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.

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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
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.

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.

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 received 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
had to follow a route 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 ‘jamming’ 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 fully 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.
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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.

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WE ARE 5 MINS AWAY FROM J11 M6
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’ theme 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.

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le you do...look at some books!

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 recommended 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.

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.

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**Products from our range designed to increase your range...**

Our superb Alpha amplifiers need no introduction! With an easy 5kW out, these loof along at the UK limit. See Feb '97 RadioCom review by Peter Hart for an independent verification of their quality. We reproduce his verdict on the 91d manual-tuning amplifier (E2,199) "An excellent amplifier in all respects", and he called the no-tune 87A (E5.295) "The Rolls-Royce of all amplifiers". As the 87A interfaces with all brands of HF radio (unlikely other "no-tune" amplifiers), you can change your radio to any make without losing amplifier compatibility.

**Antennas?** What a choice, from HyGain, Cushcraft, KLM, M-squared, Force 12 and GemQuad. In stock now, the amazing C-45XL (E829) from Force 12. This antenna implements 40-20-15-10 yagis on one 24ft boom and weights only 48lbs. For those who would like to have a super signal on 20 through 10m, including the 17 and 12m bands, the GemQuad is an excellent choice. For only £380, the all-band version of the Gem takes a lot of beating for its low windload and high efficiency on 20-15-10m with no tuning.

A 10m Mast

**Specials?** We have good stocks of baluns, cable, wire, tribander stacking units.

**Planning Probs?** They can't touch you for this one! The amazing Force 12 ZR-3 triband vertical dipole (E449) is less than 6ft high, yet retains good bandwidth and weight compared with other quads. We have lots of others, and as we list and price them in the columns below, you can have something for any requirement.

**Antennas?** What a choice. From HyGain, Cushcraft, KLM, M-squared, Force 12 and other "no-tune- amplifiers", you can change your radio to any make at all without losing amplifier compatibility.

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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.

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!

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 were 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 G3RV, John Heys G3BDQ, Kevin James GA4YNT, Peter Lait G8FQ, Roy Ratcliffe GW1XZW and Ron Wilson G3DVS. What a list! And now you can get both of these feature filled ‘Specials’ for less than the price of a single magazine.
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 horizontally 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.

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 settings. Reducing the earth loss eliminates the inefficiencies and losses associated with radials, a simple counterpoise system is all that is required. There are no traps in a GAP antenna. The elevated feed and the unique tuning 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 designated 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 ungyed, 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 the garage but for the purposes of this review I located it at ground level.

The Titan antenna arrived in a long
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 correct planes 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 had only other tools you'll need are a flat-bladed screwdriver land a (provided) nut driver. The big hole over a little hole and insert them into the correct plane end of the cable).

To get started with the assembly you'll need a 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! 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 consistent 2.1 between 50.980MHz to 51.780MHz. Coincidentally 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 it at that.

The Titan appears to work on the 50 and 144MHz bands as well! A quick excursion onto these bands one evening produced three f.m. contacts on the 50MHz, 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 6HJ. Tel: (01691) 831111, or FAX: (01691) 831386.

Table 1. David GA4ASR measured the s.w.r. on all bands from 3.5 to 144MHz, and obtained some surprising results.

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<th>Freq (MHz)</th>
<th>vswr</th>
<th>Freq (MHz)</th>
<th>vswr</th>
<th>Bandwidth (kHz)</th>
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<td>51.78</td>
<td>2.0</td>
<td>600**</td>
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<tr>
<td>144.0</td>
<td>1.5</td>
<td>140.0</td>
<td>1.7</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: David GA4ASR measured the s.w.r. on all bands from 3.5 to 144MHz, and obtained some surprising results.

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 1.3:1 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.

In 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 its 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-960S barefoot (100W) and retaining the red colour of the tuning on the amplifier I made a number of contacts on all bands. Highlights are difficult to assess (and possibly require that other operators) but as an example of the 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 6HJ. Tel: (01691) 831111, or FAX: (01691) 831386.

GAP Antenna Products can be contacted by telephone in America on: 081 561 5771 9922, or for those with internet access, visit your web browser at: http://www.gapantenna.com
Minimise those harmonics from your signal with a new low-pass filter with even lower second harmonic output.

In a recent Practical Wireless article, the rev. George Dobbs g3riv. 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. These designs are preferred because they are '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. 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 g3riv 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.

To maintain an acceptable pass-band s.w.r., the normalised component values that cause the filter pass-band within the amateur band to have a return loss of 20dB 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 accurately than s.w.r., and most computer analysis software uses return loss to characterise filter pass-band response.

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

\[ RL(\text{dB}) = -20 \times \log_{10} \left( \frac{s.w.r. - 1}{s.w.r. + 1} \right) \]

and

\[ s.w.r. = \left( \frac{\text{RL}}{\text{RL} + 10} \right)^{1/\text{RL}} \]

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 indication of pass-band response.

Commercial filters are frequently advertised as having a minimum return loss of 1.5:1, which corresponds to a 3dB return loss. However, a minimum return loss of 20dB 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 stop-band. 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 ELSE filter design and analysis software to find the special filter component.
MAXIMISED SECOND-HARMONIC ATTENUATION.

The Edge

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

values that provides the desired filter performance. Jim currently distributes his ELIE software through his company of which he is president8. 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.

Table 1

<table>
<thead>
<tr>
<th>Band (MHz)</th>
<th>Turns L2 &amp; L6</th>
<th>L4</th>
<th>C1 &amp; L2</th>
<th>Fy (MHz)</th>
<th>Core No.</th>
<th>Wire Size</th>
<th>Length (mm)</th>
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<tbody>
<tr>
<td>1.81</td>
<td>31</td>
<td>30</td>
<td>1.17</td>
<td>1.852</td>
<td>T50-2</td>
<td>0.50</td>
<td>25</td>
</tr>
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<td>3.5</td>
<td>22</td>
<td>21</td>
<td>3.437</td>
<td>3.610</td>
<td>T44-2</td>
<td>0.50</td>
<td>25</td>
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<td>7.0</td>
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<td>13</td>
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<td>11</td>
<td>27.5</td>
<td>28.87</td>
<td>T50-17</td>
<td>0.50</td>
<td>21</td>
</tr>
</tbody>
</table>

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 Bromhan W0IUN). LaSalle, Colorado. (A photo of John's antenna towers appeared on the

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

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).

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

PW - Antennas in Action, July 1998
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, NPO 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 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 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, 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×(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.

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, Fx and C1, Fy are used to find the number of turns on L2 and L4, respectively. For example, if C1 = 1650pF (1500+150) and Fx = 1.717MHz, then L2 = 5.21µH. If the null frequency is above or below the Fx or Fy frequency, then add or remove, or squeeze together (or spread apart) the turns

"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.

Fig. 5: The 7MHz version of the filter built up on perf-board.
and with the addition of a convenience of using standard - of radio transmitters, and the 7 - on the core until the null capacitor across the centre some component value changes, purpose because of the minimise the harmonic output It is desirable, and a requirement, 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 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.

REFERENCES

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

 PW - Antennas in Action, July 1998
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 does not operate as a 'quad loop' antenna.

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 5 points down on my regular antennas.
Down by the seaside - the mast and loop antenna ready for action at Poole Harbour.

Rare 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. GITEX).

**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.

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.
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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.

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
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.

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.

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 you might have.

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!

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!

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

Besides the 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 N3EOF, 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.

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 up 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.

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.

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!

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.

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.

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
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!

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

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.

**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...
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 4.7pF 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 NE602/812 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 (C5) 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 10pF 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).

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!
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Chris MacLeod GM6TYX says that we’re truly in the age of ‘super’ v.h.f., u.h.f. and microwave work are considered. And to use a phrase...

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 discuss 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.

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...
charged receivers' - particularly when equipment for popular phrase...the techniques used are ‘really cool’!

CHARGED RECEIVERS

They’re Really Cool!

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.


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...”

Practical Wireless, July 1998
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 of a much larger one.

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 slip 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.

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!

---

**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).

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

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 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...”

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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!

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

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'!

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
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! If you can't find it's available 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.

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 weakest point. 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 moisture and will cause no worries. They do not normally of course provide electrical screening and so may not be suitable for all purposes.

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 ‘breathe’.

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 Society present the 29th Eltornov National Radio Rally taking place at the Eltornov Castle Country Park on the BS501, five miles south of Hertford. There will be all the usual traders plus Special Interest Groups, a grand Bring & Buy and a huge flea market. Over 600 square metres of marquees makes this the largest outdoor rally in Europe. With crafts, bands, a floating fair, fish & chips entertainment and woodland walks, there is something for all the family. The event also has a Club approved site. Talk in is provided by GB2ECR on S22 and SU22. Brian Reid G1CUON 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 Clandeboyde Lodge Hotel (formerly The Glandeboyde), A41, Bangor, County Down starting at 12 noon (11.30 for disabled visitors). This year’s event will have a full range of trade stands, including major UK traders, a Bring & Buy and computer software. All parking facilities for the disabled, full range of meals and bar services available throughout the day. Morse tests available on site. There will be a full range of club stands and QSL QRP running all day. Admission is £2, under 16s go free. Talk-in on Ch22. Royal Gordon on (01247) 460716 or Stuart G4OCK on (01247) 454049.

June 21: The Newbury & District Amateur Radio Society will be holding their 12th Annual Amateur Radio & Car Boot Sale at St Helen’s School, Watling Street, Nr Rugby. Doors open from 0900 to 1500. Ian Trusson, Secretary NADARS on Tel/FAX: (01635) 826019.

June 28: The Horncastle Rally is being held at Horncastle Youth Centre. This rally is being held in conjunction between the Youth Centre and the Fenland Repeater Group. The Rally is open on one level with good access for disabled visitors. Food and drink is available, including the now legendary Horncastle Bacon Butties. Tables are only £2 for the day (bookable and payable in advance). Cheques should be made payable to the Horncastle Youth Club, sent to: Ares Youth Office, Cagthorpe, Horncastle, Lincs LN6 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, Essex, CM17 9AT. Tables inside £15, car boot plots, £7. For the best plots, book early! Talk-in on Ch22 and SU22. Maurice B4DO on (01707) 378783 or by E-mail on gb7jed@gb7jed.com.

July 5: The 9th York Radio Rally will be held in the Knavesmire Building. York Racecourse, York. Doors open at 10am and admission is £1.50. Children accompanied with an adult go free and there is a free car parking.

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. There will be 100+ trade stands covering Amatuer Radio and CB radio, computer and electronics. There is also a large Brins & Buy display area. Refreshments at bars are reasonably priced and there is a full view 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 Haymell Youth & Community Centre, 112 Burnham Watling Street, Nr Rugby. Slough. Doors open at 1000. There will be trade stands, car boot sale, tea, coffee and licensed access. Talk-in on S22. There will be disabled facilities also. Dave Chislett on (01628) 626720 or for further information on bookings, ring 0118 9722502.

July 26: The Colchester Radio & Computer Rally is to be held at Colchester Grammar School, Ipswich 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. Morse Tests on demand - don't forget to bring two badge size photos. Admission from 10am to 4pm and ample free parking and disabled parking which is adjacent to the entrance point is full accessible for wheelchair users. David ZEFRO on (01206) 392622.

July 28: The Rugby Radio Rally will take place at the BP Truckstop, A5 Watling Street, Nr Rugby. Arthur MOAJP on (01789) 565077 or (0966) 433947.

August 14: The Cockenzie & Port Seton Amateur Radio Rally will be holding their 9th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, East Lothian. Open from 1530 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 (01879) 811723.

August 16: The 9th Eastern Radio & Computer Rally is to be held at Wallington Hall, Nr Kings Lynn. Doors open at 1000 £9/45 for disabled visitors. The event is full accessible. The hall is on £9/45. There is also ample free parking. For further details or trader information, contact Ian GOBMS on (01853) 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 4pm. Stuart Robinson GWOWMT on (01222) 613700.

August 16: The Stroud Radio Society Rally will be held at Arrowway School, Stroud, Glos. Doors open 1030 (1000 for disabled visitors). There will be a talk-in on S22 and admission is £1/55. There will also be a Bring & Buy. Stuart G0GNM on (01453) 752411 or Steve G3ZPA 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 G9UGL on (01952) 684173 or Tony G0IAM on (01743) 238619. E-mail: zeroaop@hotmail.com

August 30: The Galashiels and Dgars are holding their Open Day and Rally in the Volunteer Hall, St Johns Street, Galashiels. Scottish rallies are held 11am to 4pm. There will be traders, refreshments, Bring & Buy, etc. Jim GM7UQN on (01896) 856245 or菲特 @ GB7JED.

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.
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
send the PMG everything previously mentioned plus another shear 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 at least tried 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. This was 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.

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 justices 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 boffins, 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 lieu 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.

Practical Wireless, July 1998
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### VHF/UF.HF RECEIVERS

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### SHORTWAVE RECEIVERS

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### BASE/MOBILE SCANNERS

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Practical Wireless, July 1998
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 unclear. 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 LS.

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, they actually built 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 120-1200MHz. To alter the unit to convert from the 2.4GHz (amateur satellite band) to the 144MHz band requires simply modifications to the i.f. amplifier, i.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.o. gain by approximately 15dB at 144MHz. The i.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 block converters (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 (Pculas) and P3D when it is launched.

Although these surplus (but brand new) downconverters have already been available for the past 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 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 G6ERU, 40 Wherryview, St John's, D说明书, West Sussex BN3 9YB Tel: (01273) 495731.

MARITIME MOBILE

Now back down to earth (well water actually!) and a report from Andy Adams G5WIZ/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 DL5AME at 19000km. During the afternoon of Sunday April 26 a satellite phone call was received from PA3BIY with informed Andy that the 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 SH5BSZ and to the south ON5NY (1000). Furthest west was EI3EG and to the east it was the station of DOUDET (IO25). A total of 25 UK stations were worked. This list includes GOETV, G0FOF, G1GNR, G1MIV, G3JMH, G1KQG, G1UFF, GINWO, G3PIW, G3RHH, G4ASR, G4GAEQ, G4DHF, G4FVP, G4HIL, G4LOH, GA4G, G4SVX, G4XUX, G3PDDN, G3MGMG, G4CMX, G4AIIF and G4SFL. (What No Chi Channel operators? Sorry you really must use c.w. to work the real DX on the v.h.f. bands!)

Andy reports that he will also be active between 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 was very low, this being ideal for many stations trying to work him during his evening rests periods. This was because European stations had to work 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 QO43 and managed to complete contacts with the stations of DL6ERW, G4TTL, PA2DWH, PA3BIY and PA3BZL and PA3FO.

By the time you read this Andy would have sailed through IO13, 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. In 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 1), the Zeta Perseids (May 20 to July 51) and the Lynxids (June 10-21), which peak 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 14W permit! and an 11-element 9F7T Yagi. To amplify the receive system he uses a Landwehr Electronics low noise mast-head preamplifier.

And Andy's 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.
Practical Wireless, July 1998

Colin Smith GMOCLN (10851) reports that for a few days around the same time both the beacon and the station of V51E were heard in Malawi. Colin was working downlinks from New Zealand were also heard and later, on the 50MHz band, was worked via Auroral -E. In the early morning of May 4, an extremely strong solar wind shock wave was observed at the SOHO satellite. An observatory in Ontario, Canada recorded extremely severe storming between 0300-0400UTC with geomagnetic A-index jumping from 58 units to 148 (severe storm approaching very severe storm). During the 3-hour interval between 0300-0600UTC several observers 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 nothing compared to what is usually experienced during solar storms. The opening was not unexpected given the very high values of the solar 10.7 cm flux and the high activity of the sun. As mentioned in the report from GWZK/MM there was a good auroral opening on April 26, 9, 18, 19, 23 and 26 although there may well have been a few on earlier days. The opening on April 1 was quite extensive throughout Europe with stations in DL, LH, F, QI, HB9, I, ON, SV, 55, YU, 9H (and no doubt more) making contact with T8IE and 3CS.

Jeff Brown G4HCO (N8R) mentions that he heard T8IE on c.w. at 1300UTC and 30 minutes later he changed to s.s.b. when signals were 59+. 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 VS1EI beacon on the following evening around the same time both the beacon and the station of VS1E were heard very strongly. Another good opening on the 50MHz band occurred on April 9 from around 1230UTC. The stations of Z65AX, Z65FS, Z65WB and Z65X1 had propagation into much of Europe including G, Cl and PA. At the QTH of Ken Osborne G4HCO (IO8O) the 7Q7/S1X beacon in Malawi was heard peaking 59+ on April 13 between 1730-1700UTC and on the following evening D8IE was heard in the UK, around the same time, as far up as CK5. He had to wait until April 26 before making his first G contacts. The lucky stations were G3NVD and G3OIL who were working on c.w. around 1405UTC.

The station of W3WL (FM29) running 310W 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 sign 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 C, I, IT9, 55, YU, H, 9H.

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 PA3ZEL, PA3FXW, PA3GFE, PA3HCW, PEI NVK, PEI OGF, PE1PRG and s.w.l. Diana will be active from a QTH some 2010m a.s.l. They will use the call-sign HB0/PIATUE on the 50 and 144MHz bands and will also be QRV on f.h.

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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 up 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 well 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 the inhabitants claiming independence from Italy. But nevertheless operations from there with TO 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 oh?

Thanks to Dereck Brown G4XKF, Alan Jobo G3PMR, Don McLean G3JNOF and Bill Abrahams G0MEU/ON4CGR 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 FOSQG is still active from Polynisia, often using s.s.b. on 14120 or 14190 from 0500 with slow English. (QSLs should go to XE1J).

Next comes Jim SV5SF 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 23th 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 GW0YJS of Eleven in West Glamorgan. He's 'all QRP' this month, using an Index Labs QRP Plus rig at 5W output and a half-size G3RV inverted 'V' dipole.

Carl's log shows c.w. contacts with VE3EJ (Canada), BP9IF (Barbados), Z1FWD (Cayman Islands) and Special event station ON50ICA 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.

Nevertheless, Ted hooked up with HK7QMF (Colombia) at the unruly hour of 0300, and K7QQ (USA) at 0500. Later operation during the evening brought in 457/DK3DW (Sri Lanka) and VU2TES (India) at around 2000, while 2100UTC saw contacts with TK3XN (Cörnica) 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 G3RV dipole.

Time it seems, was limited this month for s.w.l. Derek Blunden BRS-718675 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 MO0OB. Robert has been active on 5MHz quite a bit of late, and has listed s.s.b. contacts with CU2CE (Azores Islands) at 2121, V86L (Pitcairn Islands) at 0001, CO6SN (Cuba) at 0538, YV5M (Venezuela) at 0535, XEOBD (Mexico) at 0545, and CP6VP (Bolivia) at 0552UTC. Not bad for a morning's work Bob!

**PROPAGATION REPORT**

Don Mclean G3JNOF, 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 VKZL. 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 2100".

"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, KG4WV (Guantanamo Bay, Cuba) at 2200, YSL via W4WX, and OY3LG (Greenland) at 1938, QSL via OZELA.

Meanwhile, down in Milton Keynes, Sean Gilbert G4UCJ is only now 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 VK1FL (Australia) at 0800, plus GP8W (Barbados), V26XJ (Antigua), Z6IWD (Cayman Islands) at around 2000, ZL1AZE (New Zealand) at 0800, B77W (Taiwan) at 1720, K815 (California) at 2224, CO7XX (Cuba) at 2249, plus A45XX (Ghana) at 2346, and HF0POL (South Shetland Islands) at 2341UTC. Absolutely stunning results for such a simple set-up everyone!

Editorial comment:

Congratulations Sean - just shows what can be done with a simple set-up every time.

Talking of low power, Carl GW0V5WV has been busy here too. He lists 5W c.w. contacts with VK1FL (Australia) at 0700, CU2HI (Azores Islands) at 2000, LUFUAQ (Argentina), and FY5SYE (French Guiana) at around 2200. Also hooked, but this time using QRP s.s.b. on ZS8/NVC1 (Republic of Macedonia) at 0700, and V2LYI (Alberton, Canada) at 1332UTC.

The log from Ted G3KHU shows that he's been 'bashing the key' and having some success with V26XJ (Antigua), 7Z2BO (Zambia), 7ZC0O (Saudia Arabia), V82XK (Hong Kong) and BV7FF (Taiwan) at around 1600UTC.

Meanwhile Eric Masters G0KRT in Winchester 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-10W rig, and using it with a modified W3EDP antenna, worked I5HSTX (Sicily), and 5B4AGC (Cyprus) at around 2000, while SP7SEW came in at 0800, and IAJAR (Spain) was worked at 2000UTC.

THE 18 & 21MHZ BANDS

The 18MHz band is where Charlie Blake MOAJL of Milton Keynes has spent some of his radio time this last month. Using a mast of three dipoles for the 21, 18, and 14MHz bands, and using s.s.b. he hooked up with 238/NO6K (Rep. of Macedonia) at 1233UTC.

However, mobile operating with a whip antenna brought Charlie contacts with 7Z2DG (Algeria), CT3/P30/GIOI/M on Madeira Island, and ZD7WRG (St. Helena Island) at around 13-1400. On 21MHz, he mentions 5B4AGC (Cyprus) at 1617, KP4W-4OC (Puerlo Rico) at 1322, JA0Y (Japan) at 0800, and PT7YZ (Brazil) at 1042UTC.

The 21MHz band has been 'where it's at' for new reporter and regular PW author Gordon King G4FFV (see Fig. 1). Gordon's single band report shows that he's been busy here, working a maximum of 5W or c.w. into a 'compressed trap dipole' mounted in the loft of his house. (Perhaps you can compare notes with our other '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 V2XKN and VE3T (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 in the 28MHz band using a simple dipole antenna.

Contacts include H33/DL1KG (Dominican Republic), HC4V/VE3L (Ecuador), V09KK (Chagos Islands), S24RL (Kenya), V6KGL (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 month 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 MOAJL 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 evening except Monday at 0930.

Don McLean G3NNOF operates: 1030 Saturdays on 3.685MHz 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 tri-band 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 G3XF6 listens and operates: (weekdays & weekends) 1800 - 1830 on 3.7MHz 100W s.s.b. & 3.580 and 7010MHz QRP c.w. (c.w. using home-brew 'Oxo' VSO 800W transmitter & Eddytone EA12 receiver) and an Allinco DX-70 transceiver and a Long Wire antenna on QRP or ORO. (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 Allinco DX-70 transceivers at 5/25W output and a G5RV dipole antenna in the loft space.

T Ibitson 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.

Everyone knows that electronic equipment costs LESS IN THE USA ... OR DOES IT? ED TAKES A LOOK AT THE REALITIES, THEN INVESTIGATES THE PRACTICABILITY OF PRIVATELY IMPLANTING 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.

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.

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73, Leighton GW0LBI

SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE OCTOBER COLUMN BY 15TH JULY.

ED TAYLOR NOED,
PO BOX 261304,
COLORADO 80226, USA
E-MAIL: NOED@radialink.net

Practical Wireless, July 1998

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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 luggage, 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? Chris G3VBL says: "Be prepared for problems when you get the radio! 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 loss."

I think this could be a technique which manufacturers will use to prevent buyers operating trans-nationally. Oddly enough, I have found equipment imported from the Far East is more likely to be CE marked. And given the current currency roller-coaster in Singapore, Malaya and Thailand there must be bargains to be had."

By the way, the CE regulations came into effect in 1996 and relate to electronics. The idea 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.

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 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 dealer was then about two to the pound."

The service was great, and 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 thing!"

I was asked if sales were going well in the USA and this was his reply: "Yes, business has been 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. I thought it would be interesting to visit an Amateur 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 would be hard to admit that business is booming!

I get the impression that a downturn in sales is slowly being reversed. 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 KDQGA, assisted by John N5EHP and Roger KOYY.

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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 h.f. and v.h.f. stations 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 Joe is ready to demonstrate any radio at one of the HRO’s operating positions.

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 "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 positive "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."

"The amateur population in Europe 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."

ROUGH AND BOILED

My thanks go to AAORS, G3VBL, G3OZF, G3XTT, KDOGA, 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

RADIO SCAPe

REPORTS & INFORMATION TO ME PLEASE.
MIKE RICHARDS GW4NC,
PO BOX 1863,
RINGWOOD,
HANTS,
BH24 2ZD

E-MAIL: mike.elaine@ binternet.com

WEB SITE: http://www.binternet. net/mikespage

MIKE GW4NC 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 now decided on 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 really odd as the name is actually two a) codes boiled 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 2.0e 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 standard Windows installer 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 will also calculate Maidenhead locators from Lat/Lon and vice versa which is quite handy. If you don’t want to get into 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 USS7 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 AA62. 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 by 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...
while 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 reception and 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 connection speed of 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 ISDN2 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 lowest level of the bandwidth required for a single speech telephone signal.

The figure of 64kb/s 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 exchanges 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 64kb/s (Rihls x 8000 times per second).

All this means that, at least in theory, your 'phone line' is capable of handling data at 64kb/s. What is required, however, is some clever electronics to extend the 64kb/s data slot in the exchange down to your PC.

The electronics that extends the 64kb/s 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 64kb/s slots over the line! Not only is this very much faster than your modem, but it can handle 2 x 64kb/s with no errors.

The system is therefore very much better than the 56k modem that struggles to make 42kb/s 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. 1: Calculation screen of ORBOTE.

This would mean sending the information at the magic 64000 bits every second or 64kb/s (Rihls x 8000 times per second).

Fig. 2: AZMAP main screen display.
Washington-based broadcaster, said that from midnight UTC on 28th May, VoA would begin News Now, a 24-hour all-news service. News Now is to be transmitted on short wave and satellite world-wide, replacing the current output.

The new arrangements 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.

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**
- 00:00 Preview
- 01:00 World News
- 02:06 World News
- 02:10 Local News
- 02:14 US News
- 02:18 Sports
- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Science/Medicine/Environment
- 02:49 Business News
- 02:53 Feature
- 02:58 Station Break

**Monday to Friday - odd UTC hours**
- 00:00 Preview
- 01:00 World News
- 02:06 World News
- 02:10 Local News
- 02:14 US News
- 02:18 Sports
- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Science/Medicine/Environment
- 02:49 Business News
- 02:53 Feature
- 02:58 Station Break

**Saturday - odd UTC hours**
- 00:00 Preview
- 01:00 World News
- 02:06 World News
- 02:10 Local News
- 02:14 US News
- 02:18 Sports
- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Communications
- 02:49 Business News
- 02:53 Feature
- 02:58 Station Break

**Saturday - even UTC hours**
- 00:00 Preview
- 01:00 World News
- 02:06 World News
- 02:10 Local News
- 02:14 US News
- 02:18 Sports
- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Science/Medicine/Environment
- 02:49 Business News
- 02:53 Feature
- 02:58 Station Break

**Sunday - even UTC hours**
- 00:00 Preview
- 01:00 World News
- 02:06 World News
- 02:10 Local News
- 02:14 US News
- 02:18 Sports
- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Environment
- 02:49 Business News
- 02:53 Feature
- 02:58 Station Break

**Sunday - odd UTC hours**
- 00:00 Preview
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- 02:22 US Feature
- 02:26 Station break
- 02:31 World News
- 02:35 Science/Medicine/Environment
- 02:49 Business News
- 02:53 Feature
- 02:58 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 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 Rushing, 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. Rushing 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: 0500-0550 on 4.005, 5.88, 7.23MHz plus 527 and 1530kHz medium wave: 0600-0610 on 4.005, 5.88, 7.25, 9.465, 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, 11.81MHz and 1950-2010 on 5.88, 7.25, 9.645MHz. You can also hear Vatican Radio on the Internet at: www.wrn.org/vaticanradio/audio.html.


Radio Vlaanderen International in Brussels broadcasts in English: 0730-0800 on 7.29 and 9.94MHz; 1030-1100 on 9.925 and 15.595kHz; 1230-1300 on 15.545kHz; 1630-1700 on 5.91 and 7.23MHz and 1730-1800 on 11.81 and 17.655MHz. For Internet listening, check out www.vri.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
- 1850 onwards on 8.755MHz
- 1955 onwards on 9.875MHz

**Sunday-Thursday**
- 1950 onwards on 11.735MHz
- 1958 onwards on 11.735MHz
- 2050 onwards on 17.675MHz

**Saturday**
- 2105 onwards on 17.675MHz
- 0459 onwards on 16.00MHz
- 0715 onwards on 6.10MHz
- 0736 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

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No responsibility will be taken for errors.

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Please use our contact details.
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Yaesu FT-9000 £250. Yaesu FT-1000 £200. Yaesu SP950 speaker, also Yaesu SP102 accessories, SP102 base speaker. Yaesu FRG-7 h.f. amplifier, £15. Yaesu FT-760R 2m/70cm 144/430MHz base and mobile, TX output 50W, ready for packet, three year warranty, as new condition. £300. Tel: Prestbury (01745) 852691.


Yupiteru MVT-9000 scanner, as new, £15. All very good condition, postage at cost. Max G3WMB, 589707.

Yaesu FT-1012 h.f. transceiver, nine bands, s.s.b, f.m., c.w., comes with base station microphone and serial tuning unit, like new and boxed, manual included. £200. Tel: Wirlesb (01946) 589707.

Exchange IC-706 MkII with connectors for Yaesu/Kenwood s.s.b 100W, £70. Brem/pan.s.u. 138 6V 5A, 7A surge, £15.90. Roger G3SIH, QTHR. Tel: 01945 238423.

Yaesu FT-78R n.h.f./v.h.f. transceiver with 2m (144MHz) and 70cm (430MHz), matching SP767 speaker with filters and voice unit, all boxed and mint condition, £95, buyer to collect. Craig G1OLT daytime on 01246 401409 for details.

Yaesu FT-747GX HKM-18 mic., FC1000 a.t.u., control cable/co-ax, £485, v.g.c. JUI, SX400 26-520MHz all mode, no gaps, unused, mint condition (mod. spec.), £200. New 19 Set headphone/mic. assy, £25. Jim, Poole. Tel: (01205) 666444.

Yaesu FT-757GX h.f. multi with 5-30MHz RX, BI-speded tuning mod., hardly used, boxed with manuals, excellent condition, £495 or may exchange for complete good spec. PC set up. Tel: (0208) 2346522.


Yaesu FT-77, no tuning knob cover, g.w.o., £275. Yupiteru VT-125 L aband RX, g.w.o., £125. Both boxed. Tel: Cumbria (01539) 536104.
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To advertise on this page see booking form.

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VALVES GALORE Most valves available from stock. Otherwise obtained quickly. Please send SAE stating requirements or telephone. VALVE & ELECTRONIC SUPPLIES Chevet Books, 157 Dickson Road, Blackpool FY1 2EZ.
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THE UK'S LARGEST SOURCE for Vintage Service data, circuits and manuals from 1900 to the 1970s. Free brochure from Tudor Gwilliam-Rees, Savoy Hill Publications, 50 Meddon St, Bideford, The Little White Town, North Devon, EX39 2EQ. Tel: 01237 424280.
E-mail: tudor.gwilliam-rees@virgin.net
Visa & Mastercard accepted.

INTERESTED in vintage wireless? Send 2 x 1st class stamps for latest list of books, bits & pieces etc. Old Time Supplies, PO Box 209, Banbury, Oxon OX16 7GR.

JAPANESE TRANSMITTING TUBES and microwave semi-conductors for broadcasting, communication and industrial use. T. Yoshihara, Osaka, Japan. Tel: 0181-339 3381.
H.M.V. RADIO GRAM 1961 auto change. 4-speeds. Garrard deck. Excellent condition. £85. Tel: (01902) 897338.

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PC SSVT-DATA Tx/Rx pack £35.95. Other PC/AMIGA SSVT/Packet Interfaces. SAE leaflets, Super Demo-Utils disk £1. Peter Lockwood G8SBL, 36 Davington Road, Dagenham RM8 2LR.
Tel/Fax: 0181-595 0823.
E-mail: g8sbl@home.m resides.org.uk
HAM/SCANNER SHAREWARE External range. Free disk list. Tel: 01732 852146. Pentium systems also sold.

Wanted

WANTED FOR CASH Valve or solid state communication receivers Pre-1980. Preferably working and in good condition. No working sets considered other than domestic valve radios. Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, FY1 2EL. Tel: (01253) 751858 or Fax: (01253) 302979.

QLS Cards

HIGH QUALITY BUT LOW PRICES personal and specialist designs from 'standard' to B&W and full colour photographs including SWL, fast service. SAE for samples: Adur Village Press (G4BUE), Highcroft Farmhouse, Gay Street, Pulborough, W Sussex RH20 2HJ. Tel 01798 815711.

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VALVE ENTHUSIASTS: Capacitors and other parts at attractive prices! Ring for free list. Geoff Davies (Radio), Tel: (01798) 574774.

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NORTH WALES HOLIDAYS - Caravan - bunkhouse - camping. Elevated rural site, two miles from beach, use of shack and antennas, open all year. Tynrhos, Mynnytho, Pwllheli. Tel: 01758 740712. Packet address: GW4VAG@G7BAY#5.BGR.EU

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The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publications Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659992, Fax: (01202) 659950.

Please insert this advertisement in the issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for Insertion/s. I enclose Cheque/P.O. for £ (42p per word, 12 minimum, please add 17.5% VAT to total).

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Sunday July 12th, 1998
10.30am to 4.00pm

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- **Contact:** Len G7UFF

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All makes, types, models of any vintage, domestic, military, professional radio equipment including any accessories, adaptors, etc. Also test gear, valves, components, literature in any condition or quantity.

Please telephone or write to:

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345 Stockfield Road, Yardley, Birmingham B25 8JP
Telephone 0121-706 0261

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Harlow & District Amateur Radio Society

Rally & car boot sale
5th July 1998
FREE entrance & parking

New and better venue
Mark Hall School, Harlow (A414) First Avenue


Contact Len G7UFF
Tel: (01279) 832700 Fax: (01279) 864973
E-mail: len.brackstone@virgin.net
FREE POST & PACKING ON BOOKS MARKED *

SEEING BY WIRELESS

This month's we're offering you the chance to buy Seeing by Wireless - The Story of Baird Television at a very special price. The publication traces the Baird story from the early demonstrations, which became historical events to International Operations through to Stereoscopic Television. The book also gives a fascinating insight, complete with quality photographs, into something that has become an accepted part of everyday life - television.

Seeing By Wireless would normally cost £4.95 plus P&P but this month we're offering you the chance to buy it for just £4 including P&P (UK only). For overseas orders please add £2 P&P). So, what are you waiting for? - Place your order today! (offer open until 31 August 1998).

To order please use the form on page 82 or call the Credit Card Hotline on 01202 689930 and quote PV7.
Order Form

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- £32 (Rest of World Airsaver)
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- £50 (UK)
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- £38 (UK)
- £43 (Europe Airmail)
- £49 (Rest of World Airmail)

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- £38 (UK)
- £43 (Europe Airmail)
- £49 (Rest of World Airmail)

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- Please send me Practical Wireless binder(s)
- £6.50 each

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- Please send me the following books

Postal charges:
- £1 for one, £2 for two or more (UK)
- £2 per book or £10 for five books or more items (overseas surface)
- £2 per binder (overseas surface)

NEW FASTER NEXT DAY SERVICE (UK MAINLAND ONLY)
- £4 per parcel (orders must be placed by 12 noon)

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Orders are normally despatched by return of post but please allow 28 days for delivery.
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- Reaching Out - Graham Tanner examines the source of one of the most commonly heard utility signals on h.f.
- SSB Utilities - Graham’s regular column.

NEW BROADCAST SECTION
- Bandscan Australia
- LM&S

PLUS
- World’s First Review
  The AOR AR8200
- Amateur Radio Astronomy
- Wideband Receivers - Past, Present & Future

and all your regular favourites too!

June Issue On Sale
Now - £2.75 - Miss It Miss Out!

Next Month in Practical Wireless, the magazine that brings you Amateur Radio & So Much More . . . .

THREE REVIEWS!
The new IC-Q7 is the latest hand-held from Icom - Richard Newton GORSN shares his thoughts on this 'miniature' transceiver.

Rob Mannion G3XFD has been busy putting the new SGC SG2020 QRP Transceiver through its paces - read his review to find out how it fares.

Keen kit builder Clive Hardy G4SLU has been busy building the 1251 RF Counterpoise and the 1202 SWR Wattmeter from the Ten Tec range.

RADIO BASICS!
Re-live or discover the wonders of radio with G3XFD's monthly column and from this issue we've doubled the dosage to two pages!

ELECTRONICS IN ACTION!
Tex Swann G1TEX’s column brings together hints, tips, news and mini-reviews and much more to delight the hobbyist!

Plus all you regular favourites including

News
Carrying on The Practical Way
Radio Scene
Bargain Basement
Valve & Vintage

* Contents subject to change

CAN YOU AFFORD TO MISS IT? - AUGUST ISSUE ON SALE 9 JULY 1998 PLACE YOUR ORDER TODAY!
AT THIS PRICE... IT'S A GIFT!

It's true!... the IC-821H 144/430MHz dual-bander is now available at some considerable saving!

Icom's formidable IC-821H dual-band base-station is now available from authorized Icom dealers for a meagre £1295, a saving of £300 on the usual R.R.P. But hurry, this offer is only available until our special offer stock is sold... so be quick!

IC-821H

Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD. Telephone: 01227 741741. Fax: 01227 741742. internet: http://www.icomuk.co.uk E-mail: info@icomuk.co.uk

Count on us!
FT-847
Ultra-Compact Satellite and All Mode Transceiver

4 into 1 does go!

Technology moves inexorably onward, evolving, adapting, forever changing. At the same time, today's Radio Amateur puts even more demands upon designers to build quality, sophisticated, but easy to use stations for Voice, Packet, Satellite, CW, VHF, UHF, HF, just to mention a few. Yaesu's designers took on that challenge, and following in the footsteps of the revolutionary FT-1000, FT1000MP and FT-920 are now proud to offer today's Radio Amateur the station in a box - the all new FT-847!

The Yaesu FT-847 Ultra-Compact Satellite and All Mode Transceiver has jumped the technology with a transceiver ready for the new millennium. With its high-tech design and revolutionary features, the FT-847 is truly the one radio that can do it all! Massive band-width coverage from a single unit, the FT-847 has many features to keep it at the top of the evolutionary pile. These include crystal clear 100 watts on HF and 50MHz, a massive 50 watts on 144,430 MHz bands, Yaesu's effective DSP for bandpass, noise reduction and notch filter, and direct input of frequency on the supplied keypad. Silky smooth tuning with 0.1MHz tuning steps, Cross band and full duplex, CTCSS and DCS encode and decode built in. And for Satellite reception, normal and reverse tracking. A matching ATU (Automatic Antenna Tuning Unit) is also available as an option.

FEATURES

- All band performance (SSB, CW, FM, AM, AME)
- 100 Watt output on HF/50MHz bands
- 50 Watt output on 144/430 MHz bands
- Cross-band full Duplex operation
- Normal/Reverse tracking for satellite operation
- CTCSS & DCS encode/decode built-in
- High resolution 0.1Hz tuning steps for ultra smooth tuning
- Digital Signal Processing filters (Bandpass, Notch, Noise Reduction)
- Simplified tuning with JOY Jog control
- Direct frequency keypad entry
- Dedicated satellite memories, with 8 character Alpha Numeric Labels
- TX Freq (MHz): 1.8 - 50 (amateur band)
- RX Freq (MHz): 0.5 - 30, 150 - 54, 108 - 174, 420 - 512
- Emission modes: LSB, USB, CW, AM, FM
- FSK 1.5kHz, J2D, F2D Audio frequency shift keying (external input), F1D Frequency shift keying
- Modulation Types: SSB: J3E Balanced, filtered carver, AM: A3E Low-level (early stage), FM: F3E Variable reactance
- Options: FC-20 Automatic Antenna Tuning Unit (External), FVS-1A Voice Synthesiser, ATAS-1(X) Active Tuning Antenna System

Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

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