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# practical Wireless

AUGUST 1992 £1.75

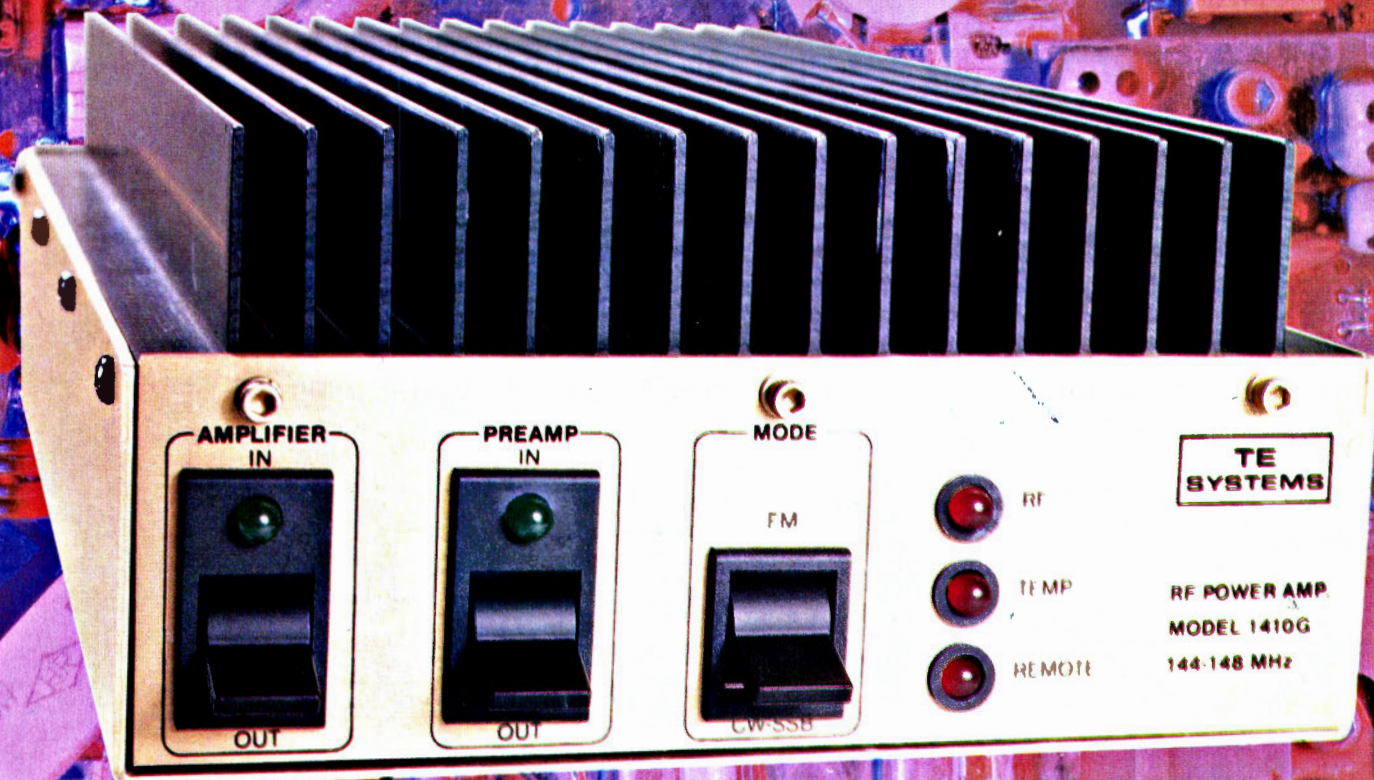
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**Review**  
**The TE Systems 1410G 144MHz**  
**Linear Amplifier**



ISSN 0141-0857



**Plus**

**Getting Started The Practical Way,**  
**Focal Point, CB High & Low,**  
**Prize Competition and Lots More**



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- ✓ Automatic Power Off.
- ✓ Selectable Channel Steps.
- ✓ Automatic Battery Saver.
- ✓ User Selectable Channel-Only

Display, Simple Operation For  
New Hams.

✓ Accessories Options:

A selection of batteries and leather cases. Desktop quick charger (NC-42 1 hour). CTCSS encode/decode unit (FTS-17A). DC adaptor with noise filter (E-DC-5). Mobile mounting bracket (MMB-49).

*Performance without compromise*



# practical Wireless

AUGUST 1992  
(ON SALE JULY 9)  
VOL. 68  
NO. 8  
ISSUE 1025

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### EDITORIAL & ADVERTISEMENT OFFICES

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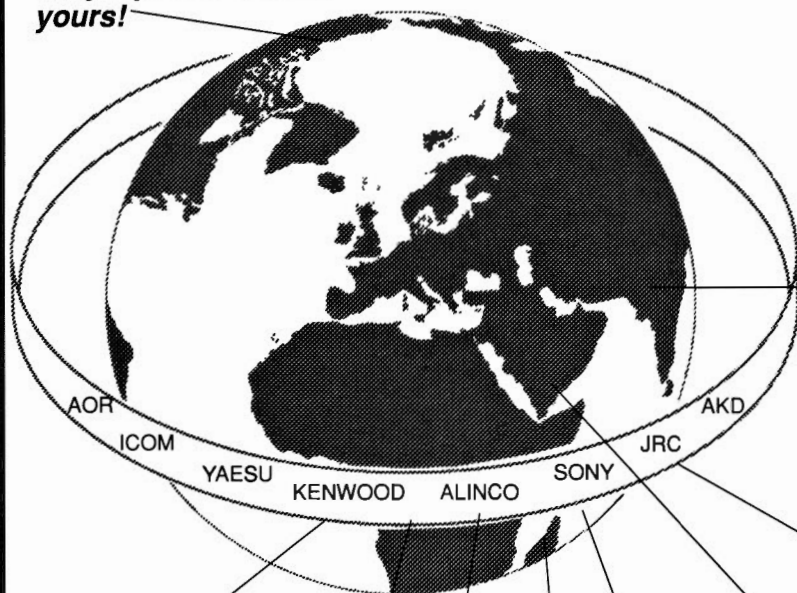
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**Greenweld**  
**Summer Sale**  
**64 Page Catalogue**

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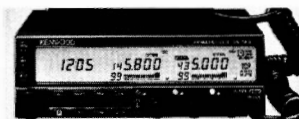
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Enjoy all advantages of these superior features: ■ Detachable front panel for maximum freedom of choice during installation (requires optional PG-4K/PG-4L kit) ■ Dual receive on same band (VHF+VHF or UHF+UHF) with one antenna ■ Audible frequency identification ■ Multi-function microphone ■ Built-in DTSS with pager function ■ Tone alert system ■ Separate speaker terminals for each band (switchable) ■ Automatic band change (ABC) ■ Multi-scan functions ■ 50 split memory channels or 64 simplex memory channels plus 1 call channel (switchable)

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G30JV/G0PEP

STOP PRESS: New MFJ 20M QRP rig with 500Hz CW filter £179.95

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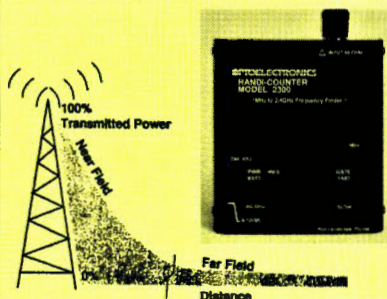
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MFJ-264	1.5kW dummy load. DC-650MHz	£69.95
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MFJ-812B	144MHz 30/300 Watt power meter	£31.95
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### MICROSET POWER SUPPLIES

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Windom 40/20/17/12/10m	1kW 21m L	£59.00
Dipole 20/15/10m	200W 8m L	£79.00
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# £369

inc VAT

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**To learn more about the transceiver that has already taken the Japanese and American markets by storm, phone or write for a full colour brochure.**



## "The Most Comprehensive Specification Ever Offered!"

Available direct or from your local dealer

Auto repeater mode  
AM Airband Reception  
Expanded Receive to 995MHz

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Now with every unit  
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### Specification

<b>Tx</b>	144-146MHz 430-440MHz
<b>Rx</b>	AM 108-143MHz FM 130-174MHz FM 400-470MHz FM 810-995MHz
<b>Steps</b>	5, 10, 12.5, 20, 25kHz
<b>Memories</b>	42
<b>Power Output</b>	2.5/1.0/0.3 Watts 5 Watts with 12V DC
<b>Scan</b>	8 Modes
<b>Tones</b>	1750Hz plus DTMF Optional CTSS
<b>Sensitivity</b>	12dB SINAD -15dBu
<b>Size</b>	140x58x33mm
<b>Weight</b>	410g
<b>Accessories Supplied</b>	Ni-Cad pack, AC charger, belt clip, carry strap, dual band antenna.

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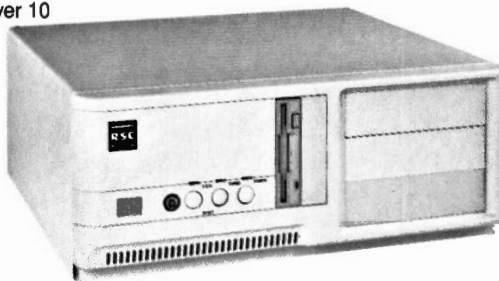


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- Handmic Supplied



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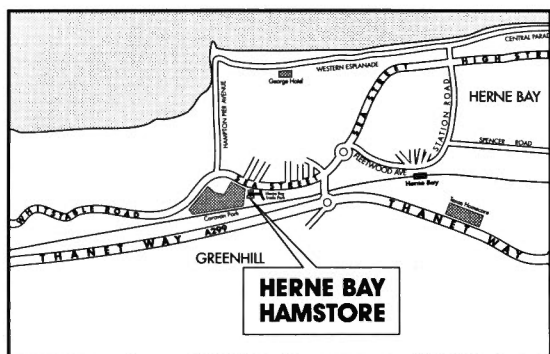
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Watch this space for more news, 73's, Chris G8GKC, Gordon G3LEQ & John G8VIQ.

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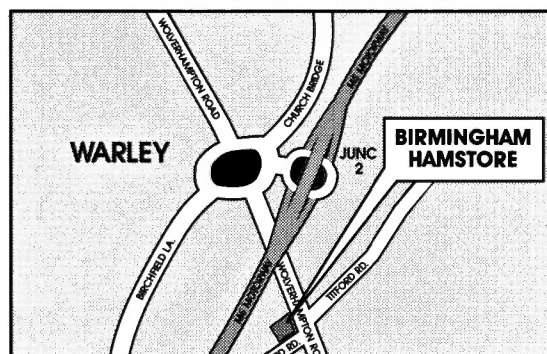
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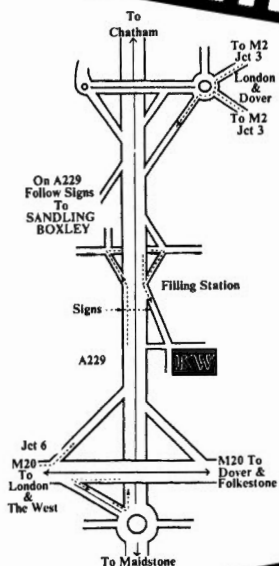
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**We look forward to serving you. 73's Tom G6PZZ**



# Keylines

As I write 'Keylines' this time, I've just returned from the RSGB's annual show at the National Exhibition Centre near Birmingham. And, although shows are normally extremely hectic for me, this is one weekend that must (speaking for myself anyway) stand out as a social event rather than purely working.

Normally I'm so busy that I don't get more than a few minutes at a time chatting to readers and friends. However, this year I'm sorry to say, the number of visitors was noticeably lower than the last time I attended the NEC in 1990.

The benefits for me were manifold. There was much more time to chat to old friends, like John EI7BA, who had taken the trouble to visit the show from Cork. Another couple of friends from the Southampton area, Alan G3HKT and Doug G3VRB, also spent some time chatting over old times in the hobby.

Unfortunately, one main topic was inevitably "isn't the show small" and "where is everybody"? It was only too obvious that the number of stands and visitors were fewer than everyone would have wished.

So, despite the fact that I enjoyed the show (and I really mean that!) what's wrong with the NEC event? Why were there so few stands and visitors? What can be done to keep it going, providing a focal point for the hobby?

## The Venue

Norman Miller G3MVV and the rest of the RSGB show team proved to be as helpful as possible, before, during and after the event. Additionally, the organisers were accessible at all times and the venue is itself located in what must be the most central and convenient part of the UK.

So, if this is the case, why were there so few people attending the show? To be honest, I think the visitor who said to me "How would you like to have to pay £3 to enter a shop, before you'd bought anything?" sums up the situation well, especially in these difficult financial times.

I really do think that money, and the cost of attending a show as a visitor or trader, does effect the overall figures of both type of customer. However, I must not forget that the show weekend's weather was also absolutely dreadful. The widespread flooding and thunderstorms caused havoc on the roads.

## Six Lane Waterway

Even on the way to the NEC on the Friday, the M42 looked like a six-lane version of the Cowes to Torquay power boat race! There was so much water on the roads, that I've no doubt that other motorists like me were wishing that they too had diesel-engined cars, rather than petrol!

One look at the exhibition site will make anyone realise that the NEC costs to the visitor, the commercial stall-holder and the RSGB itself will be inevitably high. But what can be done about it? Are we stuck with the NEC? Or can the national society look for an alternative location?

## What Are Shows For?

The questions I've raised, brings another question to mind. What are amateur radio shows for nowadays? Are they a 'shop window' on the hobby in general, or just an exercise in buying or selling?

Even though I'm a rather specialised radio amateur nowadays, I still like to attend rallies and shows with the intention of buying those 'difficult to get bits'. I'm also to be found looking at the Bring & Buy stall, and generally searching for those things I didn't know I needed!

Of course, the main reason why I'm at the important shows like Pickett's Lock (London), NEC, Leicester and the events held abroad, is to meet readers and promote *PW*. I'm also on the prowl for news, new ideas and products.

But, even bearing in mind the importance of what I've described, aren't we beginning to forget vital aspects of these events? This includes meeting old friends, learning more about the hobby, seeing what the varied sections of the RSGB have to offer, etc?

I'm wondering if the social and educational aspects of events like this are perhaps being pushed into the background of what could become one mammoth bargain hunt. And don't forget, I've already said I like bargain hunting too!

## National Societies Accused

National amateur radio societies are often accused of being remote, inaccessible and difficult to contact. Despite this, the RSGB can hardly be criticised for their effort at the NEC this year.

The president, Terry Barnes

G13USS, was to be seen everywhere throughout the duration of the show. All departments of the RSGB were represented, and they were easy to find.

I understand, on good authority, that the idea to open out the stands came from the former General Manager Philip Smith. Thanks to his initiative, society members and others could easily locate and talk to everyone from the Education & Training section, wander into Membership, before moving on to talk to the staff of *Radio Communications*.

Well done RSGB, you did extremely well! Everyone was accessible, and the society was seen to be doing its best to promote itself and the hobby, to best advantage.

However, and despite my accolade, there's a big problem. And unfortunately it all comes down to that problem we all suffer from... lack of money!

## The NEC Problem

The problem about the NEC, as I see it, is not the RSGB or their organisation. It's the NEC itself. It's too expensive and there is absolutely nothing the society or anyone else can do about lowering the costs.

I'll agree that the NEC is central, it's modern and accessible. It's also very expensive, and the RSGB has to pass on the costs to everyone. Although the show attracts more publicity by being there, I wonder if our hobby can afford the luxury of such a prestigious site?

After all, an enormous number of rallies, conventions and shows take place at less imposing sites...and they're successful. One or two take place at council-owned sports complexes, and schools are very popular.

## Wrongly Assumed

I had wrongly assumed that the NEC was a venue operated by central government. Research shows that it's actually run by the City of Birmingham on a full profit-making basis.

I also learned that far from being free, the show organisers have to pay 40p per visitor for car parking, regardless of whether a car is parked or not. This is the only way of avoiding the normal £3.50 car parking charge normally applied. I'm glad the RSGB takes advantage of this facility! It's obvious that anyone organis-

ing an event at the NEC has a great deal to take into consideration. I don't have any answers, other than that they look around for other sites in the area.

Perhaps other people will think differently. Maybe they think the recession is nearing its end, and this aspect must be having an effect. Having said that, I should also mention that I'm fully aware that some amateur radio traders reported fairly good trade!

So, although the results of the NEC event are probably interpreted in many ways by different people, I think a national show is needed. But is the present venue the right place? Is it likely to dampen the enthusiasm for what should be a very popular event with everyone. Can British amateur radio afford the NEC?

## Microwave Project

Like very many other *PW* readers, I built and used the famous Exe microwave project. Even now (if you're lucky) you can still find the occasional pair of Exe dishes at shows.

For a project published so long ago the Exe still arouses interest. Developed by Dick Ganderton G8VFN (now editor of our sister publication *Short Wave Magazine*) and John Fell G8MCP (now G0API), the Exe, published in June 1981 was a wideband 10GHz project. The Exe became extremely popular and led to many amateurs discovering and getting the bug for microwaves.

With this in mind, I'd like to follow up a reader's suggestion and ask how many of *PW*'s home-brew enthusiasts would like to tackle a project of this nature.

## Elitist Image

I managed a very brief conversation with Charles Suckling G3WDG at the NEC, and he's keen to discourage the elitist image cultured by one or two microwave specialists. Indeed, it's Charles and fellow enthusiast Mike Walters G3JVL, who have developed the simple 10GHz transverter system, recently publicised by David Butler in *PW*'s 'VHF Up' column.

However, to do our bit to encourage microwave activity, I need your help! Let me know what you'd like to do on microwaves.

73 Rob Mannion G3XFD

# Services

## Queries

We will always try to help readers having difficulties with a *Practical Wireless* project, but please note the following simple rules:

- 1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
- 2: We cannot deal with technical queries over the telephone.
- 3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the query adequately.
- 5: Only one query per letter please.

## Back Numbers & Binders

Limited stocks of many issues of *PW* for past years are available at £1.80 each including post and packing. Binders, each holding one volume of *PW* are available price £5.50 each (£1 P&P for one, £2 for two or more). Send all orders to the Post Sales Department.

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Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

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Each constructional project is given a rating to guide readers as to its complexity.

**Beginner:** A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

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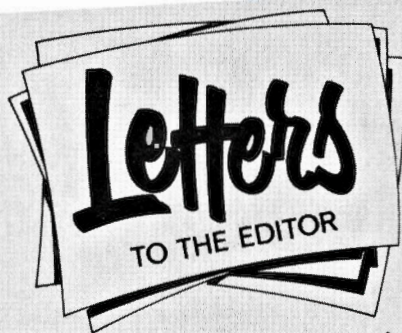
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# Receiving You



Send your letters to the editorial offices in Poole. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book, PCB or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

## £10 LETTER

**Dear Sir**

First of all I would like to say excuse me for my bad English. I don't speak and write it very well and I know of your magazine by a friend who is a subscriber.

Every month he lends me *PW* and I enjoy it. There is a lot of articles and they're all very interesting. We don't have a magazine like *PW* in France. We have magazine for the radio amateur like *REF*, *Megahertz Magazine* and some magazines for CB, but not one like yours.

I'm very surprised by the quality of new rigs and new equipment that you have in the UK. We can see this a few months later in France. Why? I don't know! And your prices are more advantageous, maybe at the end of this year, this will change?

I would like to add that my town, Auxerre which is 160km south of Paris, organises every year at the same time the biggest show for radio amateurs in France. It happens in the second week end of October (10th and 11th of October). Are you intending to visit us? All visitors will be the welcome, and if you need more information don't hesitate to contact me.

**Mr Philippe  
Auxerre  
France**

**Editor's reply:** Thank you for your letter and comments Mr Phillippe. I'm sorry to be so formal, but you didn't let us have your first name. You can be assured that nobody in the office here can write in French as well as you do in English! The *PW* team were pleased to read your letter, and delighted to hear that you enjoy the magazine. Our biggest handicap in France is of course the fact that we're an English-language magazine. Despite that, we're very pleased to hear from our French and other continental readers. We were also surprised to hear your comments on equipment and prices, personally I've always assumed that all the radio gear I fancy is always cheaper abroad! Perhaps, after your show, you would like to send us some photographs and we'd be delighted to share the news with readers.

**Dear Sir**

In the July, August and September 1990 issues of *PW*, you carried an article about an s.s.b. transmitter for home construction, called the 'Marland'. I have built this with the intention of adding the companion receiver, which you refer to in reply to a letter from G3WQW in the February 1991 issue.

Can you say when the design for the receiver will appear? I am sure that there are many other Marland users who would like to add the other half to their rig.

Also I would like to thank you for a publication which is a great help to me, as I am a newcomer to the hobby. The descriptions of circuit operation are especially important. I know it's not always possible, but it helps if the circuit diagrams are accompanied by a brief explanation of what happens to the signals at various points in the circuit. This is very important when fault-finding.

**Derek Chenery G0PPI  
Dover  
Kent**

**Editor's reply:** Thank you for your letter Derek. The *PW* team are pleased to hear that you've enjoyed using the 'Marland' and are now patiently waiting for the receiver side. I did ask, in my editorial reply to G3WQW, for readers interested in the receiver project to contact me. Apart from your letter, that's the lot! George Dobbs G3RJV decided to leave that project for a while and concentrate on the *PW* 'Jubilee' 14MHz mobile s.s.b. transceiver. This is now almost ready for publication and I hope to have a prototype of my own working soon. However, earlier in the spring, another 'Marland' owner contacted us to say he'd converted his transmitter into a transceiver. This project is now being evaluated and I hope to have some news on that project soon. In the meantime, I'd still like to hear from 'Marland' owners, whether or not they'd prefer a separate matching receiver!

**Dear Sir**

I feel I ought to drop you a line after reading your editorial in *PW* June.

Well done! I do not see why if these 27MHz rigs are available why we could not purchase, modify and use them! They would be ideal for QRP work on 28MHz, Novice use and also transverting for v.h.f./u.h.f. or even h.f.

They would also be useful for /M or /P work in my other hobby as a re-enactor of the English Civil War period. I find that the main h.f. rig is a little too bulky, and power-wise a little too high for caravan work. However, a 28MHz rig would be super, and would enable us to use the band when it's dead for DX.

I hope that you get the backing of the RSGB and RA to allow us to legally buy, modify and use the sets again. If so, I aim to get at least one! Keep up the good work!

**C. Barber G4LDS, Burnham-on-Crouch, Essex**

**Editor's reply:** Forsooth, 'twas an illuminating letter Mr Barber. Methinks that your antenna must look most oddley on either your periwig or 'round-head's' hat! I really don't know what 'side' (Royalist or Cromwellian) you're on G4LDS, but it's the most unusual use for amateur radio I've heard about! Do you base-load your musket or pikestaff? However, thanks for your support, and I hope eventually to hear from the RSGB and RA on the matter.

## PW October 1992 Issue

We particularly need reader's letters with memories of *PW* for the Diamond Jubilee issue. Get writing - it's your special celebration too!



## Dear Sir

I see from your correspondence that the Class B hunting season is upon us again! I refer to the letter from John Hemming 2E1ANW, on the subject of the novice licence. Now let me say at once, that I am in favour of the new licence, as it fills a much felt need.

I am also used to the Class A lads sniping at the Class B operators and telling us that we are, somehow, an inferior group; something to do with not knowing Morse, I believe! Whilst I am, perhaps, prepared to take snide comments from 'old timers' it seems we now have to battle with a new breed of hunters.

Let me quote from John's letter "might not make some of the operating mistakes that Class Bs do every day". To judge from his callsign John has been licensed several weeks and therefore, being very experienced in these matters, has already discovered the subordinate species in our ranks. He's also aware that Class A people do not make these mistakes, or at least if they do he is prepared to overlook these petty foibles!

The truth is that there are good and bad operators on both sides of the fence. My own achievements in amateur radio includes 38 countries on 144, 21 on 432 and eight on 1296MHz. I have worked through the satellites since Oscar 6 and I am active on 10GHz s.s.b. and f.m., and also on 24GHz.

My current tally of certificates is over the 50 mark so I think I must be doing something right! How does this equate on talking to working on 3.5MHz, talking about my carrots? Let us live and let live, there is space for all, no matter how experienced or mistake prone they may be.

Incidentally, my oldest and most prized certificate is that issued by the *Short Wave Listener* in September 1948 making me a member of the VHF Listeners' Club. I wonder how many are still out there now?

**Glen Ross G8MWR, Coventry**

**Editor's reply:** Thanks for your interesting comments Glen. Perhaps carrots won't grow above 30MHz? My own listening experience on 3.5MHz s.s.b. makes it seem to be like overhearing conversations from a doctor's surgery! But joking apart, it's remarkable how Austin Forsyth G6FO's, *Short Wave Listener* magazine, during its relatively short life, predicted by its own appearance, the future for *Short Wave Magazine*, as a dedicated listeners' magazine wasn't it?

## Dear Sir

Ref: 'Keylines' April.  
If you can't afford the Editor's suggestion of a 'Linguaphone' course, try the language tapes such as 'Deutsch Direkt' or 'Get By In..'. Your local library, will also have many books to learn from.

A useful free source are the BBC's 'culture' programmes, which usually include mainly native speakers in various situations and subtitled pronunciation in an Anglicised text.

Regarding the "ignored novice". He probably has 3.5MHz coverage like mine - two annular rings radiussed on Portsmouth and Herefordshire. Not only

were the stations probably not ignoring him, there's a good chance they didn't even hear him! Check an article on 3.5MHz sky wave cover from a 1960s edition of *Short Wave Magazine* for details.

Finally, rejected hobby newcomers? Not at my local club. The main reason is probably treatment by magazines. Projects are buildable in a few hours, hence they are simple to the point of unsuitability, use standard parts (Far East standard), are padded to fill space (e.g. the plug/socket box in a recent retail magazine) while being an insult to the builder's intelligence and can't be too com-

plex in their text or the poor newcomer won't understand.

Small wonder that we are now suffering a near disastrous shortage of good r.f. engineers, not one superhet receiver has been published for ages (and I mean here one which does not use the four i.c.s, a plated-through double-sided board and costs £70 odd) and people are asking for valve projects and older equipment details.

I hope that *PW* will occasionally feature the multi-part article offering a well made and useful item of radio equipment.

**Peter J. Brent  
Crawley**

**Editor's reply:** Thanks for the letter Peter, and the good ideas on language study and other comments. The various BBC programmes are excellent sources for students. Unfortunately, with regards to the "ignored novice" I know that the offending G station DID hear the novice, as he told the next G he worked that he wasn't going to work at 5w.p.m., etc! Finally, the *PW* 'Churchill' s.s.b. project will be published soon. I feel that this will prove very popular, and it will keep you busy for a while, and you'll end up with a very useful rig that will prove useful on v.h.f. as well as h.f.

## What do you want in *PW*?

What projects do you prefer? Are small projects to your liking? Do you want v.h.f. circuits?

Write in and tell us - we're here to serve you!

## COMPETITION CORNER

### Spot The Rig

Our art bod Steve Hunt has manipulated another pic of a rather famous piece of amateur radio equipment. Can you work out what model and make it is? Or should you take the hint and mow that lawn!

Name.....

Address.....

.....

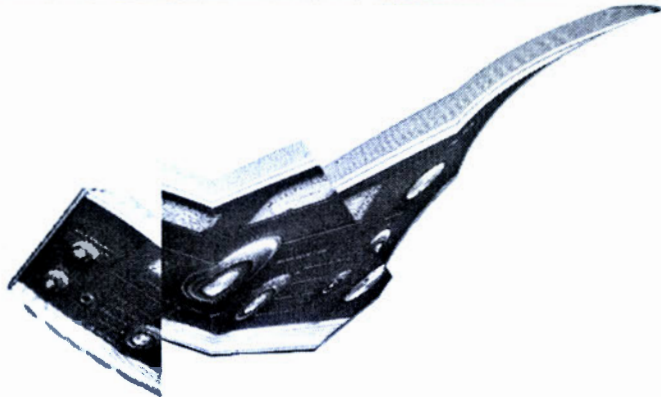
.....

☐ Subscription ☐ Voucher

Send your entry (photocopies acceptable with coupon) to: May Spot The Rig Competition, PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by August 21st.

**First Prize:** One year subscription or £20 book voucher.

**Two runners-up:** Six months subscription or £10 book voucher.



I think that this rig is a...

Competition Corner  
August '92



## Nevada Nabs NEC Thieves

Thieves had a nasty surprise when they were caught stealing new equipment from the Nevada stand at the RSGB's NEC show on Saturday May 29th. Amateur radio retailers have been hit hard by thefts at shows recently, and a new initiative against crime provided dramatic results within 20 minutes of the show opening its doors to the public on the Saturday.

Prompt action by Nevada staff member Paul Martin G0AFF, enabled Nevada's managing director Mike Devereux G3SED, to challenge the suspect with the assistance of a member of the NEC security staff. The alleged suspect was then arrested and interviewed by police.

In the meantime, the vigilance of the NEC security staff led to the detention of an alleged accomplice. The combined actions led to the recovery of two hand-held transceivers, a Standard C528 and a Kenpro KT220 together worth £600. Two young men, both licensed radio amateurs, from the Chesterfield

area of Derbyshire were later charged with theft following the incident.

Mike Devereux G3SED was delighted at the results gained by the new security initiative operating between amateur radio dealers and stated: "Paul Martin's action stopped the theft of two valuable hand-helds,



and the results show that the new approach to security, accompanied by better communications is working. Dealers are determined to crack down on the increasing number of thefts from stands at shows and rallies, and we are delighted with the success of our new approach. Finally, I must also say how impressed we were by the co-operation and professional approach of the NEC security staff, and how quickly they detained the second suspect".

## IRTS Jubilee Year Expedition, Clare Island, Co. Mayo

A major expedition to Clare Island, off the west coast of EI, is planned between August 8 and 15th.

Operation will be from IO53 (EJ60) and from IO43 (EJ60/P). The EJ prefix is reserved for operation from off-shore islands.

Stations will be QRV on the 70, 144 and 432MHz bands and also on h.f.

Frequencies will be as follows: 70.243MHz c.w. and s.s.b.; 144.143MHz c.w.; 144.243MHz s.s.b.; 432.243MHz c.w. and s.s.b.

Meteor scatter operation will take place during the Persids shower on August 12 and 13th on both 70 and 144MHz.

Skeds can be made during the Expedition only, via the v.h.f. net on 14.330 or for 70MHz on 7.077MHz each morning at 0800 local.

Further information from **Paul Martin EI2CA on 900637 work or 612241 home**, prefix codes for above numbers from the UK is **010 353 1**.

## Attention All FT757GX Mk1 Owners

Due to demand from owners of the FT757GX Mk1, Yaesu have agreed to manufacture another batch of front panels. So, if you are the owner of a FT757GX Mk1, which would benefit from a new front panel, then why not contact their Service department on (0703) 254247 for more details.

This will probably be your last chance, as they won't be repeating this production run. Price is expected to be around £20 + VAT.

**South Midlands Communications Ltd.**

**S M House, School Close, Chandlers Ford Industrial Estate  
Eastleigh, Hampshire SO5 3BY.**

## Radio Amateur Courses

**Brighton College of Technology, Pelham Street, Brighton, East Sussex BN1 4FA.** Commencing Monday 14 September 1992. Two evening classes are available: Mondays from 6 until 8.30pm covers the theory necessary to pass the City & Guilds RAE and Wednesdays, also from 6 until 8.30pm for Morse and practical project building. Enrolment fees cover the cost of all notes and paperwork.

For further details, please contact **Tim Strickland G4E0A on (0273) 667788 ext. 605 or 730.**

**Derby Tertiary College, Prince Charles Avenue, Mackworth, Derby DE3 4LR.** To commence in September 1992, C&G 773 NRAE will run on Wednesdays from 6.30 to 8.30pm (Novice) and the C&G 765 RAE will run on Thursdays, again from 6.30 to 8.30pm.

For further information, contact **Student Services on (0332) 519951 or course tutor F. Whitehead G4MLL on (0332) 512080.**

**Doncaster College, Waterdale, Doncaster DN1 3EX.** Commencing September (should there be enough demand). The class will be on a Tuesday evening from 6 until 8pm, and anyone interested should contact **Mike Parkin G60SD on (0302) 322122 ext. 282 or 287.**

There will also be a basic practical electronics course on a Wednesday evening, 6 to 8pm, the tutor being **Trevor Jones**, who can be contacted on the same number.

**The City of Westminster College (formerly Paddington College), 25 Paddington Green, London W2 1NB.** Commencing early September 1992 (for May 1993 exam). Both class A and class B licences will be catered for (i.e. a Morse course will run concurrently). Additionally, an advanced Morse course is hoped to be conducted, taking candidates up to 22/25 w.p.m., with insight to professional/marine procedures, etc. Professional college lecturers will conduct the courses.

Prospective candidates should contact **Ann James**, in the Science and Technology Department on **071-723 8826**, as soon as possible for enrolment details, etc.

**Newport ARS, Brynlgas Community Education Centre, Brynlgas Road, Newport, Gwent NP9 5QU.** Commencing Friday 18 September at 7pm, and each Friday thereafter, (with the exception of public/school holidays). The course is being planned to end at about the date of the May 1993 examination, although anyone wishing to sit the December 1992 exam is welcome to do so.

Anyone interested in taking this course, is invited to contact **Kevin Snelling GW7BSC**, at the above address. Brynlgas Education Centre is a registered City & Guilds Examination Centre.

Alternatively, enrolments for the course can be made during Brynlgas Centre's "Open week", from September 5 to the 10th, or on the first night of the course.

**Bradford & Ilkley Community College, Great Horton Road, Bradford, West Yorkshire BD7 1AY.** Tel: (0274) 753371/753377. Enrolment times are September 8, 9 and 10th, between 9.30am until 4pm and between 6pm until 8pm. Late enrolments will be accepted. Further details may be obtained by contacting the college at the above address.

**Rugeley Adult Educations Centre, Taylor's Lane, Rugeley, Staffs. WS15 2AA.** Commencing 24 September 1992 on Thursday evenings, 7 to 9pm. Course tutor is **Brian Smith G4EQC**. The class is normally a mixture of young, not so young, male, female, complete beginners and some experienced s.w.l.s. All are welcome, no previous radio or electrical knowledge is assumed. The centre is now an RAE examination centre and welcomes external RAE candidates.

Further details from **Mr B. Golemboski on (0889) 578738.**

## Special Event Station GM0PNS

Pabay near Skye. GM0PNS will be active for approximately seven days from 9/10 August 1992. Operation will be on h.f. from 3.5 to 28MHz on s.s.b. and c.w. Depending on the results achieved, operation from other islands in this part of Scotland may take place over the coming years.

Contacts will be confirmed by a special QSL. Radio amateurs who are also philatelists will be interested to know that Pabay is licenced to issue its own stamps. A special stamp is being issued to mark the event and a cover envelope with the stamp, together with information on Pabay is available at £1.

To be certain of cards, QSL direct. Cards will be returned via the RSGB QSL Bureau, unless the special stamp is requested (as above). Note that this in no way infers that they are charging for QSL cards, as requests for direct QSLs will be sent via the normal postal system (posted on the mainland after the event).

QSL Address is **GM0PNS, Isle of Pabay, Broadford, Isle of Skye IV49 9BP.**



## Swansea Foxhunting Group

Swansea Foxhunting Group are organising a 144MHz direction-finding foxhunting event for August 15 and 16th. This will consist of four foxhunts, two on each day. The foxhunt area will be the forest of Dean, an area central to all the known 144MHz foxhunting groups in the country.

Further details from **Philip Smith GW1XBG on (0792) 642001**. A detailed information sheet of the weekend activities will be available, so please send a s.a.e. if you would like to receive a copy.

## Langford Lodge Wartime Centre

In 1942, the Lockheed Overseas Corporation took over Langford Lodge Estate, near Crumlin, County Antrim, Northern Ireland, and created Station 597, a vitally important repair and research base for the United States 8th Army Air Force European Theatre of Operations.

At the height of the war, over 3000 people were based at Langford Lodge. Large numbers of men, machines, B17 and B24 aircraft passed through the base and on to other stations.

Some of America's finest entertainers, including Bob Hope and Glen Miller, played at Langford Lodge.

Although the Mansion House at Langford Lodge no longer exists, old accommodation buildings have been converted to house Ireland's finest wartime centre/museum.

The 50th anniversary of the commissioning of Station 597, will be on 15 August 1992, and will be celebrated at Langford Lodge Centre, with a '40s' dance, BBQ, fireworks display and most importantly, dozens of returning veterans.

Over the weekend, Lagan Valley ARS will be operating a special event station, callsign GB0AAF (Army Air Force). It is hoped that veterans who are unable to come over from America will be able to make contact via the short wave radio bands.

The station will be operating the following frequencies: 144.260MHz, 28.260MHz, 21.260MHz, 14.260MHz, 7.070MHz, 3.760MHz and also Packet and AMTOR modes.

An encouraging response has been received from various Royal Air Force radio clubs, other wartime centres and interested parties in Great Britain who have promised to also be active on the radio.

Contact address for special event radio station is:

**Colin Tait, 33 Riverside Drive, Lisburn, Country Antrim, Northern Ireland BT27 4HE.**

## The Tall Ships Special Event Station GB8TS

August 1992 sees the return of the 'Tall Ships' to the River Mersey as part of the Grand Regatta Columbus 1992, a flotilla of over 70 tall sailing ships celebrating Christopher Columbus' historic voyage of 500 years ago, in which he discovered America. The ships, including 11 of the World's tallest, will sail into the Port of Liverpool, from Boston, at the end of the final transatlantic leg of the four month Regatta.

As part of the celebrations taking place that week, the Wirral & District ARC are pleased to announce that they will be operating a special event station, using the callsign GB8TS.

Equally special, and significant, will be the choice of the location for the station - Perch Rock Lighthouse, New Brighton. This will be the closest to land that the ships have been since they set sail, and it will be the last piece of land to sail past on their next voyage.

The Lighthouse, a 30m high, marble replica of a classic Eddystone design, has watched over and guided shipping past the rocks where it stands, at the river mouth, since 1830. Alongside it stands Fort Perch Rock, conceived and built about the same time, to defend the Port at the time of the Napoleonic wars, before the popular Victorian seaside town of New Brighton even existed.

Both the Fort and Lighthouse are now privately owned. Their location, at the Northern tip of the Wirral Peninsular, provides probably the best vantage point to see the ships both in the river, and sailing in and out of Liverpool Bay and the Irish Sea. Naturally, the location has proved to be popular with the world's press and TV in their search to locate cameras.

Operation of the station will commence on Thursday 13 August 1992, and continue until after

the ships have left the river, celebrations completed, on the afternoon of Sunday 16th. Depending on conditions and time of day, most of the popular short wave bands will be worked, as well as v.h.f. and some u.h.f. operation.

A rather unusual QSL card, befitting of the event and location, has been designed to send to those who send in their confirmation of working the station, as well as for short wave listeners. All QSLs via the Bureau please. All QSLs will be acknowledged.

Although the Lighthouse is only a 10-minute walk from the promenade over sand and rock, access is dependent upon the tides. Wellington boots are essential, as a deep pool of water forms around the base of the lighthouse, and the door is halfway up the side!

Inside the lighthouse, the accommodation is good, as it possesses light, heat, a bedroom, kitchen, toilet and a bathroom with a shower, as well as a general area, store and lamp-room. It even has a phone! All of this will be welcomed by the operators who will be staying aloft for up to four nights.

The success of the special event station is looking good, given the unique callsign, location and event. Added to that the amount of interest already generated world-wide and within the hobby, in events connected with the Columbus voyages and Tall Ships in general, and they might have a pile-up! Contacts and schedules from other stations involved with the Regatta would be most welcome.

Gerry Scott is acting as publicity co-ordinator and he can provide additional up-to-date information (s.a.e. please). **Gerry Scott G8TRY, 19 Penkett Road, Wallasey, Merseyside L45 7QF. Tel: 051-630 1393.**

## Amateur Radio Special Event Station GB17USA

The amateur radio special event station GB17USA is to commemorate 50 years of the USAF B17 Bomber and air/ground crews first arrival in England at Royal Air Force Station Bovingdon (now a disused airfield) near Hemel Hempstead, Hertfordshire.

The actual date of arrival was 12 June 1942, but it was not made official by the War Office until 12 August 1942.

Primary communication will be as follows:  
145.350MHz f.m., 144.360MHz s.s.b., 144.050MHz c.w. and 3.710, 7.045, 14.277, 14.290, 21.290, 28.590MHz s.s.b. plus/minus 5kHz and 3.515, 7.015, 14.055, 21.055MHz c.w.

The licence for GB17USA is from August 9 for 23 days. The station will be on the air depending on operators available, equipment and propagation with special effort on weekends and August 12. A special QSL card to stations worked, also they may have a certificate to some special stations which will be advised over the air.

If more information is required, contact **Terry G4PSH QTHR, tel: (0296) 85760**. For the States, contact **Ernie W1BFA QTHR or Steve ARRL Public Information Manager.**

## BBC Wenvoe ARC

August 15 marks the 40th anniversary of the beginning of the domestic television service in Wales, which started from the BBC Wenvoe transmitter, near Cardiff, on Band I, 405-line. Today, transmissions continue - albeit on v.h.f. 625-line PAL colour!

To mark the anniversary, members of the BBC Wenvoe ARC (GW4WVO) are running special event station GB2WV. They will be active on all h.f. bands, including 3.5MHz, to warn fellow 'Gs'. They will especially welcome QSOs with anybody from the broadcasting profession. All QSOs will be acknowledged with a special QSL card, which incorporates a potted history of the Wenvoe station.

Details from **Paddy O'Reilly GW4MAD on (0222) 515213**.

## 1st Annual Scottish Activity Weekend

Due to the fact that two of the regional stations did not appear for the 1st annual Scottish Activity weekend event, on April 18 and 19th earlier in the year, anyone having a contact with GB2STB can now claim 20 points towards the 'Scottish Century Award'. Any comments regarding this event would be appreciated, especially those concerning the points system. All letters will be answered.

**Paddy GM3MTH,  
9 Ramsay Place,  
Coatbridge,  
Lanarkshire,  
Scotland ML5 5RE.**



Newsdesk  
'92



# Club News

Please send in all of your 'Club News' items to Sharon George at the editorial offices in Poole.

**Acton, Brentford & Chiswick ARC** meet 3rd Tuesdays, 7.30pm at Chiswick Town Hall, Turnham Green, London W4. July 21 is 'Critique On QRP Field Day'. Further details from **Paul Truitt G4WQC** on 071-938 2561.

**Appledore & District ARC (Devon)** meet 3rd Mondays, 7.30pm in Appledore Football Clubroom. For further details, contact **Trevor Brookes G0JUR** on (0237) 477777.

**Axe Vale ARC** meet 1st Fridays, 7.30pm in the 'New Commercial', Trinity Square, Axminster, Devon. Further details from **Pat Cross G0GHH** on (0297) 33756.

**Aylesbury Vale RS** meet 1st & 3rd Wednesdays, 8pm in the Village Hall at Hardwick. August 5 is a Summer Social. Further details about the club from **Martin G4XZJ** on (0296) 81097.

**Barr Beacon RC** meet 1st Mondays & 3rd Wednesdays, 7.30pm at 112 Walsall Road, Aldridge, West Midlands. For further details, ring (0922) 36162.

**Barnsley & District ARC** meet Mondays in the radio club room & shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. For further information, ring **Ernie G4LUE** on (0226) 716339.

**Basingstoke ARC** meet 1st Mondays, 7.30pm at the Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. July 11 is Le Court Fete - exhibition station, the 26th is a 144MHz Foxhunt & August 3 is HF Field Day planning & Junk Sale. For further details, phone (0256) 25517.

**Bedford & District ARC** meet Thursdays, 8pm in the Allen Club, Hurst Road, Bedford. More details from **Gavin Carmichael**, 15 Evesham Court, Avon Drive, Bedford MK41 7AJ. Tel: (0234) 365660.

**Blyth ARC** meet Wednesdays, 7pm at Newsham Community Centre, Elliott Street, Blyth, Northumberland. All welcome. Details from **Keith Ritson G0PKR** on 091-237 1963.

**Bradford ARC** meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. **Charles Bolt G0ACX** on (0247) 494634.

**Brantree & District ARC** meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Brantree. **M. Andrews**, 22 Arnhem Grove, Brantree, Essex CM7 5UD. Tel: (0376) 27431.

**Brighton & District ARC** meet 1st & 3rd Wednesdays, 7.45pm at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton. More details from **Harold Lunson G3WRR**, 17 Tongdean Rise, Brighton, East Sussex BN1 5JG. Tel: (0273) 501100.

**Bromsgrove & District ARC** meet Fridays at Avoncroft Arts Centre, South Bromsgrove, Worcester. July 10 is Club 144MHz Activity & the 21st is GB2PC 'Project Countryside' station at Waseley Hills Country Park. More details from **Joe Poole G3MRC** on (0562) 710010.

**Bromsgrove ARS** meet 2nd & 4th Tuesdays, 8pm at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. July 14 is a 144MHz Direction Finding Contest G4ZWR, the 28th is a night on the air & August 11 is a natter night. **Mr D. Edwards G4ZWR**, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

**Bury St. Edmunds ARS** meet 3rd Tuesdays, 7.30pm in Room EO-40 of West Suffolk College, Out Risbygate, Bury St.

Edmunds. For more details, contact **Ian G0KRL** on (0359) 70527.

**Bury RS** meet Tuesdays, 8pm in The Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays are Lecture/Talk nights & other Tuesdays are general natter nights with the club's 'new' rigs on the air. August 11 is a Foxhunt. More details from **Colin Fox G3HII**, 'The Lair', 5 Pinewood Crescent, Holcombe Brook, Ramsbottom, Bury BL0 9XE. Tel: (0204) 883212.

**Buxton Radio Amateurs** meet at the Lee Wood Hotel, Buxton at 8pm. July 14 is Rig Alignment Checks, the 28th is CW Procedures & August 11 is Test Equipment. For further details, contact **Derek Carson G4IHO** on (0298) 25506.

**Charnwood Amateur Radio Contest Club** meet 1st & 3rd Sundays at 'The Albion', Loughborough. Dedicated to operating & demonstrating the joys of amateur radio & furthering the hobby. Listen on S17 or contact **Phil on (0509) 232927**.

**Chelmsford ARS** meet 1st Tuesdays, 7.30pm at Marconi College, Arbour Lane, Chelmsford, Essex. More details from **Roy & Elia Martyr G3PMX & G6HKM**, 1 High Houses, Mashbury Road, Great Waltham, Essex CM3 1EL. Tel: (0245) 360545.

**Chester & District RS** meet at the Upton Recreation Centre, Cheshire County Sports & Social Club, Plas Newton Lane, Chester CH2 1PR. More details from **David Hicks G6IFA** on (0244) 336639 or **Sid Ainsworth G0HTP** on 051-355 2833.

**Clacton RC** meet alternate Wednesdays in The Imperial Public House, Rosemary Road, Clacton-on-Sea. For their membership details, phone (0255) 672606, 436565 or 615207.

**Conwy Valley RC** meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. For further details, contact **Merlyn Jones G4WNL**, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW. Tel: (0492) 530725.

**Cornish RAC** meet at the Memorial Hall, Perranwell Station, Perranwell, nr. Truro, 7.30pm. For further information, please contact **Mr G. Bate**, 9 Tresithney Road, Carharrack, Redruth, Cornwall TR16 5DZ. Tel: (0209) 820836.

**Coulsdon ATS** meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. **Andy Briers G0KZT** on (0737) 557198.

**Coventry ARS** meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. For further details phone **Jon on (0203) 610408**.

**Crystal Palace & District RC** meet 3rd Saturdays, 8pm at All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). July 18 is 'UFO Phenomena' by Leslie Baker G8JIC. More details from **Marino Fiorentini G7HUC** on 081-653 1090.

**Dacorum AR & TS** meet 1st (informal) & 3rd (formal) Tuesdays, 8pm at The Heath Park, Cotterells, Hemel Hempstead. A special event station G817USA is being held throughout August. Further details from **Dennis Boast G1AKX** on (0442) 259620.

**Delyn RC** meet every other Tuesday, 8pm at the Gwernymynd Community Centre in Gwernymynd, near Mold, Clwyd, North Wales. July 14 is 'Build A Kit' with G7WAAV. For more details, contact **Steve Studdart G7WAAV** on (0244) 819618.

**Denby Dale & District ARS** meet at Pie Hall, Denby Dale, nr. Huddersfield, 8pm. More details from **Ivan Lee**, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.

**Derby & District ARS** meet Wednesdays, 7.30pm at 119 Green Lane, Derby. More details from **Richard Buckby G3VGW**, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.

**Dereham ARC** meet 2nd Thursdays, 8pm at the St. Johns Ambulance Hall, Yaxham Road, Dereham. July 9 is a Problem Solving Night & August 13 is a BBQ & Surplus Equipment Sale. More details from **Mark Taylor G0LGJ** on (0362) 691099.

**Derwentside ARC** meet Wednesdays, 7.30pm in the Steel Club, 36 Medomsley Road, Consett, County Durham. Regular talks by amateurs & non-amateurs. Construction work overseen by Don G4LGA. Further details from **Geoff Darby G7GJU**, 60 Pine Street, Grange Villa, Chester-le-Street, County Durham DH2 3LX. Tel: 091-370 2032.

**Dorking & District RS** meet at The Friends Meeting House, South Street, Dorking, 7.45pm. More details from **John**

**Greenwell G3AEZ** on (0306) 77236.

**Dorset Police ARS. A new radio society.** Membership open to anyone connected with Dorset police, such as all regular police officers, all special constables, civilian staff employed by Dorset police, immediate families of all the above & retired police officers resident in Dorset. Further details about membership from **Richard Newton G0RSN**, Ferndown Police Station, Ringwood Road, Ferndown BH22 9AF. Tel: (0202) 552099 ext. 3198.

**Dragon ARC** meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. July 20 is a Surplus Equipment Sale, the 24th is a Special event - GB2CPC - Summer Fayre at Penrhyn Castle & August 3 is an evening on HF. **Tony Rees G4WFMQ** on (0248) 600963.

**Dronfield & District ARC** meet 1st & 3rd Mondays, 7.30pm in Room 3 of Gladys Buxton School, Oakhill Road, Dronfield. On other Mondays, members meet socially, by arrangement at the Fleur-de-Lys Public House, Main Road, Unstone. More details from **Piers Oldham G7HRW**, 110 Green Lane, Dronfield, Nr. Sheffield S18 6FU. Tel: (0246) 290444.

**Dundee ARC** meet Tuesdays, 7pm in the College of Further Education, Graham Street, Dundee. Further details from **George Millar G4MFSB**, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

**Dunstable Downs RC** meet Fridays, 8pm at The Old Mill, West Street, Dunstable, Beds. Further details from **Wendy Jefferson** on (0582) 451057.

**Easington ARS (Co. Durham)** meet Thursdays, 7.45pm at Southside Social Club, Easington Village. Further details from **Mr H. Walker G3CBW**, 20 Birchfield Drive, Eaglescliffe, Stockton-on-Tees, Cleveland TS16 0ER. Tel: (0642) 788280.

**Echelford ARS** meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. Further details from **P. Townshend G6PMT** on (0344) 843472.

**Edgeware & District RS** meet at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. July 9 is an informal/GX3ASR on air & the 23rd is 'Happy Girls & Boys', commercial radio in the 1930s by Stephen Slater G0PQB. More details from **Howard Drury G4HMD**, 11 Batchworth Lane, Northwood, Tel: (0923) 822776.

**Erewash Valley ARG** meet Thursdays, 8.30pm at 'The Ancient Druid' public house, Cotmanhay Road, Ilkeston. Further details from **Graham Beech G0KBN**, 15 Fisher Court, Cotmanhay, Ilkeston, Derbyshire DE7 8PZ. Tel: (0602) 327540.

**Fareham & District ARC** meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Details from **Rod Smith G0ERS** on (0705) 373572.

**Farnborough & District RS** meet 2nd & 4th Wednesdays, 7.30pm at Farnborough Community Centre, Meudon Avenue, Farnborough, Hants. More details from **Tommy Tomlinson G3UHW** on (0252) 515041.

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midland Road, Blackpool. July 9 is a talk on 'Radio Controlled Models' by S. Barlow G4NVF, the 23rd is an informal & August 13 is a DF Foxhunt. **Eric Fielding G4IHF** on (0253) 726685.

**Glenrothes & District ARC** meet in their clubrooms, Provosts Land, Leslie, Fife, 8pm. Further details from **John Hardwick G4ALA** on (0592) 742763.

**Gloucester ARS** meet Wednesdays, 7.30pm at St. John Ambulance HQ, Heathville Road (off London Road), Gloucester at 7.30pm. July 15 is Homebrew Clinic, the 22nd is Packet Self-Help Group, the 29th is Construction Group, August 5 is G4CLR - talk on the 'Novice Licence' & the 12th is Homebrew Clinic. Further details from **Jenny Beekingham G7JUP** on (0452) 528533 Ext. 2734.

**Goole R & ES** meet most Fridays, 7.30pm at the West Park Pavilion, West Park, Goole, last Fridays at the 'Black Swann Inn', Asselby. July 10 is Logbill & contest de-brief, the 17th is a natter night, the 24th is G0OLE on air, the 31st is a social evening & August 7 is G0OLE on air. Further details from **Steve Price G8VHL** on (0405) 769130.

**Grafton RS** meet 2nd & 4th Wednesdays, 8pm in Holy Trinity Club Hall at the rear of Holy Trinity Church, Granville Road, London N4. Further details from **Rod G0JUZ** on 081-368 8154.

**Grantham RC** meet 1st & 3rd Tuesdays at the Kontak Social Club, Barrowby Road, Grantham. Further details from **John Kirtton G8WWJ**, 'Treetops', 13 Saltersford Road, Grantham, Lincolnshire NG31 7HH. Tel: (0476) 65743.

**Great Lumley AR&ES** meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact **Barry G1JDP** on 091-388 5936.

**Halifax & District ARS** meet 1st & 3rd Tuesdays, 7.30pm at the 'Running Man' Public House, Pellon Lane, Halifax. For further details, contact **David Moss G0DLM**, Beechwood Lodge, Leeds Road, Lightcliffe, Halifax, West Yorkshire HX3 8NU. Tel: (0422) 202306.

**Hambleton ARS** meet in Room A5 of Northallerton Grammar School at 7.30pm. For more details, contact **Nigel Robertshaw G0NHM** on (0609) 776608.

**Hereford ARS** meet 1st & 3rd Fridays at the Civil Defence HQ, Magistrates Court, Gaol Street, Hereford. More details from **Errol Robinson G4MET**, 29 Folly Lane, Hereford HR1 1LX. Tel: (0432) 355297.

**Hoddesdon RC** meet alternate Thursdays, 8pm at the Conservative Club, Rye Road, Hoddesdon, Herts. July 9 is a natter night, the 23rd is a talk by **Steve G3ZVW** on 'DF Hunting' & August 6 is a social evening. Details from **Roy G4UNL** on 081-804 5643.

**Horndean & District ARC** meet 1st Thursdays, 7.30pm at Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. August 6 is Packet Radio, Siskin Electronics. For more information, contact **Stuart Swain**, 35 Mavis Crescent, Havant, Hampshire PO9 2AE. Tel: (0705) 472846.

**Hornsea ARC** meet Wednesdays, 8pm at the Mill, Atwick Road, Hornsea. Further information from **Jeff G4IGY** on (0964) 533331.

**Horsham ARC** meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. Further details from **Peter Stevens G8SUI**, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: (0737) 842150.

**Ilford Group RSGB** meet Fridays at 7pm. For further details, please contact **J. Hooper** on 081-478 3741.

**Ipswich RC.** Contact **Mrs S. Elden G8HYE**, 124 Larchcroft Road, Ipswich IP1 6PD.

**Itchen Valley RC** meet 2nd & 4th Fridays, 7.30pm at the Scout Hut, Brickfield Lane, Chandlers Ford. July 10 is a talk on 'Radio Astronomy' by **Peter Werba G7FXO** & the 24th is an open meeting & natter night. Further details from **Maurice Cheeseman G1PQD** on (0703) 736784.

**Jersey ARS** meet Fridays, 8pm at La Moye Signal Station, St. Brelade. Further details from **Ken on (0534) 483722**.

**Keighley ARS** meet at The Ingrow Cricket Club, Ingrow, Keighley, 8pm. July 9 is a natter night, the 16th is a Quiz, the 23rd is a natter night, the 30th is a talk & demo. on 'Using Packet Mail Boxes' by **G3TQA**, August 6 is a night on the air & the 13th is Ideas for Club Events 1993. Further details from **Kathy Conlon G1IGH** on (0274) 496222.

**Kettering ARS** meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. Further details from **Len G0ROV** (but QTHR as **G7EHM**) on (0536) 514544.

**Kidderminster & District ARS** meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact **Geoff Philpotts G7JIR**, 62 Erney Close, Stourport-on-Severn, Worcs DY13 0AH. Tel: (0299) 379229.

**The Kilo Delta Club** for all radio enthusiasts meet in the 'Victoria Inn', Hollins Road, Oldham, Lancashire, at 8pm. All enquiries to the **Secretary, Kilo Delta Club**, PO Box 93, Oldham, Lancashire OL8 3XE.

**King's Lynn ARC** meet Thursdays, 7.30pm at the 19th King's Lynn Scout HQ, North Runcton. Further details from **Derek Franklin G0MQL** on (0553) 841189.

**Lothians RS** meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. Further details from **Mel Evans** at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.

**Loughton & District ARS** meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pilsbury G4KCK** on 081-504 4581.

**Louth & District ARC** meet 3rd Tuesdays, 7.30pm at the Kings Head, Louth. More



details from **Neil Bartholomew G0JXY**, The Bungalow, Main Road, Grainthorpe, Lincs LN11 7HX.

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. July 21 is a Questions & Answers session & August 6 is a BBQ. Details from **Neil G8XYN** on (0628) 25952.

**Manchester & District ARS** meet Tuesdays, 7pm at Simpson Memorial Community Association, Moston Lane, Manchester M10 9NB. Further details from **Roger Farnley G0KTR**, 6 Cardigan Road, Hollinwood, Oldham OL8 4SF.

**Mansfield ARS** meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield, August 6 is a Foxhunt, followed by a BBQ. Further information from **Mary GUNZA** on (0623) 755288.

**Midland ARS** meet in Unit 22, 60 Regent Place, off Caroline Street, Birmingham B1 3NJ. Wednesdays are RAE classes & Thursdays are natter nights. July 27 is a Computer night & the 31st is an Atari night. For further details, contact **John Crene G0LAI** on 021-628 7632 evenings.

**Milton Keynes & District ARS** meet 2nd Mondays at North Bucks Youth Sports Hall, Haversham Road, Wolverhampton, Milton Keynes. August 10 is a night on the air. For more information, please contact **Julian Winsor G3FGB** on (0908) 611005.

**Morecambe Bay ARS** meet every other Tuesday, 7.30pm at the Trimpell Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact **J. Burrow G0NYD**, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212.

**Nelson & District ARS** meet Wednesdays, 7pm at Llancaich School Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact **Leighton Smart GWOLBI** at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736.

**Norfolk ARC** meet Wednesdays, 7.30pm at 'The Norfolk Dimpling', The Livestock Market, Harford, Norwich. **Jack Simpson G3NJO** on (0603) 747992.

**North Bristol ARC** meet Fridays, 7pm at Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. RAE & Morse tuition is available for members. More details from **Tony G4ROX** on (0272) 513573.

**North Ferriby United ARS** meet Fridays, 8pm at the North Ferriby U.F.C. Social Club, Church Road, North Ferriby, East Yorkshire. Further details from **Frank Lee G3YCC** on (0482) 650410.

**North Wakefield RC** meet Thursdays at 'The White Horse' PH, Fall Ings Lane, East Ardsley, N. Wakefield. Morse classes start at 7.30pm & all are welcome, with the Novice class on Friday evening. More details from **John Hoban G0EVT** on (0924) 825443.

**Nottingham ARC** meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. July 9 is a talk, the 16th is Activity/Foxhunt, the 23rd is a Construction evening - complete your projects, the 30th is Practical HF Construction, G6ABU/G4JAE, August 6 is Forum & the 13th is a talk on 'Balun Construction' by **Stewart G3WQW**. Further details from **Ian Miller G4JAE** on (0602) 232604.

**Otley ARS** meet Tuesdays, 8pm in the shack at the rear of the RAOB Club, Westgate, Otley, West Yorkshire. Further details from **Jack Worsnop G7DFC** on (0274) 636197.

**Oxford & District ARS** meet 2nd & 4th Thursdays, 7.45pm at the British Legion Club, Haddow Road, Crotch Crescent, Marston Road, Oxford. On July 23 they have a Junk Sale. More details from **Terry Hastings G0CFN** on (0865) 863526.

**Pontefract & District ARS** have Morse classes on Mondays, Novice classes on Tuesdays & normal meetings on Thursdays, all at the Carleton Community Centre, Carleton, N. Pontefract, at 8pm. Details from **Colin Wilkinson** on (0977) 677006.

**Poole RAS** meet 2nd & last Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. More details from **Vernon Cotton G3BCI**, 45 Branksome Hill Road, Bournemouth, Dorset BH14 9LF. Tel: (0202) 760231.

**Preston ARS** have 'Legging - Locking - Gongoozling' slides by Mr Astin on July 9, a natter night on the 23rd & an Outing evening to HMS Inskip radio station on August 6.

Details of their meeting place & time from **Eric Eastwood G1WCO**, 56 The Mede, Freckleton, Preston, Lancashire PR4 1JB. Tel: (0772) 686708.

**Prudential ARS** is open to all employees & ex-employees of the Prudential companies. All those interested in PARS should contact **David Dyer G4DNX** at 'Highbank Cottage', Underhill, Moulshold, Oxon OX10 9JH.

**Reading & District ARC** meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. July 9 is 'WAB Organisation' by Roger Muggleton G0HZK, the 23rd is 'New Repeater Hardware' by Graham G8JIP, the 30th is Boat Trip from Town Lock & August 13 is 'Standing Wave Ratios' by Peter Chadwick G3RZP. More details from **Nick Challacombe G0LGG** on (0734) 722489.

**Rochdale & District ARS** meet Mondays at TS Froisher, Greenbank Road, Rochdale. Further details from **Brian** on 061-653 8316 or **Dave** (0706) 32502.

**Rhyl & District ARC** meet 1st & 3rd Mondays. August 3 is Foxhunt no. 2. For more details, contact **Ken Padley G7JAR**, 67 Rosehill Road, Rhyl, Clwyd LL18 4TS. Tel: (0745) 338276.

**Salisbury Radio & Electronics Society** meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. July 14 is a 2m DF Hunt, the 21st is a natter night, the 25th is a 144MHz LP & SWL contest & the 28th is contest de-brief. For further details, contact **David Kennedy G7GWF**, 'Celeborn', 11 Silverwood Drive, Laverstock, Salisbury, Wiltshire SP1 1SH.

**Salop ARS** meet Thursdays, 8pm at the 'Old Buck's Head', Frankwell, Shrewsbury. July 16 is a 3rd Foxhunt at the Oak Hotel & the 30th is 'Computers' by G3UDA. Further details from **Glenda G1YJB** on (0839) 232090.

**Sevenoaks & District ARS**. Details from **The Secretary, c/o Sevenoaks District Council**, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

**Shefford & District ARS** meet Thursdays, 8pm at the Church Hall, Amptmill Road, Shefford, Bedfordshire. For further information, contact **Paul G1GSN** on (0402) 700618.

**Silverthorn RC** meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. More details from **Andrew Mowbray G0LWS** on 081-529 4489 between 5.30 & 6.30pm weekdays only.

**Solihull ARS** meet 3rd Thursdays in The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. For more details, contact **Colin Taylor G3USA**, 231 Robin Hood Lane, Hall Green, Birmingham B28 0DH. Tel: 021-777 9965 evenings or (0827) 53344 day-time.

**South Dartmoor ARC** meet Mondays, 8pm at South Dartmoor School, Balland Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact **Peter Thornhill G6ZKO**, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433.

**South Dorset RS** meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. July 17 is their annual BBQ at the Swan Inn, Abbotsbury. **Geoff Gwillian G4FJO**, 13 Dverlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.

**South Notts ARC** meet at Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. July 10 is a talk-in & Junk Sale, the 12th is a 3rd Foxhunt, the 17th is construction, the 24th is on the air, the 31st is talk-in & SSB Field day planning, August 7 is a talk-in & open forum & the 9th is a 4th Foxhunt. For further details contact **Ray G7ENK** on (0602) 841940.

**Southgate ARC** meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. July 9 is a lecture by Roger Western G3SXW on 'Contesting & DXpedition, the 23rd is s.s.b. contest simulation by G3KTZ & August 13 is a lecture by Keith Draycott G8UKT on 'WAB Hunting'. **Brian Shelton G0MEE**, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.

**Spalding & District ARS** meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. On August 7 they have a DF Hunt at the Fisherman's Arms, Podohele, 7.15pm. Further details from **David Johnson**,

65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 425367 (6-7pm).

**Spun Valley ARS** meet Thursdays, 8pm in Old Bank Working Men's Club, Mirfield. Alternate Thursdays are 'Noggin & Natter nights'. Further details from **Ian Barraclough G7DWY** on (0484) 716453, early evening.

**Stevenage & District ARS** meet in Ground Floor Rear Suite, Sitec Building, Ridgmond Park, 7.30pm. More details from **Pete Daly G0GTE**, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.

**Stirling ARS** meet Thursdays, 7.30pm at premises near Throsk, Stirling. Details from **Brian Mullaedy G0KWL**, QTHR or on (0324) 36235.

**Stockport RS** meet 2nd & 4th Wednesdays, 7.45pm in Room 14 of the Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. Further details from **Ray Dawson G3JLX**, 4 Douglas Road, Hazel Grove, Stockport SK7 4JG. Tel: 061-483 0372, or **Andrew Paterson G0HAL** on 061-980 1334.

**Stourbridge & District ARS** meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. Details from **Dennis Body G0HTJ** at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.

**Stratford-Upon-Avon & District RS** meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. July 27 is a Construction contest. Further details from **Alan Beasley G0CXJ**, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.

**Stroud & District ARS** meet fortnightly in the Minchinhampton Youth Centre. For more details, please contact **Dave Stallon** on (0453) 886964.

**Sudbury & District ARC 'SANDRA'** meet 1st Tuesdays, 8pm at the Five Bells Inn, Great Cornard, Sudbury, Suffolk. August 4 is 'Bee Keeping' by Derek G4DHU. Further details from **Colin Muddimer G0PAD** on (0787) 77004.

**Sutton & Cheam RS** meet 3rd Thursdays, 7.30pm at Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey, with natter nights on 1st Thursdays. July 16 is 'DXCC' by Roger Brown G3LQP, the 25th is a 144MHz Low Power Contest, the 26th is a 432MHz Low Power Contest, the 28th is a committee meeting, August 6 is a natter night and the 28th is a BBQ. More details from **John Puttock G0BWW**, 53 Alexandra Avenue, Sutton SM1 2PA.

**Taunton & District ARC** meet 1st & 3rd Fridays, 7.30pm in 'The Basement', County Hall, The Crescent, Taunton. Other Fridays informally for a natter & station operation, Morse code classes, etc. For further details, contact **Mr W. Lindsay-Smith G3WNI**, Way Close, Madford, Hemmock, Cullompton, Devon EX15 3DY. Tel: (0823) 680778.

**The GB3HZ Repeater Group** meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Details from **Francis Rose G2DRT** on (0494) 814240.

**The Submarine ARC** submerge on Thursdays, 7pm at HMS Dolphin, Gosport, Hants. For more details contact **K. Fisher G0LXC** on (0329) 281174.

**The Three Counties ARC** meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. July 15 is Emergency Communications in Surrey, the 29th is Interfacing Computers to Amateur Radio & August 12 is a Video night. **Kevin Roche G6GOS** on (0420) 83091.

**Thornbury & District ARC** meet at the United Reform Church, Chapel Street, Thornbury, 7.30pm, talks start at 8pm. Morse practice sessions are held between 7.30 & 8pm. More details from **H. Cromack G0GFI** at Rose Cottage, The Naite, Oldbury-on-Severn, Bristol, Avon BS12 1RU. Tel: Thornbury 411096.

**Tor ARS** meet Tuesdays, 7.30pm at the Ernest Bailey Community Centre, New Street, Matlock, Derbyshire. More details from **Vince Shirley G0ORC** on (0773) 826747.

**Torbay ARS** meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbot. July 10, 17th, 31st & August 7 are club nights & July 24 is a talk on 'VCRs Through The Ages'. More details from **Andy Stafford G4VPM** on (0803) 329055.

**Trowbridge & District ARC** meet at 8pm, in the Territorial Army Centre, Bythesea Road, Trowbridge, Wiltshire, 8pm. More details from **Ian Carter G0GRI** on (0380) 830383.

**Vala of Evesham RAC**. Further details on the club from **Alasdair** on (0386) 41508.

**Verulam ARC** meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Marlborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings & 4th Tuesdays are their main monthly meetings. More details from **Walter Craine G3PMF**, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD5 0DR.

**Wakefield & District RS** meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. July 14 is an on the air night, the 21st is 'The Simple Spectrum Analyser' by Gordon Parkin G0ISJ, the 28th is 'Improve Your CW Using A Computer' by Cyril Davey G7GLO, August 4 is an on the air night & the 11th is Foxhunt preparation. More details from **Dave Ackrill G0DJJA**, 104 Durkar Lane, Crigglesstone, Wakefield WF4 3HY. Tel: (0324) 240577.

**West of Scotland ARS** meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G0MKTO**, PO Box 599, Glasgow G3 6QH.

**White Rose ARC** meet Wednesdays, 8pm at Moortown RUFC, Moss Valley, King Lane, Leeds LS17 7NT. More details from **Mrs Betty Cappellato**, 7 Rycroft Place, Leeds LS13 4PF. Tel: (0532) 555488.

**Whitton ARC** meet Fridays, 8pm at the Whitton Community Centre, Percy Road, Whitton, Twickenham. More details from **Ian G0OFN** on 081-894 9131.

**Wiesbaden ARC - DA1WA** - is a club mainly for US military personnel stationed anywhere near Wiesbaden, Germany. For more details, contact **Robert Kipp G0JPU**, Hugelstr. 25, D-6070 Langen, Germany.

**Wigtownshire ARC** have meetings & RAE classes every Thursday, 7.30pm at the Community Education Office, Stranraer Academy. More details from **Ellie Gaston G0MHPK**, 3 Victoria Buildings, Cairnryan, Stranraer, Dumfries & Galloway DG9 8RA. Tel: (0581) 2202.

**Wimbleton & District ARS** meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbleton SW19. July 10 is a general activity evening & the 31st is Camp briefing. **Chris Frost G0KEB**, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.

**Winchester ARC** meet 3rd Fridays, 7.30pm at the Red Cross Centre, Durngate House. Further details from **Malcolm Butler G0LMD**, 44 East Stratton, Nr. Winchester, Hants SO21 3DU. Tel: (0962) 89550.

**Wirral ARS** meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. More details from **Alec Seed G3F00** on 051-644 6094.

**Woodpecker Radio Group** meet Mondays, 8.30pm at Richmond Place Club, Edgar Street, Hereford. More details from **Chris** on (0432) 352441.

**Wrexham ARS** meet at the Maesgwyn Community Centre, Maesgwyn Road, Wrexham. July 21 is a Field evening & August 4 is a Quiz. More details from **Ian Wright G4IMVL**, 'Derwydd', 2 Duke Street, Rhos, Wrexham, Clwyd LL14 1SY. Tel: (0978) 845858.

**Yeovil ARC** meet Thursdays at Red Cross HQ, Grove Avenue, Yeovil, Somerset. July 9 is 'Aerial Radiation Patterns' by G3GC, the 16th is a Club BBQ on Ham Hill, the 23rd is 'Semiconductor Theory' by G0PWJ, the 30th is a natter & operating night, August 6 is a Quiz night by G3MYM & the 13th is RSGB Video. Further details from **Mike Woodford G0JVG**, Holm Wood, 5 Orchard Close, South Petherton, Somerset TA13 5DX.



# A Low Cost 1.2GHz Pre-Scaler

*Ian Hickman describes a simple and inexpensive pre-scaler that can add a great deal of versatility to your bench frequency counter. Any PW 'Robin' frequency meter owners will find it particularly useful.*

The project I'm going to describe, produces an economical, simple to construct pre-scaler. It can operate with input frequencies up to 1.2GHz.

The sensitivity of the pre-scaler, even at this frequency, is excellent, permitting fairly loose coupling to the source. The loose-coupling avoids excessive loading, which could otherwise affect the frequency of an oscillator or even stop it running altogether.

The key to the unit's low cost, is the use of a pre-scaler designed for use in the phase-lock loop forming part of the synthesiser in a Band IV/V TV receiver. These i.c.s are designed for consumer applications and are very modestly priced. They can often be pressed into service in applications such as this, for which they were never designed.

## How It Works

Let's take a look at the process, and see how it works. The device we're going to use is the Siemens SDA4212. It's a dual-modulus pre-scaler which divides either by 64 or by 65, depending upon the state of a logic control line.

The dual-modulus facility is not required in this application, so the line is strapped permanently 'high' (connected to the chip's positive supply rail). This selects the divide by 64 mode.

A useful feature of this i.c. is the built-in input pre-amplifier, which provides high sensitivity. Fortunately it's equally happy with a large input signal, unlike some pre-scaler chips which only

operate reliably over a fairly restricted range of input amplitude.

## Division Ratio

To be useful as a pre-scaler to extend the range of a counter or frequency meter, a decimal division ratio such as 10:1 or 100:1 is needed. So, some lateral thinking is necessary in order to take advantage of the low cost and high sensitivity of the SDA4212 i.c.

In this case, we need to turn a division ratio of 64:1 into 100:1. This is achieved by using a divide-by-five stage to gate out every fifth pulse from the SDA4212's output.

Doing this twice over produces the desired result, as indicated in the output pulse chart I've provided in Fig. 1. Let's suppose, for the sake of example, that the waveform in Fig. 1(a), is the output from the SDA4212 when fed with a 1GHz input.

With this example, the waveform (a) is at 1GHz  $\times$  1/64 or 15.625MHz. After the knock-out-one-pulse-in-five circuit, the frequency is 1GHz  $\times$  1/64  $\times$  4/5 = 1GHz  $\times$  1/80 or 12.5MHz, as in Fig. 1(b).

Repeating the process gives 1GHz  $\times$  1/80  $\times$  4/5 = 1GHz  $\times$  1/100 or just 10MHz, as in Fig. 1(c). Notice that in (b), the pulses are not all equally spaced, whilst in (c) the pattern is even more odd. However, this is of no consequence in the present application.

Finally, further divide-by-ten stages are incorporated. These give a choice of divide-by-100, divide-by-1000 or divide-by-10 000.

## Magazine Circuit

The diagram, Fig. 2, shows the circuit of the pre-scaler. It's based on an application circuit, published in the Siemens company's house magazine, (ref. 1).

The unit is powered from a PP9 battery, and in view of the current drain, around 50mA, a rechargeable NiCad battery is recommended. When fully charged, a battery of this type will run the unit continuously for over an hour.

A 2.1mm power socket is incorporated in the design to enable the battery to be recharged without removing it from the unit. A d.c. source of about 18V is suitable for the purpose.

A suitable power source can be conveniently obtained from a 12V 300mA unregulated plug-top power supply. These power units will provide the best part of 18V when the load current drawn is only 10mA.

The charging input by-passes the switch, which will normally be in the off position during charging. The charger can be connected to the unit while it's in use. However, as the maximum recommended charging current for a NiCad PP3 style battery is only 10 or 12mA, the unit will not operate correctly with a flat battery. You must give it time to charge up first!

## Three Legged Regulator

The d.c. supply from the battery is applied to a standard three-legged 7805 regulator. The earthy leg is 'propped' up on diode D5, to provide a stabilised output of about 5.5V. This extends the operating frequency range of the divide by 64 pre-scaler, IC1,

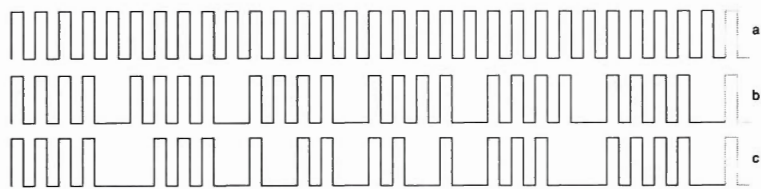
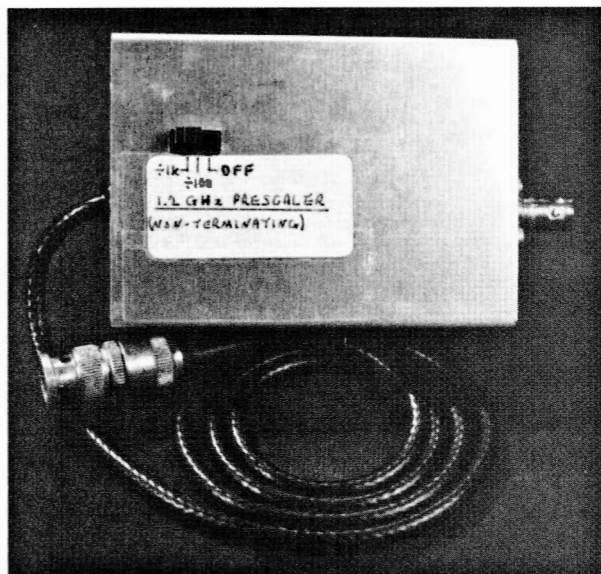


Fig. 1: Output pulse chart from the SDA4212 i.c. (see text).



Author's prototype pre-scaler. The final version of the project employs an off-board switch.



# MARTIN LYNCH..

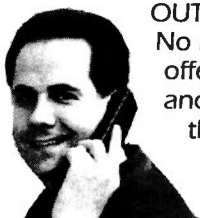
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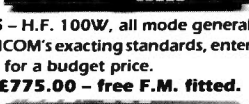
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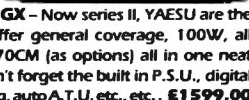
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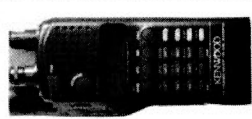
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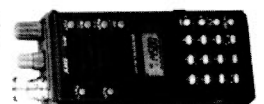
**7. ALINCO DR-599E** – Dual watch, remote head high power mobile 2/70. Special attention to U.K. operation - one of the few to offer tone burst inside the rig, not built into the mic like most. New bright lit display and a host of features. **£539.00**

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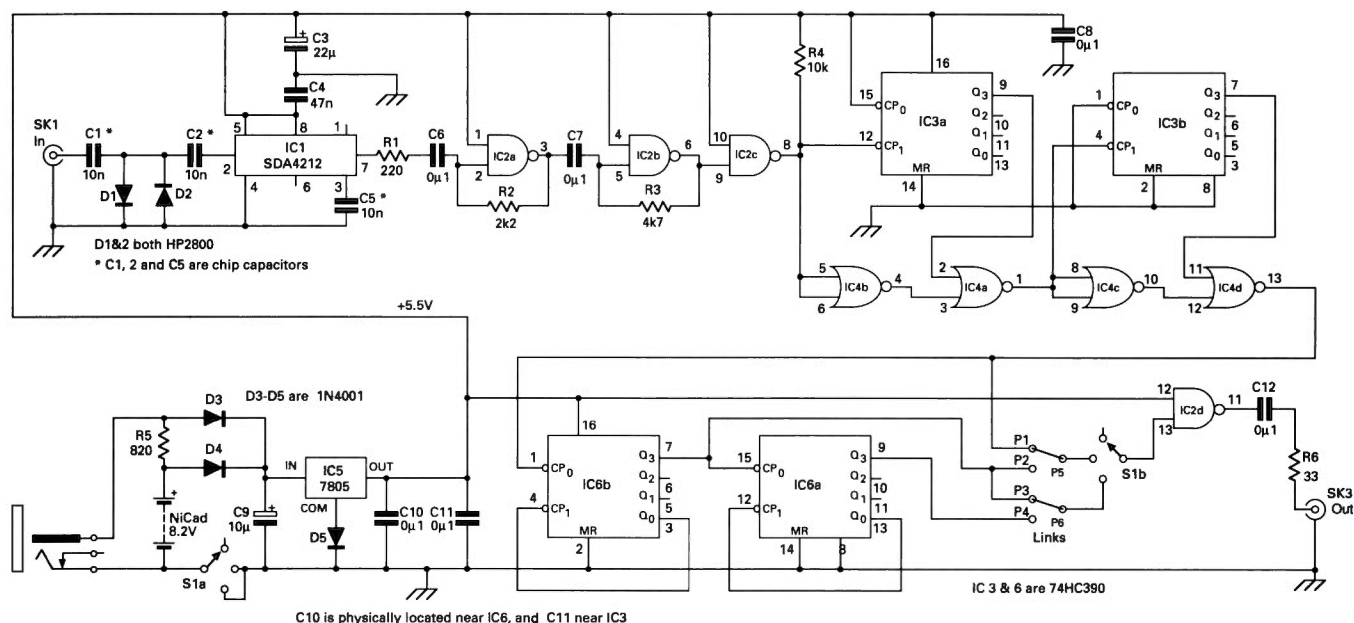
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**Fig. 2: Circuit diagram of the 1.2GHz pre-scaler.**

to about 1.2GHz.

The diode, D3, protects the regulator in the event of accidental reversed battery polarity connection. The stabilised output powers the e.c.l. (emitter coupled logic) pre-scaler IC1. It also supplies the four other i.c.s, which in the interests of battery economy are mostly c.m.o.s. (complimentary metal/oxide silicon) types.

The input signal at the input BNC socket, SK1, is applied via two 10nF capacitors in series to the pre-amplifier input of the pre-scaler chip. The pre-amplifier output is internally connected to the divider stages.

The two Schottky diodes, D1 and D2, protect IC1's input in the event of an excessive input voltage being applied. The output of IC1 is a.c. coupled via R1 and C6, to two stages of the quad two-input AND gate IC2, used with self bias as linear amplifiers.

## Simple Inverter

The action just described, converts the e.c.l. output to a solid t.t.l. logic swing, while the 'pull-up' resistor, R4, at the output of the third AND gate, also used as a simple inverter, converts it to a full swing suitable for h.c.m.o.s. devices.

The output of the third AND gate is applied to the B input of a dual decade divider IC3, and also to a two-input OR gate, part of IC3. The output at Q (D) (pin 9) of IC3, is at one fifth of the frequency of the B input (the divide by 2 section with its A input at pin 15 is not used) and goes high during every fifth input pulse. This maintains the output at pin 1 of IC4 low for that pulse, so gating out one pulse in five.

The delay through the divide-by-five section of IC3, is compensated for by the delay through the OR gate in the clock frequency path (output at pin 4 of IC4). This process is repeated again using the second divide-by-5 section of IC3 together with the other two OR gates, giving an output of  $(F_{in}) \times 1/100$  at pin 13 of IC4.

The output is applied to two cascaded divide-by-10 stages, comprising of IC6. With the links P1-P5 and P3-P6 as shown in Fig. 2, the three-position switch, S1, gives a choice of divide-by-100, divide-by-1000 and off.

## Without Overflowing

The divide-by-1000 range enables frequencies above 1GHz to be displayed on a 10MHz counter without overflowing. For use with a counter with a 1MHz top frequency, you should cut the two links, and rewire them to the lower positions. This will provide a choice of divide-by-1000 and divide-by-10000.

The selected output is routed through S1b, to the remaining section of IC2. This section is strapped as an inverter and used as an output buffer.

## Careful Construction

I built my version using single-sided copper-clad fibre glass p.c.b. material for cheapness. This needs careful layout and construction, because it's working with signals up to 1.2GHz. Fortunately, only the short track from the input socket to IC1, via C1 and C2, has to work at up to 1.2GHz.

The p.c.b. layout, with track diagram and component overlay, are shown in **Fig. 3** and **4**. The input track is soldered directly to the cut down centre conductor of the input connector. The connector is a BNC socket of the sort with a square mounting flange.

Two of the mounting screws carry solder tags. The ends of which are bent over at right-angles and soldered to the ground plane of the p.c.b., on either side of the input track.

Note that the link over the input track, is used to connect together the ground planes on either side of the input track. Support for the p.c.b. is provided by three bolts. In view of the small board area, these simple mounting arrangements are all that is necessary.



## Aluminium Box

The case is a two-part aluminium box measuring  $38 \times 70 \times 102\text{mm}$ , from Maplin Electronics (their ref: AB9). This provides adequate space to accommodate a NiCad type PP3 in addition to the p.c.b.

The output from the pre-scaler can either be by a flying coaxial lead or via another BNC socket. In the former case, it is best to limit the length of the lead to about 500mm, preferably using  $75\Omega$  coaxial cable. This is because the  $75\Omega$  type has less capacitance per millimetre than  $50\Omega$  coaxial cable.

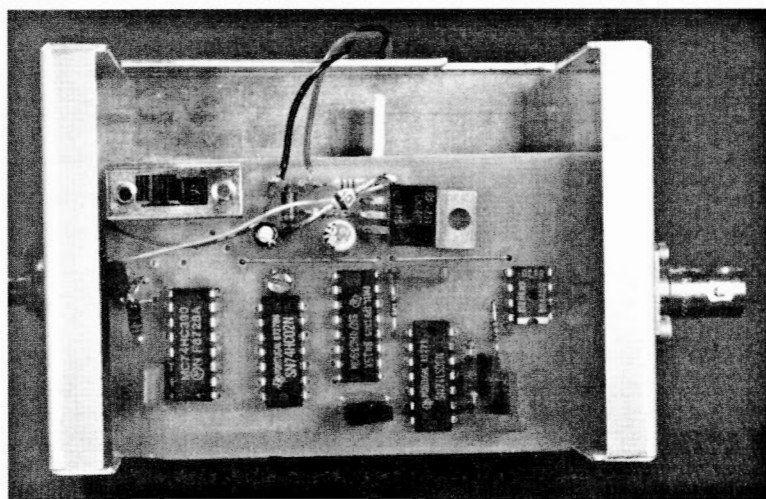
In the latter case, a short BNC to BNC lead is the best option. Again, the lead should be preferably of  $75\Omega$  coaxial cable, used to connect the pre-scaler to the counter or frequency meter with which it is to be used.

## Construction Stages

Construction is best carried out in stages, testing as you go along. The diagram, Fig. 4, shows the component locations. To start, I suggest you first mount the components associated with the 7805 i.c. regulator.

Next, you should then check that 5.5V is available to power the other ICs. Now mount these, and check that the current drawn is about the expected amount.

You should note that along with many other pre-scalers, the SDA4212 i.c. will free run at a few hundred MHz, in the absence of an input. So you can expect to see a frequency of a few MHz at the output, on the divide-by-100 range.



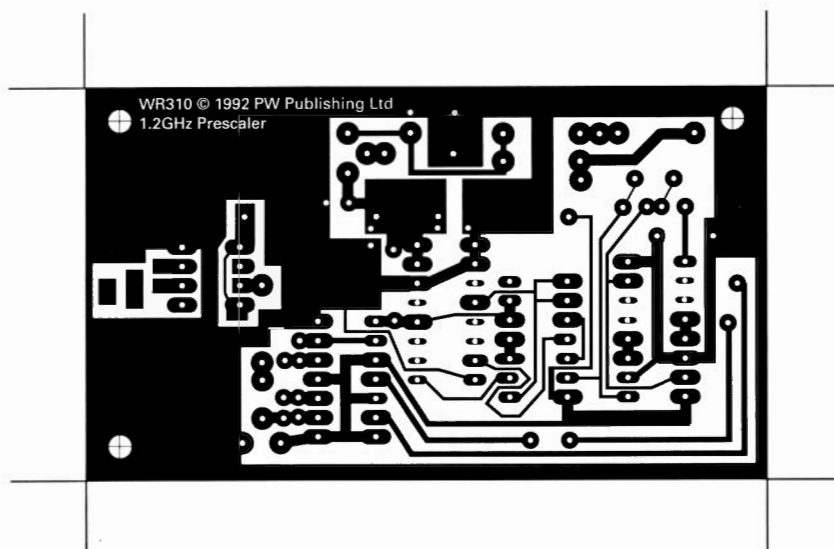
The exact frequency will depend on the particular layout, the chip itself, and on whether the input is open-circuit or short-circuited. This effect is useful, as it provides a quick and simple check on whether the unit is basically functioning or not.

## Prototype Performance

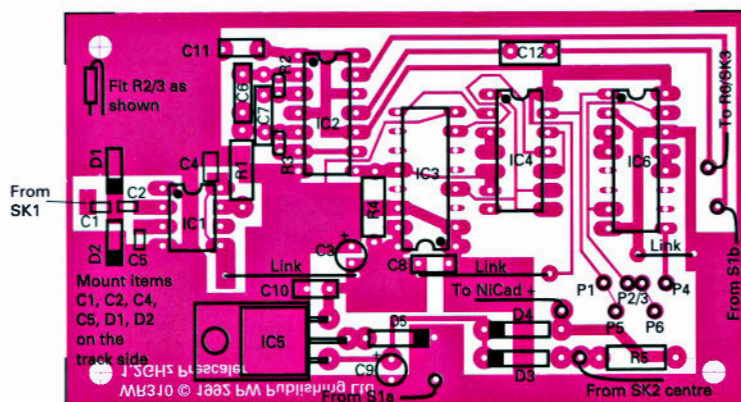
The prototype performance was verified by driving a Racal-Dana Universal Counter/Timer type 9500 via the pre-scaler, from a Racal-Dana Signal Generator type 9087.

The process was carried out at each of a number of frequencies from 1MHz to 1.2GHz. Starting with a largish output from the signal generator, the correct division ratio was verified by comparing the

**Photograph showing the author's prototype pre-scaler.**



**Fig. 3: The p.c.b. copper track design for the pre-scaler.**



**Fig. 4: Component side of the p.c.b., with component overlay provided to assist placing. The components marked as such, must be mounted on the copper track side of the p.c.b.**



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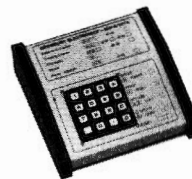
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generator and counter digital read-outs.

During the evaluation, I steadily reduced the output until any further reduction resulted in miscounting. This level was taken as the sensitivity at that frequency.

My results showed that maximum sensitivity occurs at around 600MHz and that the sensitivity is considerably better than 10mV even at 1.2GHz. The unit is usable right down to 10MHz, though at this frequency the required input has risen to 14dBm or about 45mV.

The pre-scaler will even operate down to 1MHz, if it's pushed very hard. But in reality, the useful range can be taken as 10 to 1200MHz.

Reference 1. 'Simple Prescaler for Frequency Counters', R. Boensch, Siemens Components XXIII (1988) No. 3, page 123.

## Miscellaneous

Suitable case (see text), p.c.b. (PCB Service), BNC input socket, coaxial cable, BNC plug. NiCad battery (see text), four-pole three-way switch. Power socket with change-over switching (to suit), battery connector, hardware. Connecting wire, wire for p.c.b. links.

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4.7kΩ  
10kΩ

1 R6  
1 R1  
1 R5  
1 R2  
1 R3  
1 R4

#### Capacitors

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10nF  
Ceramic  
47nF  
Polyester  
0.1μF  
Electrolytic 25V d.c. working  
10μF  
22μF

3 C1, 2, 3  
1 C4  
6 C6, 7, 8, 10, 11, 12  
1 C9  
1 C3

#### Integrated Circuits

SDA4212  
74HC390  
74HC02  
74LS00  
7805

1 IC1  
2 IC3, 6  
1 IC4  
1 IC2  
1 IC5

#### Diodes

HP2800  
1N4001

2 D1, 2  
3 D3, 4, 5

**July 11:** The Cornish Rally will be held at Penair School, St. Clement Hill, Truro. Usual amateur radio/electronic/computer traders, Bring & Buy, ample free parking, refreshments, vintage wireless display, RNARS, RAFARS, repeater groups, etc. Doors open 10.30am, disabled visitors 10am. Admission is £1, accompanied children under 16 free, otherwise 50p. Talk-in on S22, GX4CRC. Further details from **Mr Barrie Thomas G0NNR**, 'Creekside', Greenbank Road, Devoran, Nr. Truro, Cornwall. Tel: (0872) 862046.

**July 12:** The Horncastle Amateur Radio, Electronics & Computer Fair will be held in the Sports Hall of Queen Elizabeth's Grammar School, as last year. There will be facilities for a flea market outside, a talk-in station on 144MHz & there is lots of free parking. If anyone would like to bring things to sell from the boot of your car (electronics/radio only please), you will be able to, for a small fee. Any information can be obtained from **Tony Nightingale** on (0507) 522482, or send an s.a.e. to The Area Youth Office, Horncastle Youth Centre, Cagthorpe Building, Cagthorpe, Horncastle, Lincs LN9 6HW.

**July 12:** The Sussex Amateur Radio & Computer Fair will be held at Brighton Race-course. Trade stands, Bring & Buy, picnic area, refreshments, car park, free shuttle to Brighton sea front. For more details, phone **Robert Gornall (0424) 444466**.

**July 19:** The 9th McMichael Rally & Car Boot Sale will be held at the Haymill Youth & Community Centre, Burnham Lane, Slough (near Burnham Railway Station). The event starts at 10.30am, & admission is £1.50. The car boot sale (no advance bookings) is £5 per pitch on the day. There is free parking on site & talk-in is available on S22 (145.550MHz). For more details, contact **Neil G8XYN** on Maidenhead (0628) 25952.

**July 19:** The 2nd Wirral Rally will be held in the Masonic Hall, Manor Road, Liscard, Wallasey, Merseyside. Doors open 11am (10.30am for disabled). Details from **Dave Clifford G0NVF** on 051-639 5922 & **Darren Roberts** on 061-476 3076.

**July 25/26:** Norfolk ARS are planning a 2-day event. Details from **Sheila G0KWP**. Tel: (0603) 618810.

**July 26:** The Rugby ATS 4th Annual Amateur Radio Car Boot Sale will be held at the BP Truckstop on the A5, three miles east of Rugby & just two-and-a-half miles north-west from junction 18 of the M1 motorway. Open from 10am, admission is £1 per car & facilities include a good cafeteria & toilets. Talk-in on S22 by GB6CBS. Pitches are £7 pre-booked or £9 on the day. Further details from **Peter** on (0455) 552449 or for bookings ring **Kevin** on (0203) 441590.

**July 26:** Scarborough Amateur Radio Society will hold their Radio, Electronics & Computer Rally at the Spa, South Forshore, Scarborough. Doors open 11am. Many traders, Bring & Buy, refreshments & bar. Details from **Ian Hunter G4UQP** on (0723) 376847.

**August 16:** The Southend Rally will be held at The Rocheway Centre, Rochford, nr. Southend-on-Sea, Essex. Bring & Buy sale, bar & refreshments, ample parking. Talks in & out on SS2 v.h.f. For booking & other details, contact **John Stone G0DFE** on (0702) 202216.

**August 23:** The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre,

Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level. Refreshments available all day & bar. Doors open at 10.30am for disabled & 11am for general public. Admission £1, children free. Further details from **Dave G1100** on (0204) 24104 evenings only.

**August 30:** The Galashiels Club are to hold their Open Day at the Focus Centre, Livingstone Place, Galashiels. All the usual activities, Bring & Buy, traders, club stalls & refreshments, etc. Doors open 11am until 4.30pm. More details from **John Campbell, 9 Brunton Park, Bowden, Melrose TD6 0SZ**. Tel: (0835) 22686.

**August 31:** Huntingdon ARS will be holding their Annual Rally & Junk Sale at the usual venue, the Medway Centre, Coneygare Road, Huntingdon, Cambridgeshire. Doors open 10am until 4pm. Featuring trade stands, Bring & Buy, components, junk & their usual excellent refreshment bar. Car boot pitches available. Talk-in on S22 & GB30V (433.125MHz). Details from **David Leech G7DIU** on (0480) 431333.

**September 6:** Preston ARS will be holding their 25th Annual Rally at the University of Lancaster, as in previous years. The university is located south of Lancaster & the entrance is on the A6 trunk road. From the M6 leave at junction 33 on to the A6 & proceed north for approximately three miles. Trade stands, club/repeater stands, large Bring & Buy, snack bar, lunchtime restaurant, licensed bar, free prize draw & free parking on campus. Doors open 11am (10.30am for disabled). Details from **George Earnshaw** on (0772) 718175.

**September 6:** Vange Amateur Radio Society will be holding their Annual Rally at The Laidon Community Centre, Laidon High Road/Aston Road, Laidon, Basildon, Essex. The centre is only a short walk from Laidon Railway Station on the Fenchurch Street to Shoeburyness Line. Doors open from 10.30am to 4.30pm. Admission 75p. Featuring many traders, Bring & Buy, refreshments & a free raffle. Talk-in on S22. Approach roads will be signposted. For further details contact **Mike Musgrave G4NVT** on (0268) 543025 or **Doris Thompson** on (0268) 552606.

**September 6:** Milton Keynes & DARS will be holding their 6th Car Boot Rally at Cranfield Airfield, (south side), Cranfield, Bedfordshire MK43 0AL (off J13 or J14 of the M1). Doors open 9.30am until 4pm. Hot & cold snacks & drinks, admission is 30p. Talk-in on S22, G8MKC. For further details, contact either **Ray G1LRU** on (0908) 660798, **Tony G6WXM** on (0908) 316435 or **Dave G3ZPA** on (0908) 501310.

**September 12:** The Scottish National AR Convention will be held at the Fife Institute of Physical & Recreational Education, Viewfield Industrial Estate, Glenrothes, Fife. Doors open 10.30am until 5pm. For further details, contact **John Hardwick GM4ALA** on (0506) 410677 during office hours or otherwise on (0592) 742763.

**Attention rally organisers. We like to give your events all the publicity possible, but you can help us to help you by making the details as short as possible. Thank you!**



# TE Systems 1410G 144MHz Linear Amplifier



*As he's a keen v.h.f. man, we asked Richard Aley G6AKG to try the beefy 1410G 144MHz linear amplifier out on the air.*

With today's densely populated housing, radio amateurs running QRO equipment are not the most popular people on planet earth! So, when I was asked to review an amplifier capable of delivering no less than 160W on 144MHz, I cringed at the spectre of all the possible domestic strife I might be the centre of.

However, 12V linear amplifiers like the one I'm reviewing are not just meant for base-station use. They can of course be used for mobile hill-topping, using a light-weight beam and small mast.

The mobile aspect would be the personal attraction for me owning one of these amplifiers. It's the only circumstances under which I could use such a high-powered beast!

## Compact Power

There's no doubt in my mind that the TE 1410G amplifier is certainly one of the most compact ways of obtaining high power, 160W at 144MHz. It's ideally suited to the mobile environment.

The amplifier is not much larger than a two pound box of chocolates, measuring 70 x 150 x 270mm and weighs approximately 2kg. The exterior appearance of the amplifier is very solid, but at the same time stylish. It gave me the feeling that it was built to last.

Like most semiconductor linear amplifiers, a large black heat-sink forms the chassis of the design. Two gold-coloured anodised plates are fixed on to the heat-sink using small hexagonal machine screws. These form the front and back panels of the unit.

An interesting point to note, is that only those fixings that need to be used by the operator employ the more standard type of fastener. A wrap-round type cover, also in the gold-coloured anodising, forms the base/cover of the amplifier.

## Fully Populated

Both the rear and front panels of the amplifier have a busy look about them. They are almost fully populated with controls and sockets.

Looking from left to right at the back panel, there is a 25mm fuse holder, and a four-pin Jones plug for the 12V d.c. supply. There's also a B7G type valve socket wired for external monitoring and control, and two SO239 sockets. Finally, there's a small rotary control for setting the transmit/receive (TR) hang-time when the amplifier is being used on s.s.b.

Personally, if I purchased this particular model of amplifier I would change the two SO239 sockets for N-types. I was disappointed to find this type of socket on such a high quality item of equipment. Having said that, I shouldn't be altogether surprised as the TE 1410G is

manufactured in the USA, which is also the home of the PL259 connector system!

I would also change the accessory socket for something a little more robust and practical. Maybe a 7-pin DIN type would do the job, as the B7G is outdated and very fragile. No doubt our US cousins over-looked the DIN system plugs and sockets as being a little too European!

## Jones Plug

It was nice to see however, the Jones plug and socket being used for the high current 12V d.c. connection. Like the SO239/PL259, the Jones plug is also a hang-over from the American contribution to the Second World War (yes they are that old!).

I don't think a more suitable power connector has ever been devised. That's probably why Japanese manufacturers are still using a variant of them on their mobile h.f. transceivers.

It's fair to say I'm a little biased towards electronic produce from the USA. In the past I've had the good fortune to work with their commercial communications equipment, and generally it's built to very solid standards, as well as being easy to service. The TE Systems' range of linear amplifiers follow in this fine tradition and long may they reign.

## Paddle Switches

Three paddle-type toggle switches dominate the front panel of the amplifier. Two of these are illuminated with green l.e.d.s.

On the right of these switches is a vertical array of red l.e.d.s. These indicate whether the amplifier is on or off-line and providing output, or if the amplifier has reached its maximum rated operating temperature. The third l.e.d. is to show the status of a hard-wired p.t.t. facility, if it's used.

## Amplifier Rating

The amplifier rating is for a 50% duty-cycle to the Industrial, Commercial and Amateur Service (ICAS) specification. When the heat-sink temperature reaches 65°C the amplifier is automatically taken off-line, and the temperature warning l.e.d. is triggered.

The circuit used to operate the warning l.e.d. can also be configured for switching on an external cooling fan. This can be done via the accessory socket, rather than taking the amplifier off-line. If this facility is to be used, TE Systems suggest this is best done in liaison with their appointed distribution and service agent.

## Antenna Pathway

In operation, the power amplifier is switched in and out of the antenna pathway with the first of the two front panel switches. The second switch controls the line status of the on-board GaAs-f.e.t. receive pre-amplifier. The GaAs-f.e.t. pre-amplifier has 15dB gain (minimum) with a nominal noise figure of 0.6dB.

In my opinion, this extra receiving gain, matches in well with the philosophy of increasing receiver performance to match transmitting capability. Despite this, my personal feeling is that most modern v.h.f. transceivers far outstrip their transmitting capability by already using low-noise, high-gain front ends.

Anyway, most serious DXers look to put this extra gain at the mast-head where it belongs! Although I must admit it's a nice touch and can easily be switched-out of circuit.

The third switch on the front panel gives you the option of switching out the transmit-receive delay circuit, for either f.m. or hard-wired p.t.t.

**Review**



## Good Practice

With high power low voltage equipment it's always good practice, if possible, to locate the equipment near the power source. This is in order to avoid losses in long cable runs.

No doubt the designers at TE Systems bore this in mind with the 1410G amplifier, because they have enabled each of the front panel facilities to be wired via the back-panel accessory socket. This facility is enabled by cutting a few internal links, and it's a procedure which is well documented in the user's manual.

## Good Manual

The good, easy-to-use manual provided with the amplifier is worthy of any prime mover, let-alone an accessory. There are five chapters including: general information, installation, operating instructions, theory of operation and maintenance.

In fact, everything you'll ever need to know about the amplifier is shown in an easy-to-follow block diagram format, backed up with a full circuit 'schematic' and parts list. As I'm an ex-service engineer, the manual made me feel very at home with the amplifier. I'd be totally at ease with carrying out any modifications or service on the unit.

The internal construction of the amplifier is very smart and well arranged, showing a high standard of workmanship. The p.c.b. is made from double-sided glass fibre laminate.

Very nearly all of the tuned inductors are etched onto the board in linear strip-line fashion. This gives the design a clean and un-cluttered look.

## Good Quality

The components used in the amplifier are of good quality, with high stability mica postage stamp type trimmers used throughout the design. The amplifier is based around three bipolar devices run in class A-B which combines efficiency with linearity.

The first of the devices is used as a pre-driver, its output being divided equally to each output stage, these are run in parallel with their outputs combined before being fed through a low-pass filter. The bias networks are very uncomplicated using silicon diodes which provide good thermal tracking.

Additionally, all the tuned circuits used are low Q. This technique provides a flattened performance curve right across the band. It's a factor that's very important in the USA, where 144 to 148MHz is available for amateur use.

## Unconditionally Stable

It's plain to see that the TE Systems' designer went to a great deal of trouble to make this amplifier unconditionally stable, both thermally and electrically, as a large amount of the hardware is devoted to r.f. decoupling.

In use, the amplifier can withstand poor v.s.w.r. conditions of up to 3:1, although the manufacturers point out this value may, in time, cause transistor failure. Large devices such as the type used in this amplifier are prohibitively expensive. In fact, they're far more expensive than an average v.s.w.r. meter, a point worth bearing in mind!

## Removable Module

The GaAs-f.e.t. receive pre-amplifier stage is built on a small removable module, which is 'piggy-back' connected to the motherboard. This I feel is an inspirational design feature, making it a five minute job to replace the f.e.t.

Unfortunately, GaAs-f.e.t.s are a little touchy and do not suffer ill treatment more than once. The control p.c.b. is also attached to the motherboard in the same way, making it easy to service.

My last comment about the interior of the amplifier, is that the output relay is of a fairly nondescript type. It wouldn't look out of place under the bonnet of any automobile.

It just goes to prove that almost any high current relay can be made to work with high levels of r.f. at least up to v.h.f. That's providing their inadequacies are tuned-out!

## Richard Chickened Out

Bearing in mind my earlier comment about using an amplifier of this type on my home installation, Richard (needless to say) chickened-out!

I took the amplifier and myself to my club, the Flight Refuelling Club near Wimborne. Here they have a modest 144MHz installation for everyday use, which I felt was fairly typical of most amateur station facilities today.

Trying to find a prime-mover multi-mode rig with just 10W r.f. output proved to be a problem. Once, all 144MHz s.s.b. equipment on the market had 10W maximum output combined generally with a carrier level control.

However, a quick survey of most of the club members' 144MHz gear proved that this was no longer the trend. It seems that nowadays, 25W maximum was the normal output level to be encountered.

Almost all of the modern multi-mode rigs need to be tweaked internally to give the required drive level. Alternatively, they must be run with a relay-controlled power attenuator, which in the end made me settle for using the club's standby rig, an old Yaesu FT221R.

## Respectable Report

Despite the problems encountered with input levels\* (See note below regarding input levels), when the amplifier was eventually used with the FT221R, it brought forth a respectable 57 report from a chap in South Humberside, on the first call. The antenna installation at my disposal during the course of my tests was a 10-element Jaybeam Yagi antenna at approximately 15m a.g.l.

The band conditions were not good, and without the GaAs-f.e.t. pre-amplifier it was hard going due to the deep QSB. No adverse comments were passed about transmit audio quality or the bandwidth of the signal.

## Summing Up

In summing up, I've got to say that speaking overall, the TE Systems' 1410G amplifier is a well-built, well thought-out and very substantially documented amplifier. Any adverse comments I've made about the amplifier are relatively minor in nature. I'm very grateful to the Flight Refuelling Amateur Radio Club, for the chance to test the amplifier on their antennas, although I would still love to own one if the wife and neighbours would let me!

My thanks to Bredhurst Electronics Ltd of High Street, Handcross, West Sussex RH17 6BW. Tel: (0444) 400786, for loaning me the review model, which is available from them at £339 plus £5 p&p. Bredhurst can also supply the 1412G 30W input drive model at £299 plus £5 p&p.

## Manufacturer's Specifications

Frequency range	144-148MHz
Input power	10W Nominal (see note ref. input levels)
Output power	160W Minimum

### Class of Operation

Power amplifier	A-B
Pre-amplifier	A
Transmit-receiving sens.	0.5W Minimum
Antenna v.s.w.r.	3:1 Maximum
Receive pre-amplifier gain	15dB Nominal Minimum
Receive pre-amplifier noise	0.6dB Nominal
Supply current @ 13.6V	
Nominal	20A
Peak	26A
Dimensions	70 x 150 x 270mm
Weight	2kg Approx.

**Editorial note regarding G6AKD's comments on the input level for the TE 1410G:**

Unfortunately, when the original review model was collected from Bredhurst Electronics, we were unaware that TE Systems produce the linear amplifiers with a wide range of input levels. For example they are: 1409G with 2W input and a 160W output and the 1412G with 30W input for a 160W output. This series of amplifiers is also available for the 50 and 430MHz bands.

(Full information available direct from Bredhurst Electronics).



# Test Equipment -

*The PW workshop and test facilities are jointly known as the 'Tardis' by everyone in the office. The name was adopted because of the similarity of the screened r.f. room to Dr. Who's preferred transport! Our technical sub-editor Tex Swann G1TEX uses the workshop a lot and although he's surrounded by very sophisticated gear, he doesn't dismiss the basic 'tools' found in nearly everyone's shack.*

**Fig. 1: Although many dip-meters are bought nowadays, it's a simple job to build your own instrument.**



My job as technical sub-editor of *PW* gives me access to many pieces of test equipment, all doing splendid jobs. The total cost of this sort of gear is way beyond the pocket of the average radio amateur. I can say this, because I can't afford it at home myself!

So, if we can't afford much test equipment, what can we, as enthusiastic amateurs achieve with simple (cheaper) test facilities? The answer in my opinion is a great deal! I feel, that with three main pieces of test equipment, we could do most of the testing needed in our hobby.

## Humble But Useful

I'm going to start with the humble, but extremely useful, multimeter. You can use it for measuring millivolts to megavolts, microamps to hundreds of amperes.

In fact we can use the meter in any job where we need to know the voltages, currents or resistance. In fact, I'll take this opportunity to mention a very useful booklet designed to help you get the most out of your meter.

The booklet *Are The Voltages Correct?* is a *PW* reprint and is very good value for money. It's available from the Book Service and the author guides you through the techniques needed in fault-finding with a meter. I can guarantee that you'll not under-estimate the versatility of your meter after you've read the booklet!

## Two Main Forms

Now it's time to look at the various types of multimeters. This unsung hero appears in two main forms, digital and analogue, and each has its strengths and weaknesses.

As digital meters seem to be very popular, I'll start off with a look at these very neat instruments. Even the cheaper digital multimeters (d.m.m.) will measure d.c. and a.c. voltages, over an extremely wide range, with a good degree of accuracy.

Many d.m.m.s even display their readings to three, or more, decimal places. Some even have 'auto-ranging' to use the most effective voltage range for the test. In auto-ranging, the instrument automatically selects the appropriate voltage or current range.

A diode and transistor testing facility may also be fitted on the more expensive meters. This most useful feature can be used to great advantage to check out those surplus transistors you bought at the last rally.

## Major Disadvantage

The major disadvantage of digital meters, shows up in the slow reaction to fluctuating readings. The last numbers may be rapidly changing, making them difficult to read and you might end up with an ambiguous result.

So, against the list of features I've listed for the d.m.m., how does the trusty old analogue multimeter fare? In truth, I have to admit

that it fares very well for certain tests.

For example, on analogue meters, a fluctuating measurement is not a real problem. Because of the meter movement's action, both the mean and variation readings can be read.

The final accuracy is very dependent on your ability to read the meter scale. To help in this, the more expensive meters have an anti-parallax mirror fitted on the instrument's calibrated scale.

The anti-parallax mirror ensures that when the reflection in the mirror is directly underneath the meter's needle, the reading should be correct. All you have to do is position yourself so that the mirror can do its job!

Another advantage is that when measuring a.c. voltages, the moving coil analogue meter's bandwidth is in many cases, higher than an equivalent d.m.m. This added benefit allows comparative tests to be carried out into the higher audio frequencies.

## Analogue Meter Disadvantage

Unfortunately, the moving coil analogue meter also has a major disadvantage. The main problem isn't because of the movement, but due to its mechanical switching arrangements.

The problem with this form of meter occurs when they're accidentally used as 'smoke signal' generators! It's something that can happen to any amateur or professional technician for that matter!

This unhappy state of affairs, usually happens when you're in a rush and trying to measure mains voltage or other high current supply. It's bound to happen when the last time you used the meter, you were using the resistance (or ohm's range).

The result is almost invariably, a spectacular (and expensive) expanding cloud of acrid smoke. If you're lucky the fuse will blow before this happens, but don't count on it!

## Expensive Mistake

When it comes to being careful about overloading meters, I have it on good authority, that the editor Rob Mannion G3XFD, managed to make an expensive mistake. It happened when he was working on the 750V d.c. electrified Southern Region of British Rail in the early 1960s.

Apparently, Rob was demonstrating the sensitivity of a very expensive multimeter to a track lineman, whose job it was to maintain conductor rails and cables. This attentive man was interested to see how superior Rob's neat little meter was, when compared to his bank of test lamps. He was sure that the traditional lamps, arranged in series to illuminate fully when applied to 750V, were adequate.

Rob duly demonstrated the meter, quite forgetting the fact that he'd been measuring the loop resistance of a length of conductor rail just before. The next few moments of the demonstration transfixed the linesman in his place, as Rob promptly disappeared in a cloud of thick black smoke!

After the smoke cleared, Rob was left holding a strap with a charred, hollow Bakelite box on the end. In this instance, the meter movement had not only burnt out, but the 750V d.c. on the conductor rail had arced inside and completely destroyed the meter. End of demonstration! (Incidentally, despite the demonstration, we understand that BR still prefer the test lamp method!)

So, take care when you're using a test meter. Try to



# Tools Of The Trade

make it a strict rule that you switch to the highest range first. If you do this, you can work down. You can't work up after the meter's burnt out!

If you are offered one of these meters second-hand, then a good sniff at the edge will usually let you know if it has had the burn-out treatment. They're easy to spot, and Rob tells me that the smell lingers for some time!

## Radio Frequency Measurements

Having discussed the basic meter that everyone needs in the workshop, I realise of course most of us in our hobby, need to take measurements at radio frequencies. To this end, there's a whole range of instruments to help and, as in measuring d.c. or low frequencies, there are digital and analogue methods of displaying the results.

There are two 'ends' to measure in most electronic circuits. They are of course the input and the output. For the input at r.f. there are basic signal generators providing levels from  $1\mu\text{V}$  to around  $1\text{V}$ . This signal may have a frequency or amplitude modulation facility.

Frequency accuracy and stability are the most important aspects to bear in mind when choosing a signal generator. And don't forget, it should of course cover the frequency band you need.

The output level from a signal should also be checked before you buy. If the output is too small for the job, then I'm afraid little can be done to help. However, should the output be too large a stepped attenuator can reduce the signal to a more useful level. It may even reduce out-of-band signals.

A good signal generator can cost several hundred £s, and an excellent one will set you back several thousand. Do we have to spend that much? How can we achieve good results at a cost to suit our pockets?

## Signal Generator Alternative

Fortunately, when it comes to buying a signal generator, there's an alternative. If you can't afford a signal generator, why not use my second recommended piece of test equipment - the familiar dip-meter.

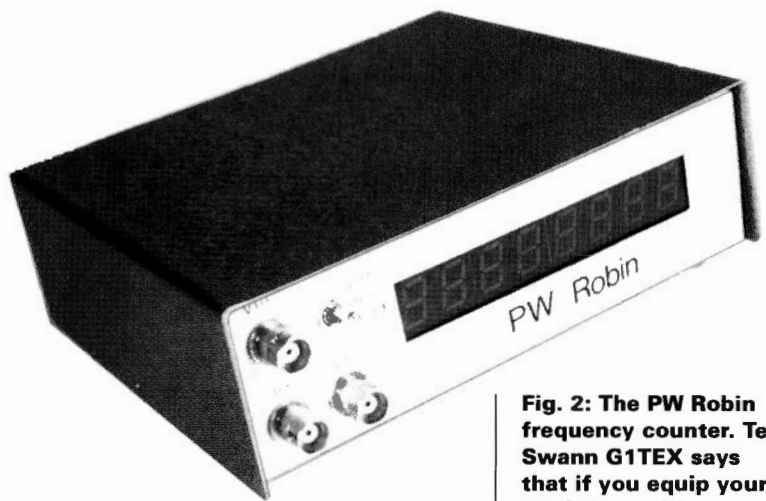
When valves ruled supreme, the dip-meter was known as a grid-dip oscillator (g.d.o.). Tradition dies slowly, and the letters have remained with us, but nowadays have become gate-dip oscillator. Funnily enough, there's still a connection with the old days, as the grid was the control electrode in a valve, and the gate in a field effect transistor (f.e.t.) does basically the same job.

The dip-meter is a versatile instrument. When it's oscillating, the 'dipper' will provide a rather rough-and-ready signal source on most bands from 1-250MHz. It will also probably produce useful harmonics up into the u.h.f. bands.

The same g.d.o. can then be used to check both the wanted frequency and harmonic output of a transmitter. By adding a small antenna to one side of the coil, it can also be used as a simple field-strength meter for optimising an antenna.

The dip-meter can prove to be very useful in the signal-strength meter role. Despite only providing a relative indication, it can help you set up cubical-quad and other antennas to best advantage.

You can resonate the antenna using the dip-meter in its basic role (as a dipper) and then go on to use it as a field-strength meter. As I've said, they are a most useful instrument to have around.



**Fig. 2: The PW Robin frequency counter. Tex Swann G1TEX says that if you equip your workshop with a counter of this type, a dip-meter and a multi-meter, you can achieve a great deal.**

## Resonated Antenna

While on the subject of resonating antennas, you can use it to identify your 'long wire's' natural frequency. This must be useful, especially as so many amateurs rely on the long wire as their only antenna.

The measurement can be done by using a single or double turn coupling loop. Using this method and a dip-meter, the resonance of a random length of wire may be found.

The Rev. George Dobbs G3RJV outlined this technique in Fig. 1 of 'Getting Started-The Practical Way' (page 29) in the May 1992 issue of *Practical Wireless*. Using a similar method the natural resonance of an antenna array may also be found.

**Note: Don't forget that when you couple the dip-meter to the antenna under test using this method, that you'll be radiating a signal! So, when you do use this method, try to ensure you're not going to cause any interference and make sure you stay within your licence conditions. In other words, don't radiate a signal on the medium waveband!**

## Digital Robin

My third and final recommendation for basic test equipment has to be a digital frequency counter. As it happens, I think that the PW 'Robin' frequency counter is a superb unit. This instrument is capable of counting well into the 430MHz band.

The 'Robin' is sensitive enough to check the output of almost any g.d.o. Using the frequency meter in this way, adds accuracy to the often crudely calibrated tuning scales often found on commercially-made dip-meters.

Fortunately, the PW 'Robin' is quite cheap to build and provides very good results. Anyone on a fairly tight budget should consider building one. If you aren't quite sure about tackling the job, you can always call me in the office (between 12 and 1pm please) to discuss the project.

## Tex's Round Up

So, to round up this time, I'll leave you with a final piece of advice. With the basic items of test equipment I've suggested, almost all the tests an amateur needs to do can be carried out. Nowadays, only the multimeter needs to be bought, as honestly speaking, it's not really worthwhile making your own test meter. All the other suggested items have appeared as projects in *PW* within the last few years. Who said test equipment has to be expensive? It certainly wasn't me!



Firstly this month, I've got an observation that's been made by a number of readers in letters to 'CB High & Low'. A lot of the letters include sentiments such as "the 27MHz band is now pretty well useless because 'skip distance' during the day allows very distant (foreign) 27MHz stations to override otherwise receivable local signals", or words to that effect! I'll deal with this later.

One reader is also convinced that the only answer to the first problem is to make available another v.h.f. or u.h.f. band allocation. Ah! That brings back memories, that's one of the main reasons why we abandoned Band I v.h.f. TV in the UK!

If you want another u.h.f. (or v.h.f.) band, you will have to convince the DTI it's needed. A strong National CB Radio Society to back the request would be helpful (hint!) Now let's get to the problem of 'skip distance'.

### Skip Distance

The term 'skip distance', sometimes called the 'hop distance', has been in common use since the ionosphere was discovered. This is the name given to the medium by which h.f. radio waves can be transmitted around the world.

The word 'skip' is used to indicate a distance along a great circle ground path, over which h.f. radio signals, otherwise propagated via an ionospheric region (normally the F region), are transmitted from one place on earth we can call (A in the diagram) to another, at a great distance (B in the diagram).

Most textbook illustrations of 'skip distance' give the impression that 'ionospherically propagated' h.f. radio waves, travel from earth, up to the ionosphere and back to earth again in **straight lines**. They also give the impression that **no signals** will be heard anywhere between the two places. **This is not so!**

### Radiation From Antennas

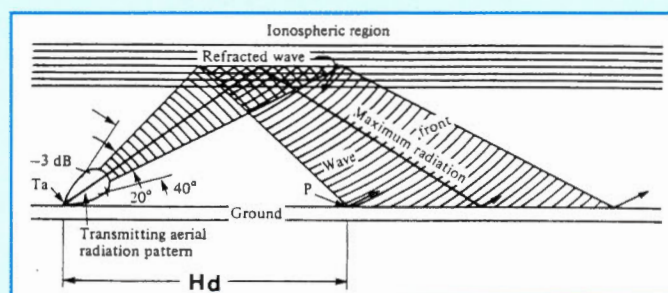
Radiation from directional (beam) antennas, commonly used by the amateur radio fraternity, travels toward the ionosphere. The radiation is usually at a fairly low angle with respect to earth. However, it spreads out over a wide arc before reaching an ionospheric region as illustrated in Fig. 1. In this case there will be a 'hop distance' (hd) (call it 'skip' if you wish!) along the ground over which no signals are receivable except for those due to 'ground-wave' propagation.

After the first reflection from ground, the propagated wave spreads more and more. This has the result that signals may be returned to

# CB HIGH & LOW

By 'Quaynotes'

*This time, 'Quaynotes' takes time out to answer some of your letters in a general reply, before talking about propagation. Finally, our contributor announces that he's off on an extended holiday.*



**Fig. 1: Diagram illustrates how an h.f. radio wave expands over the distance between a conventional beam antenna and an ionospheric region. After 'refraction', this expansion continues until the wave reaches ground and is reflected, still expanding, back to the ionosphere. This is a process repeated by ground and ionosphere absorption. The term hd is the initial 'hop distance' (see text).**

earth almost anywhere along a ground path, beyond the initial 'hops' or 'skips' over any ground distance at all.

### Single Element Verticals

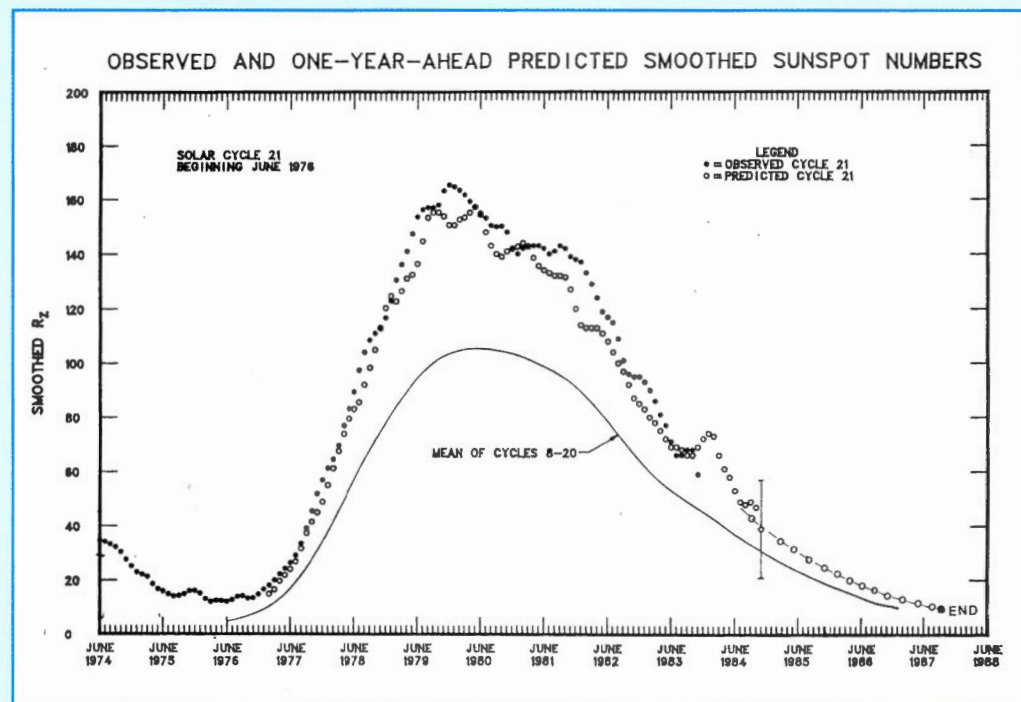
Propagation using single element vertical antennas, as used for 27MHz CB could, under certain conditions, follow a similar trend. This would occur if radiation from the antenna is at low vertical angles, let's say 20 to 30°, but this is unlikely if they are very near to the ground, or operated in conjunction with a ground-plane.

### Ionospheric Propagation

When, and only when, the right 'ionospheric conditions' prevail, transmission and reception of signals between stations on 27MHz separated by ground distances of thousands of kilometres, or more, becomes possible. Under these conditions, signals from distant stations can arrive with sufficient strength to override transmissions from a 'local' station.

The ionospheric phenomenon **does not** occur all day or every day, as some 27MHz operators seem to think! This is because of variations in the degree to which the ionospheric regions become ionised.

The 'right conditions' are not all that frequent anyway. Ask any 28MHz band amateur radio operator and see what they say!



**Fig. 2: Zurich smoothed sunspot counts for the whole of the solar cycle number 21, the minimum of which occurred in late 1987 (by courtesy of 'Sunspot Bulletins', edited by Dr Andre Koeckelenburgh, Brussels Belgium).**



## Radiation From The Sun

The intensity of ionisation of the ionospheric regions, is due to the emission of various forms of radiation from the sun. These emissions are mostly ultra-violet, and they normally increase with the occurrence of 'sunspots'.

The degree of ionisation, in turn, determines what is known as the 'critical frequency'. Transmissions above this frequency and reaching the ionosphere at a low angle of incidence, are refracted and returned to earth. They are then reflected back to the ionosphere and so on. This is how h.f. transmissions are propagated over long distances around the earth.

## Solar Cycles

You've probably already heard solar cycles being discussed on the air. The solar cycle number 21, shown in Fig. 2, reached its minimum more or less at the end of 1987.

The diagram shows the progressively increasing 'sunspot counts' for the whole cycle. The conditions for h.f. band DX would have been quite frequent from 1978, when the 'sunspot counts' were over the 100 mark, and reached peak at just over 160 during 1980.

At present, we are only about halfway through the current solar cycle, number 22, and the sunspot counts are still fairly high. They're still in the region of 150, with two peaks reaching over 190, as shown in Fig. 3.

This record for solar cycle number 22 is from its beginning (end of 1987) to February 1992. Remember that a solar cycle lasts about 11 years, although records show that some have been shorter and some have been longer.

## Less Frequent

The chances of two-way long-

distance (DX) contacts on the higher h.f. bands, including 27MHz (or interference from other very distant stations), will become less frequent as we get near to the minimum of cycle number 22. These conditions will prevail for some while after the start of the following solar cycle, number 23. However, DX conditions may prevail for short periods during that time, due to short spells of sunspot activity.

## Final Observation

As a final observation, CB radio transceivers designed for f.m. only, will of course receive s.s.b.

transmissions which will sound like garbled speech. These transmissions could be mistaken for a foreign language from some distant station.

In reality, the transmission may well be coming from a local CB operator illegally using a s.s.b. (single side band) transceiver. There's a lot of them about you know!

## Extended Holiday

That's the lot from me this time, and for a little while as I'm taking the chance of an extended holiday. I hope you enjoy 'CB High & Low' as much as I enjoy preparing it.

All the best to you all, and don't forget: CB radio is fun whether you're on high or low. Cheerio for now!

## Further Information and Reading

Our contributor Ron Ham ('Reflections') deals with the mysteries of sunspots, solar activity and ionospheric, etc., every month. Also, the book *Radio Wave Propagation* (h.f. bands), which deals with the subject in considerable depth, is obtainable from PW Publishing.

Editor's suggestion: *Wires And Waves* and the excellent ARRL *Antenna Manual* are two more books that are worth reading (see Book Service).

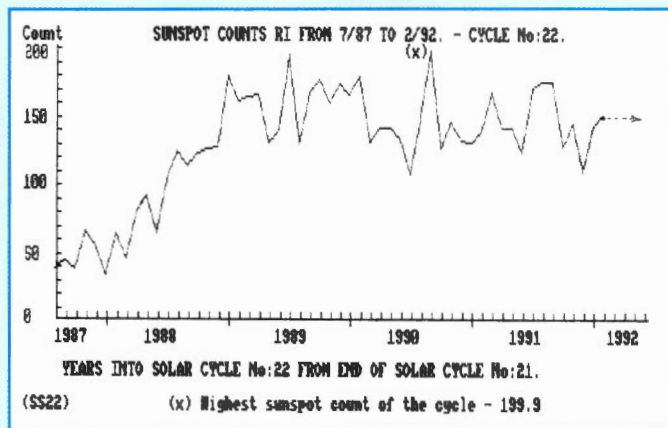


Fig. 3: Sunspot counts for solar cycle number 22 from end of previous cycle (21) to February 1992. (collated by G1FLP).

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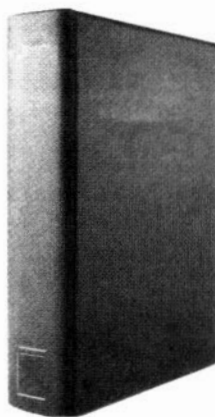
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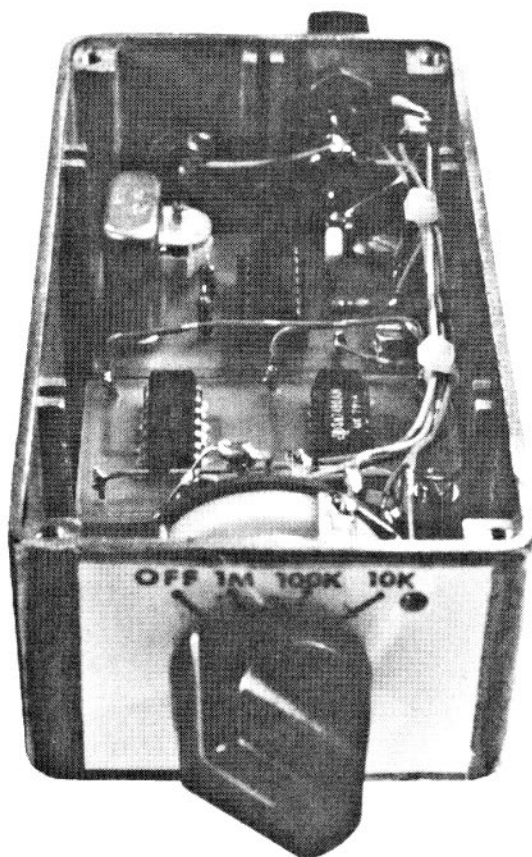
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# Getting Started - The Practical Way



In the last part of this series I introduced digital electronics. As part of this introduction, you read about 'on and off' or 'high and low' states within a circuit.

We used a simple t.t.l. (transistor-transistor-logic) i.c. to produce a crystal oscillator with a frequency of 1MHz. In other words, the i.c. generates pulses at a frequency of 1MHz.

Another, perhaps more common, use of logic circuits is counting pulses. So, the next step is to take a closer look at counting pulses and how to do it.

## Counting Job

There's a whole range of digital i.c.s whose job is counting pulses. For example, the 7490 t.t.l. decade counter is an inexpensive and common counter i.c.

This chip contains the logic circuitry enabling it to divide by counting. This means that for a certain number of pulses put into it, the 7490 will give one pulse on the output.

However, by using various connections to the i.c., pins it can divide by 5, 6, 7, 8, 9 or 10. We are to use it to divide by 10.

In this case for every 10 pulses fed in to the input, the i.c. will produce one pulse on the output. So, the device 'counts' every 10 pulses for one pulse out, or, in other words, it divides by 10.

## Digital Divider

The digital divider is very useful device. The circuit, Fig. 1, shows two 7490 i.c.s connected to divide by 10. Both 7490 circuits are identical.

A simple way to think of their operation in this application is to imagine them as 'counter blocks'. They work like this: when pulses are fed into pin 1, after every 10th pulse entering pin 1, one pulse comes out of pin 12. The diagram, Fig. 6, provides a simple illustration of the technique involved.

The supply line, which is the usual 5V t.t.l. supply voltage, and I suggested several approaches in the July *PW* for simple power supply ideas. However, for the complete project, the regulator has been incorporated on the main p.c.b.

On the main circuit diagram, Fig. 1, you can see that the supply goes to pin 5 on each 7490 i.c. Two capacitors C3 and C4, are added on the supply line near each counter chip.

The capacitors serve to decouple the supply. In other words, they help prevent any of the signal appearing on the supply. The capacitors are important, and should be placed as close as possible to pin 5 on each i.c.

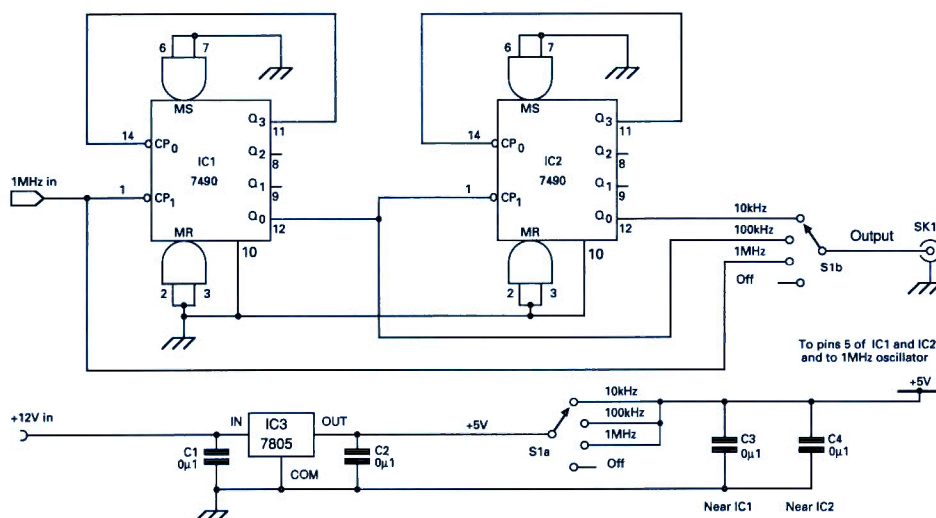
The pulses produced by the circuit are very rich in harmonics. These harmonic signals go well into the v.h.f. radio spectrum, and they are best retained within the required signal paths of the circuit.

## Looking At The Process

Perhaps it's best that we start with a look at the full process. If a signal with a frequency of 1MHz (pulsed at the rate of 1MHz) is fed into IC1, the signal will be divided by 10, producing a signal at

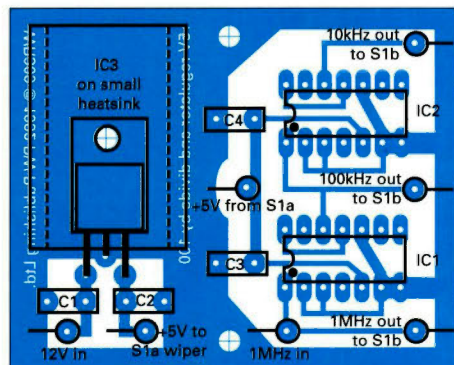
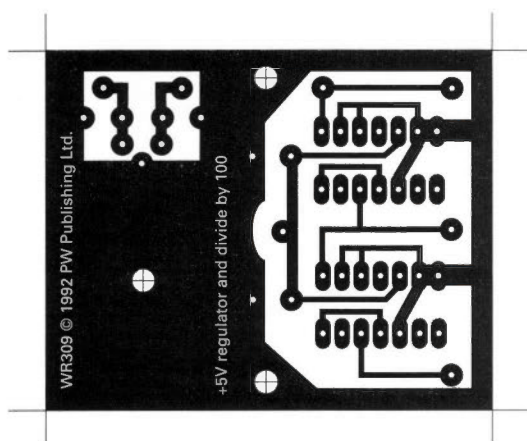
*This month, the Rev. George Dobbs G3RJV shows us how to divide, regulate and calibrate. In this case, George can really claim that we need to divide to work, even though it's digits he's dealing with!*

**The heading photograph shows George Dobbs G3RJV's prototype t.t.l. crystal oscillator and divider board. The '1M' '100K' and '10K' legends refer to the frequency outputs of 1MHz, 100 and 10kHz.**



**Fig. 1: The circuit of the t.t.l. divider. This project enables the 1MHz signal from the July *PW*'s 'Getting Started - The Practical Way' to be divided to produce 1MHz, and 100 and 10kHz outputs.**





**Fig. 2: The p.c.b. design showing the copper track side of the board.**

**Fig. 3: The component side of the project, with components placed to aid positioning.**

100kHz.

If this signal is then fed into IC2, as shown in Fig. 1, a signal of 10kHz will be produced on the output. Of course, 100kHz is a tenth of 1MHz, and 10kHz is a tenth of 100kHz. The circuit, when fed with a 1MHz signal, allows outputs at 1MHz, 100kHz and 10kHz.

### What Use Is It?

I've no doubt you're wondering 'what use is this circuit?' Well to answer your question, it can be added at the output of the 1MHz t.t.l. oscillator you built last time, (July PW) to produce a crystal calibrator.

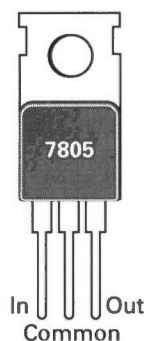
In case you're not quite sure what a crystal calibrator is, it's a piece of test equipment which produces accurate signals for checking the calibration of a receiver. Used alone, the 1MHz oscillator would produce a signal which can be heard at every 1MHz point (1MHz, 2MHz, 3MHz, 4MHz, etc.) on a receiver, well into the v.h.f. range.

The two dividers I've described help to fill in the gaps. The first stage produces a signal which can be heard at 100kHz points, and the second a signal which can be heard at 10kHz points.

The extra frequency-marked points are useful to check the frequency of a receiver, especially one with an analogue scale, or to calibrate a home-brewed radio. The amateur radio licence requires the licensee to have an accurate method of checking the frequency of transmissions, and this circuit can do that job.

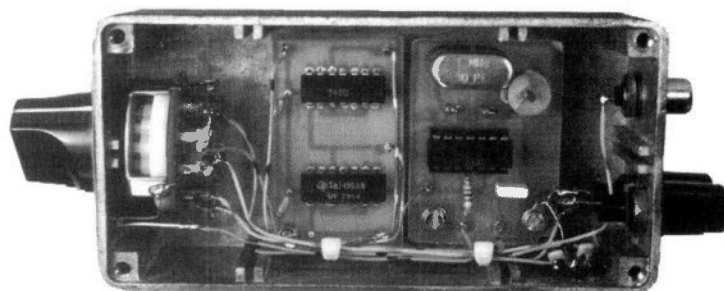
### Circuit Laid Out

The diagram, Fig. 2, shows how the circuit can be laid out as a printed circuit board design, and the diagram shows the copper track side. One of the advantages of digital logic i.c. circuits is that they often produce 'pretty' p.c.b. layouts. This board only contains three i.c.s and four capacitors.



**Fig. 4: Illustration showing the 7805 regulator i.c. in detail, with pin connections shown. The centre pin is the common connection. The metal tab with the hole is the integral heat-sink.**

**Fig. 5: Photograph showing G3RJV's prototype. In the prototype, the t.t.l. oscillator and the divider boards were housed in the same die-cast box, employing a separate regulated power supply. In the PW final version, the t.t.l. oscillator is separate (as shown last month) but the p.c.b. incorporates the i.c. regulator using the 7805 i.c. (see text).**



In addition to the supply line, there's also an input and two outputs. The diagram, Fig. 3, shows the component side of the p.c.b.

### Boards Combined

The t.t.l. divide board and the t.t.l. oscillator board can be combined to produce a switched crystal calibrator. The method of switching the boards is shown in Fig. 1.

All the switching functions are done by a single switch, which is a two-pole, four-way rotary wafer switch. This is a switch that's based on a control shaft with a single knob. It can switch an input to any one of four output contacts.

The four-way wafer switches are usually made with three poles. In other words they have three sets of four-way switching actions controlled by the same shaft. This is a common arrangement because it's easy to get 12 switching contacts around the wafer of the switch.

As you might expect, four-pole three-way, two-pole six-way, and one-pole 12-way are also common combinations of the wafer switch. You can often pick up some useful, and very cheap, switches of this type at rallies.

### Power Switch

The section of the switch, S1a, is the pole which acts as a power switch for the calibrator. In position 1 (below the 1MHz position in Fig. 1), the 5V supply goes nowhere! In the other three positions it provides the supply for the oscillator and the dividers.

The section S1b selects the required output. Position 1 also goes nowhere, it's the 'off' position. Position 2 picks up the 1MHz signal from the oscillator. The position 3 on S1b picks up the 100kHz signal, and position 4 the 10kHz signal from the divider board.



## Neat Idea

You're probably wondering 'what about the third pole?' Well, it has no use in this circuit and can remain unused. However, I've got a neat idea for the more sophisticated constructor!

Why not use the third pole as an indicator switch? You could use the spare contacts on S1c (the unused pole) to switch three light emitting diodes.

Each l.e.d. can be switched on by the 5V supply, and they could be mounted in line on the calibrator case. Mark the case to show '1MHz', '100kHz' and '10kHz' by the appropriate l.e.d.

Although they're not really needed, the l.e.d.s will add that little extra touch to the project. But don't forget that the l.e.d.s will need a series resistor in line with the supply.

For this purpose, a value of about 330 or 390Ω will do the trick. For once, I haven't included a circuit, as it's a nice little addition job to work out for yourself!

## Suitable Power Supply

A suitable power supply is the next problem! The t.t.l. range of i.c.s require a 5V supply, and unfortunately this isn't a common battery voltage.

In the last part of this series I described a simple way to use a 6V supply by dropping some of the voltage through a diode. This is a simple, no frills method.

A better approach is to have an accurately-regulated 5V supply. Thankfully that's neither difficult nor expensive and it's been incorporated on the p.c.b. design.

## Three Terminal Regulators

To help us with power supplies, there's a very useful range of i.c.s often called 'three terminal regulators'. They look like transistors, but are actually useful integrated circuit devices for providing a regulated voltage from a higher voltage.

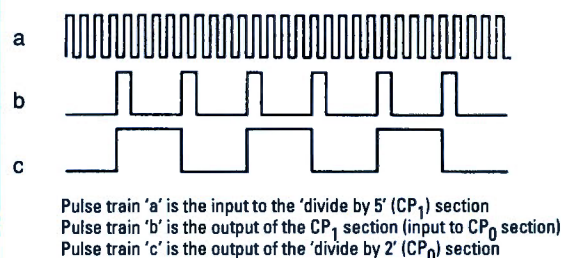
The regulators are manufactured for a specific output voltage, one of which is 5V. A suitable regulator i.c. for our t.t.l. project is the 7805. This device, and its connection details, is shown in Fig. 4.

Regulator i.c.s usually require a minimum input voltage some 2V above the regulation voltage. In the case of the 7805, it will work over an input range of 7 to 25V and produces a 5V output while providing a current of up to 1A.

## Regulator Circuit

The regulator circuit is shown in the lower part of the main circuit diagram in Fig. 1. The 7805 has an input and output pin and a common pin, which is connected to ground, and these are shown in Fig. 4.

On top of the i.c. is a metal tab, to which a heat-



**Fig. 6: Diagram illustrating the technique involved in dividing, using the 7490 i.c. (see text).**

sink may be connected. For use in our calibrator project this is connected to the small heat-sink as shown in the component overlay diagram, Fig. 3.

The circuit also shows two capacitors, and these are included to decouple any noise due to the action of the regulator's internal circuitry. The input is shown for a 12V d.c. input, as this is a common supply voltage, but despite this the circuit will work over the whole 7 to 25V range.

## The Prototype

In the finished prototype calibrator, I connected the two capacitors directly between pins 1 and 2 and 3 and 2. In my version, the i.c. was bolted to the side of the case using the mounting hole in the metal tab.

The circuit can be used directly with a 12V d.c. supply. The power switch in Fig. 1, (S1a) is best connected in the power input line to the regulator, as this will switch the d.c. supply on and off.

To help you get a good idea of what to do, the construction of the calibrator can be seen from the prototype's photograph, Fig. 5. Any suitable case which can contain the boards may be used. The output socket in my prototype is a phono socket, but any other type of connector can be used.

## Easy To Use

The calibrator is easy to use. You shouldn't have to connect it directly to the receiver. Usually, a wire about a metre or so long, coming from the output and laid near to the input of the receiver will do.

However, if the receiver is well screened by a metal case and the antenna input lead is also via a screened input, the end of the wire may have to be placed inside the case to enable the receiver to detect the signals.

As I mentioned in the previous article, the oscillator should be adjusted with the trimmer capacitor to be at 1MHz. Also, don't forget that the receiver must be used with a beat frequency oscillator (b.f.o.) or in the c.w. or s.s.b. mode. When you're using the calibrator, begin by finding the 1MHz points, before going down to the 100kHz and 10kHz points.

*That's your lot for this month. Keep building, and having fun and I'll see you next time.*

## Shopping List

Two 7490 i.c.s, Maplin QX66W are suitable (there are many other suppliers). See July PW for explanation of chip identification. 100nF disc ceramic capacitors. Three-pole four-way wafer switch (Maplin FF75S or similar). Regulator, 7805 type. Maplin QL31J (or similar) suitable.

## PW PCB Service



The new p.c.b.s, generated since the March issue this year, are now available. The boards have been improved and now include a silk-screened component overlay on the top side of the board. The component placing now matches the article in PW, and so the assembly is made easier for everyone.

Please add £1 p&p to orders for one board (or one set of boards) and £2 p&p to orders of two or more p.c.b.s

**Urgent? Phone your order in by calling (0202) 665524 at any time. Please allow 28 days for delivery.**

**Other p.c.b.s are as shown on page 65 of the November 1991 issue of Practical Wireless.**

Board	Article Title	Issue	Price
WR307 SET	Crystal Checker (Getting Started) <b>WR303/304/305/306</b> Inductance Bridge	June 92	£4.25 £19.30
WR302	GDO (Getting Started)	Apr-May 92	£4.75
WR301	CHALLENGER Receiver	Apr 92	£4.75
WR300a	OSCAMP Oscillator	Feb 92	£4.75
WR300	OSCAMP Amplifier	Mar 92	£5.20
WR299 SET	Multivibrator (Getting Started) <b>WR295/296</b> PW BEAVER WR297/298 additional Beaver p.c.b.s	Feb 92	O/S £14.00
SET	<b>WR292/293/294</b> CHATTERBOX	Oct 91	£14.00
SET	<b>WR290/291</b> ROBIN Frequency Counter	O/S	£14.00
		Aug-Sep 91	
		Aug 91	£12.75



# A Portable Vertical Antenna For HF Operation

For a summer project, the well-known amateur radio designer and writer Doug DeMaw W1FB, has come up with a portable h.f. antenna design. Armed with the transmitter from last month's PW, surely you must be tempted to try portable working now!

**Figs. 1, 2, 3 and 4:** Mechanical details of the W1FB 3.9MHz (suitable for 3.5MHz also) helically-wound vertical antenna. The antenna is arranged for normal mode radiation, which is vertically polarised and omni-directional. Suitably treated wooden joiners (see Fig. 5) are used to combine the three antenna sections. The shorting strap D provides an electrical connection between the antenna sections, and stabilises the joints. The 'top hat' E is a 250mm diameter aluminium disc, attached to a 10mm bush (F). The bush is drilled at the centre for attachment to the 6mm diameter brass rod (G). The 6-32 screw at the top of the section A winding passes through a threaded hole in rod G to connect the winding to the top hat.

As I'm a camper and a QRPer, it goes without saying that a transceiver is an essential part of my field pack.

Unfortunately, not all camping areas have trees of the correct height, or somewhere to accommodate a dipole or end-fed wire. To get over this problem, I've adopted the rule that 'if you can't go out, go up'. In other words...vertical antennas provide a solution to this problem!

This article describes a helically wound h.f. band vertical that breaks down into a conveniently-sized bundle for transporting it to the camp site. It's got the advantage that it may be tailored to the amateur band of your choice.

## Short Vertical Antennas

Let's take a look at short vertical antennas in general. The debate over whether a top-loaded, centre-loaded or base-loaded short vertical is best will no doubt continue until Doomsday!

Over the years, I have used each type and have had good results with all of them. However, this was provided the loading coil had high Q and the feed-line was matched to the antenna.

The quality of the ground system does, of course, play an important part if good performance is to be achieved. The more effective the ground screen or radial system, the greater the overall efficiency.

I have found that helically wound vertical antennas perform better for me, than verticals of the same length, using lumped inductance for loading coils do. The voltage and current distribution is more uniform with a 'helical' than for short verticals with loading coils.

Although this may not be important with regard to general performance, I find it appealing from an academic point of view. So, I've said my piece, and it's time to look at the idea!

## Essence Of A Helical

Let's take a look at the essence of a helical vertical antenna. Firstly, owing to a small outer diameter of the antenna coil, respective to a wavelength, axial mode radiation doesn't occur.

Therefore, the long slender coil (normal mode) performs in the same fashion as a short vertical that contains a loading coil. Resonance is  $1/4\lambda$  and this requires approximately 0.5 wavelength of wire to construct a  $0.25\lambda$  radiator.

The greater the diameter and length of the helically wound coil, the less wire required to establish  $0.25\lambda$  resonance. Experimentation with resonance will be required with various form factors.

Experimentation may be done by erecting the antenna at ground level, and operating it in conjunction with four  $0.25\lambda$  radials. These are laid upon the ground, and a small four turn sampling coil is inserted between the feed-point of the vertical and the ground screen.

## Dip Meter Check

When the sampling coil has been inserted, a dip meter can then be used to check resonance, by inserting its coil in the small link at the antenna feed-point. Add or remove helix turns until the antenna is resonant in the chosen part

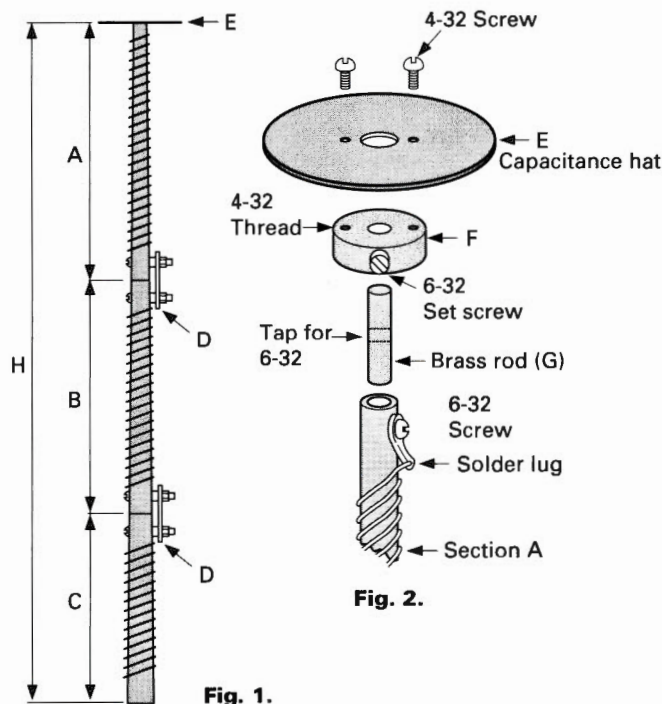


Fig. 1.

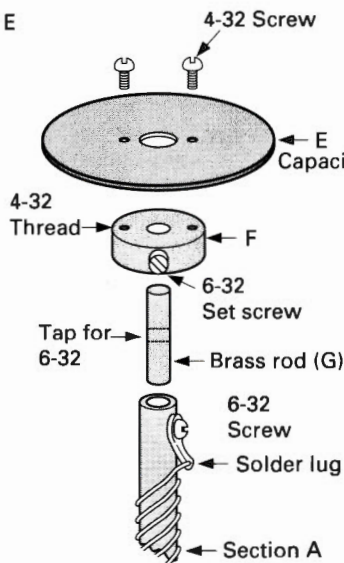


Fig. 2.

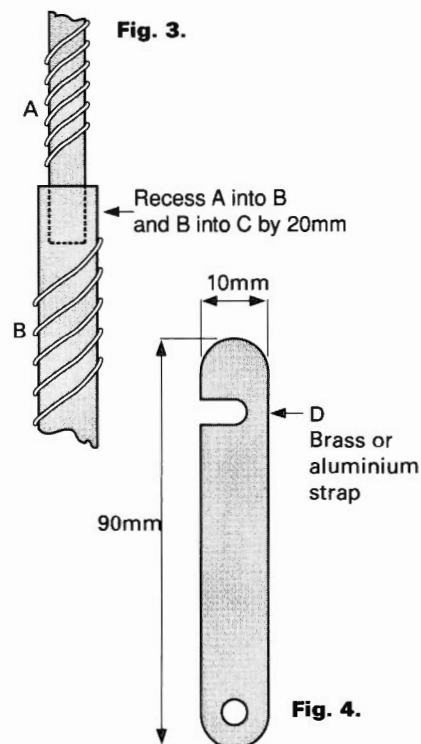


Fig. 3.

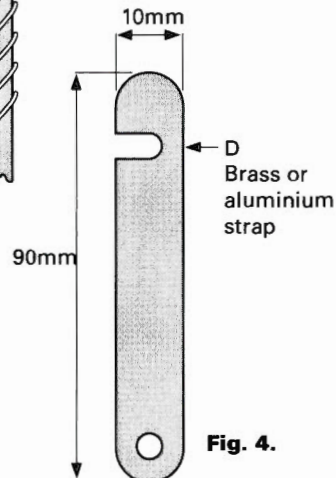


Fig. 4.



of the band. The capacitance hat must be in place at the top of the antenna when this test is performed.

I like to make my antenna resonant at the upper frequency of the range of interest. This enables me to add a small adjustable loading coil at the feed-point, for establishing resonance at frequencies that are lower in the band.

The 2:1 s.w.r. bandwidth for a properly matched helical vertical is quite narrow, in the order of 8kHz at 3.8MHz. The feed impedance is between 8 and 15Ω, typically. This calls for a matching network or tapped resonating coil at the feed-point to ensure a match to 50Ω coax cable. More on this later.

## Capacitance Hat

A capacitance hat or metal rod is necessary at the top end of the helix. This prevents the Tesla-coil effect at high power levels. A diameter of between 200 and 250mm is satisfactory. If a metal rod is used instead of the hat, make it approximately 440 to 560mm long.

A helical vertical may be space wound or close wound. The pitch of the winding is dependent upon the coil form diameter and the wire gauge used. The heavier the wire gauge the higher the antenna Q because of a reduction in a.c. resistance.

## Practical Helical Antenna

I needed a 3.5MHz vertical for use with my Kenwood TS-140 when camping. I installed a mounting bracket near the roof of my aluminium-sided camping trailer to accommodate the vertical.

The location I chose, places the antenna in the clear above the roof of the camper. The antenna is worked against the metal side and frame of the trailer.

When it's in use, a ground rod is driven into the soil below the camper. A ground strap is then attached to the frame of the unit.

My helix antenna is over 3.96m long, which makes it impractical to transport it assembled. Therefore, I chose to construct it in three sections to permit the system to be bundled for easy storage and transport. Metal shorting straps are used to join the three antenna sections when it's assembled, as shown in Fig. 1.

## Antenna Foundation

The foundation for my antenna is a fibre glass cubical quad spreader. In my case, the spreader is made up from three telescoping sections. You could use a hollow fibre glass fishing rod, as an alternative to the quad spreader.

The telescoping feature is impractical for the antenna in Fig. 1 however, owing to the coil wire being added to the fibre glass form. Each section can be slipped into the mating section if you cut 50mm or so of stock off the upper end of each section.

Wooden joiners are used to combine the antenna sections, as shown in the diagram. I turned these joiners on my lathe to have the upper end of each slightly smaller in diameter than the bottom end.

Turning them in this way ensures a snug fit inside the fibre glass tubing. The joiners are fixed to the tubing at the lower end of each wooden insert.

The mating upper section of the vertical, simply sits on the top the joiner. The shorting straps prevent the 'loose' antenna section from turning or slipping out of the lower section. Each upper antenna section slips into its lower mating section (there's a recess of approximately 20mm).

There's no reason why 25mm o.d. plastics plumbing pipe can't be used for the coil former on the helix. The wooden joiners would be the same diameter from one end to the other at each junction.

## Higher Bands

Helically wound verticals for the higher bands can be wound on wooden dowelling rod. This is quite practical if the wood is treated with an exterior grade of polyurethane varnish. The type of varnish used on boats, also works well as an effective moisture-prevention treatment.

I once used a 4.9m long wooden hand rail as the form for a 1.8MHz helix. I coated the wood with three layers of spar varnish, wound the helix and added two more coatings of spar varnish.

A 250mm diameter aluminium pie tin served as the capacitance hat! This antenna performed very well, and I worked a fair amount of DX with it.

Continued over...

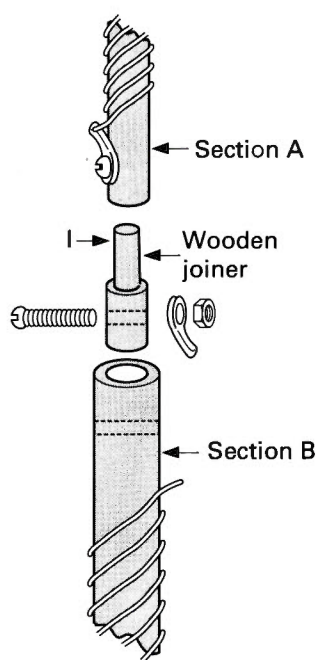


Fig. 5.

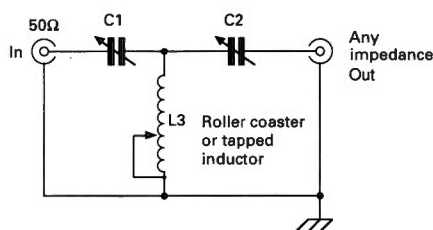


Fig. 6.

Figs. 5, 6 and 7: The diagram in Fig. 6 illustrates a matching method for a single-band operation of a helically-wound antenna. The inductance, L2 is adjusted for antenna resonance and the lower tap is adjusted to provide a 50Ω match (see text). The T network in Fig. 7, can be used to move the operating frequency from part of a band to another without changing the inductance of the vertical radiator. The a.t.u. will also permit using the vertical on bands other than that for which it is designed. The inductor L3 should have a minimum of 15μH for 3.9MHz (see note below text). The C1 and C2 are 150pF variable capacitor with sufficient plate spacing to accommodate the transmitter power. For operating convenience, L3 in Fig. 6, can be a roller-coaster coil or a tapped coil (tapped every three turns).

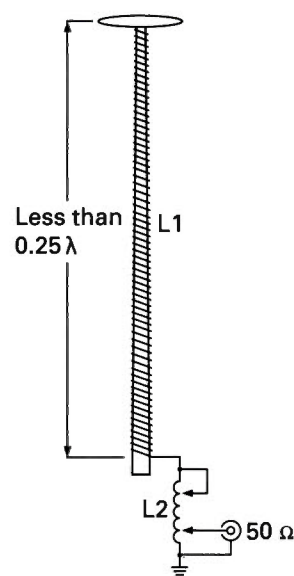


Fig. 7.



## Speaker Wire

The windings for sections B and C in Fig. 1, were made from the commonly available translucent plastics covered speaker wire (this is often sold as light-duty mains cable in the UK and is of figure '8' section. Editor).

The suggested wire pulls apart easily to form two single conductor wires of equal length. Details of the windings are shown in Figs. 2, 3, 4 and 5.

The translucent plastic insulation on the wire withstands ultra-violet radiation, heat and cold quite well. It's also cheap! Antenna section A is wound with No. 16 magnet wire (1.5mm diameter enamelled wire is suitable).

Each section contains 13.5m of wire for 3.9MHz **\*(Readers in the UK, see note at end of text)**. Ideally, each section would be wound with equal spacing between the turns.

Owing to the taper of the sections, I was not able to judge the proper spacing between turns. Because of this, the upper ends of the three sections have turns that are spaced farther apart than the bottom halves of the sections. This has little effect on the overall antenna performance.

I would have preferred to use shrink tubing over each antenna section after completing the windings. I didn't have shrink tubing of great enough diameter, so I simply ran a strip of clear RTV (or Silastic) compound down two sides of each antenna section.

The compound keeps the turns firmly in place. Low-loss electrical tape may be used in place of shrink tubing or sealant, and you can also use bath-tub caulking material to fix the windings in place.

## Antenna Matching

The diagrams, Figs. 6 and 7, show two methods for matching a 50Ω feeder to the vertical antenna. The tapped coil method is simple and easy to use.

The coaxial cable feed is tapped on the coil near the grounded end to provide a s.w.r. of 1:1. The overall coil is adjusted to provide resonance at the operating frequency.

Since there is some interaction between the tap points, it's necessary to readjust the taps two or three times to obtain a 1:1 s.w.r. This technique requires the helix to be resonant slightly above the chosen operating frequency.

A simple T network is shown in B, in Fig. 6. I use the T network when camping. This permits me to use the antenna on frequencies other than the 3.9MHz (75 metre) band. However, the tapped coil method shown in Fig. 7, is only suitable for single-band operation.

If your transmitter is able to withstand moderately poor s.w.r. conditions, you may wish to eliminate the matching networks and install a 365pF variable capacitor between the antenna feed-point and the coaxial line.

If this is done, the helical antenna must be lower in frequency than the proposed operating frequency. Valved rigs work nicely with this tuning arrangement. But be warned, s.w.r. protected solid state equipment will gasp in horror if you try this method!

## Multi-band Operation

In the USA, we have a larger frequency allocation between 3.5 and 4MHz than in Europe. However, *Practical Wireless* readers in the UK will be interested to know that I've used my 75 metre band (3.9MHz) portable helical vertical antenna on 7, 10 and 14MHz without changing the antenna windings. The T-network a.t.u. in Fig. 6, makes this possible.

Remember that as the operating frequency is increased, so is the radiation angle. This is okay for 'cloud warming' contacts, but don't expect great results when chasing DX!

A better technique is to retain section C of Fig. 1 and construct a new section B for 7MHz use. If there is around 13.5m of wire on section C, you will need approximately 8.53m of wire on section B for 7.2MHz. Readers in the UK and Europe will have to adjust these lengths for their 7 to 7.1MHz allocations.

Alternatively, you could build sections C for 14MHz and tailor sections A and B for 14, 7, 3.5 or 1.8MHz. A set of sections would permit operation on many bands.

## Remarkable Results

The longer the antenna the better the performance. However, I've had remarkable results with very short helically-wound antennas.

For example, I constructed one that was just under 1m long and 10mm in diameter for use on 1.9MHz. I had to use 24s.w.g. enamelled wire and a small loading coil to obtain resonance.

This was in 1954 when a.m. was king on 'top band'. Owing to the light gauge wire, I restricted my transmitter power to 10W.

I made several contracts out to 160km and was elated to receive signal reports of Q5 and S6 to S9 with the midget antenna. Later on, W8UUN and I constructed an experimental helically wound dipole for 1.8MHz.

The antenna was 5m long and had a bandwidth of 3kHz! Matching was accomplished by means of a link at the centre of the dipole's continuous winding. A small capacitance hat was used at each end of the dipole. Results were good, and we had solid QSOs of up to 800km during night-time operations.

If there is a bottom line to this story, it's that no shortened antenna compares in efficiency to a full size antenna of the same type. However, on the advantage side, short antennas are a practical means to an end when there's not enough room available for a large antenna.

**\*Note:** Although the antenna dimensions are based for the 3.9MHz (75 metre) band, there is no necessity to alter the dimensions of the antenna if an a.t.u. is used.

I've included the formula below, so that you may use it to design a helical for the band of your choice.

$$L(\text{antenna}) \approx \frac{516}{f(\text{MHz})} \text{ (in feet)}$$

## Shopping List

Wire (see text) aluminium disc, glass fibre tubing for pole, tape, sealing compound, coaxial cable, plugs and sockets, brass rod, plastics tubing for base-loading coil (see text), variable capacitors (see text), solder tags, polyurethane varnish (yacht varnish is ideal). **Note:** The reference numbers for the nuts, bolts, screws and threads used in this project are American standards. Readers having to purchase screws, rather than modifying the design themselves, will find that ironmongers and specialist tool shops will have equivalents and information.



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# Reflections

*This month Ron Ham looks back again at wartime radio equipment. Just for a change he takes a look at the 'other side's' radio work before looking at the regular monthly reports.*

Sound mechanical construction is an important factor with all radio gear, especially when it is required for military use. This was frequently proved during WWII when static and mobile sets had to be robust and able to perform under really hazardous conditions.

Do keep in mind that this war was fought 50 years ago when the current hungry thermionic valve, with its fragile glass envelope, was the latest technology. Before the advent of the printed circuit board, some 10 years later, radio components were generally either bolted to the chassis or 'strung' between tag boards prior to their connections being soldered.

## Solid Construction

Many of us young engineers learnt a lot about 'solid' construction through modifying, repairing and using the variety of purpose-built sets that appeared on the surplus market after the war. It was like your favourite dealer today selling off all his beautiful stock, new and boxed, at scrap prices, hi!

Almost all military sets were assembled and wired by hand, individually aligned and tested. In addition to performance and electrical reliability, the designers had to think about mechanical construction, stability and weight. The latter was really important, especially if the equipment was being

carried by a soldier on foot or used in aircraft where every ounce had to be considered. To this end various alloys were used, and all nuts and bolts were fitted with spring washers and then 'painted' to prevent them coming loose.

Don't forget that a slack fixing could mean a poor earth connection causing crackles or intermittent operation of the set. Worse still, a stray nut, bolt or washer could lodge itself between components, create a short circuit and cause damage to the valves or the power unit. Every effort was made to prevent 'silly' faults like this from occurring.

## Beautifully Engineered

Throughout WWII, military wireless equipment, on both sides, was well-designed and beautifully engineered as shown by the German low frequency communications receiver Torn. E.b. The set itself, **Fig. 1**, made by Telefunken, weighs (bathroom scales) about 22lb (10kg) and measures approximately 330x210x230mm. The sturdy metal casing, finished in German field grey, has a

sides.

The full frequency coverage is 96.6kHz to 7.095MHz, divided into eight wavebands individually selected on a turret tuner. No doubt, the lower frequency ranges are the reason for the extensive screening employed throughout the set. For instance the valves are metal clad and then fitted inside a well-screened holder.

One valve can be seen removed from its holder in the centre of **Fig. 2**, and on its own on the left of **Fig. 4**. Now look at the massive coil turret, **Fig. 3**, and the separated coil assembly ('biscuit') in the centre of **Fig. 4**.

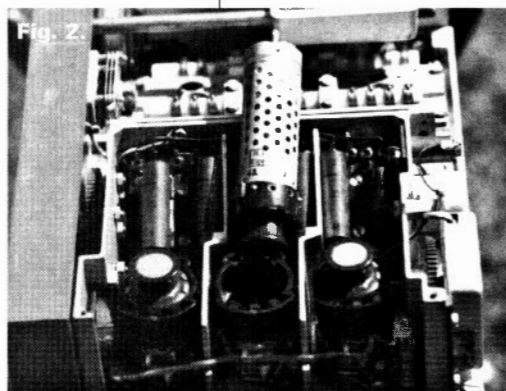
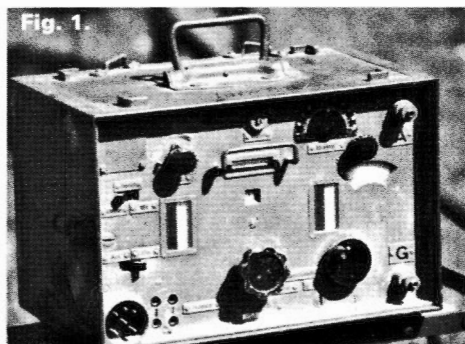
Each 'biscuit' has three separate coils independently screened and protected by an alloy cover. The cover is shown by itself at the lower right in **Fig. 4**. As the turret is revolved to select the required frequency range, the 10 contacts (one group of four and two groups of three) from each coil unit engage in the equivalent number of fixed sockets located behind the slanting panel, just left of top centre in **Fig. 5**.

Incidentally, the end-

disengaged to illustrate the direction of movement of the contacts, and to show the relative size of each 'biscuit' assembly.

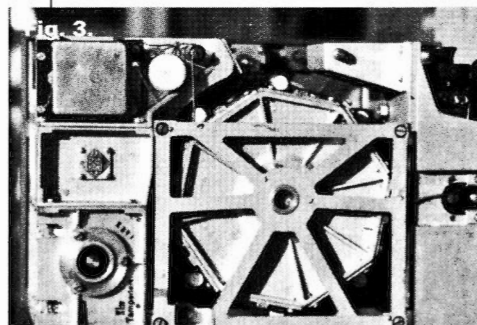
Obviously the large terminals marked 'A' and 'G' (right of **Figs. 1** and **6**) are provided to accept a long-wire antenna and an 'outside' earth. Any of the following frequency ranges, 1, 96.6-177.2kHz, 2, 171-313.7kHz, 3, 304-558.5kHz, 4, 540-990kHz, 5, 955kHz-1.740MHz, 6, 1.674-3.075MHz, 7, 2.920-4.820MHz and 8, 4.360-7.095MHz can be selected by rotating the central knob (**Figs. 1** and **6**).

The range number appears in the small square above the knob and tuning instructions, for the vernier dial, are shown in the upper and the left and right oblong panels. The left (darker) and right sides of each panel are labelled 'Grad' & 'kHz'



hefty carrying handle at the top and a number of webbing attachment points on the top and

threaded rod opposite this panel is one of the three long bolts that secures the chassis to the cabinet, and its slotted head is visible just left of top centre in **Fig. 6**. The turret in **Fig. 5** is



respectively.

Tuning to a precise frequency is carried out with the knob below the right-hand panel, and it's indicated on the crescent shaped vernier dial below the 'A' terminal. This has a reasonably slow-motion drive and is scribed 0 to 100 which corresponds to the 'Grad/kHz' relationship given in the two oblong panels. For example, range 4, 0, = 540kHz, 25, = 624kHz, 50, = 749kHz, 75, = 881kHz and 100 = 990kHz. At this point the upper rectangle is showing "1 Grad = 4.5kHz", a



figure which varies according to the range.

## Power Requirements

I once saw a Torn E.b. standing on a purpose-made box, which no doubt contained the high and low tension batteries for this 'portable' receiver. Judging by the valve types its power requirements would be around 2V l.t. and 120V high tension, fed via a large screened plug to the six pin socket at the bottom left of Figs. 1 and 6.

The set uses four RV2P800 (pentode) valves, each requiring 1.9v at 0.18A on their filaments (l.t.) and up to 120V (h.t.) at 3.5mA on their anodes. Apart from the top pin, which I think is grid 1, the other connections to the valve's electrodes are side-contacts fitted at the base just below the 'finger' type removal cap, lower Fig. 2 and left and right, Fig. 5.

These valves were among a variety of special types made by Telefunken for the German government. The holes to let the valves protrude through the

I often suggest specific books in this column, firstly, because I believe it helps many of our readers. Secondly, it shows the respective authors and publishers that their efforts are appreciated.

Two more books that link WWII research to our present day observations are *Radio Astronomy* by Roger Jennison, published in 1966 by Newnes and *The Radio Universe*, by J. S. Hey, published in 1971 by Pergamon Press. Briefly, in addition to some good reading on the title-subjects, both authors refer to the investigation, by Dr. Hey, into enemy attempts at jamming British radar stations operating at "wavelengths of a few metres."

However, it appears that in

solar disc as he saw it on his projection screen at 0655 on the 19th.

## Aurora Reports

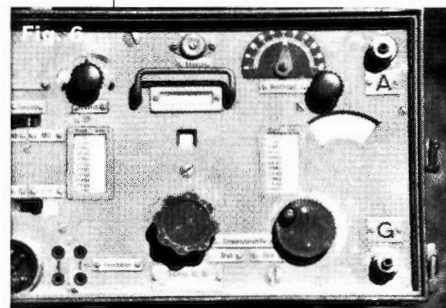
The auroral co-ordinator for the British Astronomical Association, Ron Livesey, received reports of 'active aurora' up to 90 for the overnight period on April 19, and 'glows' on the 24th from the Kirkwall Met Office. 'Active aurora' on the 2nd and 3rd, and 'corona 2/3 sky' on the 5th from Jay Brausch in North Dakota.

Auroral reflected radio signals from the Lerwick beacon, GB3LER, on 144MHz, were

Italy and Spain at the bottom end of Band II, on the 5th, reports Michael Larsson (Cheadle Hulme) that an event was in progress. And, to add a bit more weight, Russ Burke (Northampton) tells me he received television pictures from these two countries on the 2nd, 3rd, 4th and 11th.

## Earthquake

Finally, I don't think we can blame the sun for this! Around 0222 on April 13, Peter de



Jong was at home and awake when Holland experienced its strongest earthquake since 1692! Its strength was 5.5 on the Richter open scale near Roemund, some 160km from where he lives in Leiden. "It is indeed a weird and frightful experience. It is like being weightless, with waves moving back and forth (instead of up and down) under you. The whole house shook, despite the distance from the epicentre," wrote Peter.

He added, "Ultimately it is related with the same fault as the now active Etna volcano!" Local damage in Peter's area has been estimated at £30m. We are glad that you are safe Peter and thank you for this first-hand account, it is much appreciated by us all. Apart from her horror of the situation, Joan's reaction to your letter was, "it must feel like standing on a jelly."

Fig. 7.

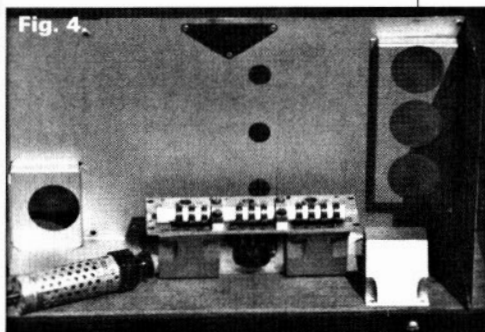
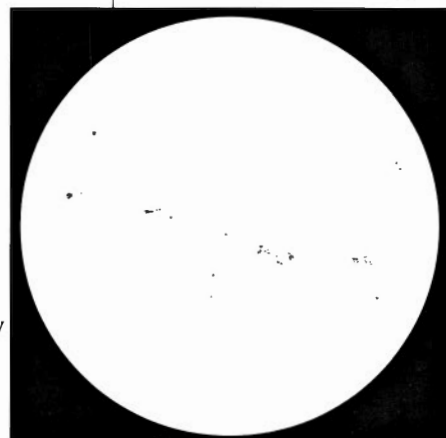


Fig. 4.

upper chassis screen can be seen on the left and right of the large metal cover standing at the rear of Fig. 4.

## Bookshelf Must

The Torn E.b., shown in Fig. 1, may have been used on airfields because each of the valves is stamped with the letters R.L.M. (Reichsluftfahrtministerium), meaning State Ministry of Aviation. More information about German aircraft radio can be found among the 672 pages of William Green's book, *Warplanes of the Third Reich*, (ISBN 0 356 02382 6). In my opinion the hundreds of photographs, technical drawings and detailed text makes this comprehensive work a bookshelf must for students of aviation history.

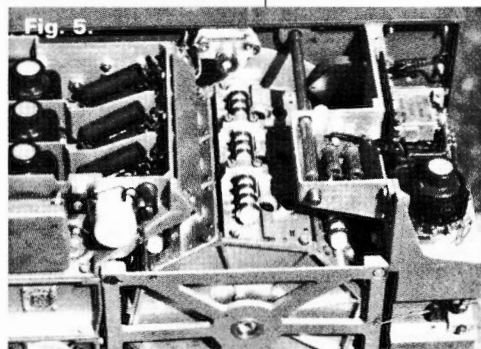


Fig. 5.

February 1942 a period of high noise level, seen on the screens, was due to sunspot activity and not the work of German engineers. These findings were kept under wraps until the war ended. Since then, enthusiasts in the fields of radio and astronomy have kept a regular watch on sunspots and their effect on the propagation of terrestrial radio waves.

## Reports And Observations

As usual I end up with your reports and observations. From his home in Edinburgh, Ron Livesey, using a 2.5in telescope and a 4.0in projection screen, identified four active areas on the sun's disc on April 3, 4, 15, 16 and 24; five on days 18 and 19; six on the 21st, 24th and 26th and seven on the 2nd and 25th. At the other end of the UK, Patrick Moore (Selsey) watched the progress of a number of groups and spots as they appeared with the 27 day rotation of the sun. He kindly sent a drawing, Fig. 7, of the

received by Doug Smillie at 1720 on the 3rd and 1414 on the 18th.

## Magnetic Observations

Although there were no magnetic storms recorded during April, the magnetometers used by Tony Hopwood (Upton-On-Severn), Karl Lewis (Saltash), Ron Livesey and Doug Smillie, for observations, were unsettled on days 3, 5, 6, 8, 9, 10, 17th to 23rd inclusive and 26, 27 and 29th.

## Sporadic-E Season

The 1992 Sporadic-E season began for John Woodcock (Basingstoke) on May 5 when he received strong pictures from Italy, in Band I, at midday. Since then he logged Estonia on the 7th, Estonia and Sweden on the 9th, Spain on the 12th, Italy again on the 15th and Estonia and Portugal on the 18th.

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# Mathematics For The RAE

To start off this month, we'll begin with the easiest bit! Let's suppose that we have three capacitors connected in parallel, as in Fig. 1. For this problem, the effective capacitance across the terminals a and b is given by:

$$C_{a-b} = C_1 + C_2 + C_3$$

To work in our usual way, I'll put some figures in as an example: For example if  $C_1 = 10\mu\text{F}$ ,  $C_2 = 2.2\mu\text{F}$  and  $C_3 = 4.7\mu\text{F}$ , what's the effective capacitance between the terminals a and b?

$$C_{a-b} = (10 + 2.2 + 4.7)\mu\text{F} = 16.9\mu\text{F}$$

As all three values were in the same sub-multiple of the unit, it was only necessary to add the numbers together! This applies to any number of capacitors connected in parallel, as long as the values are all in the same multiple or sub-multiple of the unit or, of course, they're all in basic units.

For three capacitors with different sub-multiples of the basic unit (capacitors used in radio nearly always have values far smaller than the basic unit the Farad) it's first necessary to convert all the values either to basic units or to a common multiple, or sub-multiple of the unit.

If we have three capacitors having values of 680pF, 820pF and 2nF are connected in parallel, what's their effective capacitance?

As two of the values are already in pF, we'll change the 2nF to 2000pF, then we only need to add the values together.

$$C_{a-b} = (680 + 820 + 2000)\text{pF} = 3500\text{pF} \text{ or } 3.5\text{nF}$$

## Capacitors In Series

What about capacitors connected in series? Well, it's a little more difficult, just like inductors in parallel but don't worry about it, as I'll explain it carefully.

Mathematically speaking, calculation of the effective value of series connected capacitors is the same as that for the parallel connection of inductors. If it's still a bit puzzling, don't fret, as it will become clearer a bit later on when we look at inductive and capacitive reactance.

The effective value of three capacitors connected in series (Fig. 2) is:

$$\frac{1}{C_{a-b}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

To help, I'll put some figures in to illustrate the principle. In this example I'll say that  $C_1 = 470\text{pF}$ ,  $C_2 = 390\text{pF}$  and  $C_3 = 220\text{pF}$ . If this is so, what's the effective capacitance between terminals a and b in Fig. 2? It's not too difficult, and because all values are in the same sub-multiple of the unit, pF (picoFarads), we only need to bother about the figures.

$$\frac{1}{C_{a-b}} = \frac{1}{470} + \frac{1}{390} + \frac{1}{220}$$

(using a calculator):

$$= 0.00213 + 0.00256 + 0.00454 = 0.00924$$

(inverting both sides):

$$C_{a-b} = \frac{1}{0.00924} = 108.23\text{pF}$$

## Two In Series

For just two capacitors in series, having values given in the same type of units:

$$C_{a-b} = \frac{C_1 * C_2}{C_1 + C_2}$$

What is the effective capacitance of 330μF and 680μF connected in series? As both values are given in μF? Putting the figures in the above formula gives us:

$$C_{a-b} = \frac{330 * 680}{330 + 680} = \frac{224400}{1010}$$

These figures give an effective value of 222.2μF when two capacitors of 330μF and 680μF are in series.

Here's a final example of capacitors in series:

In this example we have three capacitors having of 3.3nF, 910pF and 750pF connected in series. Now we have to determine their effective capacitance.

To start the process, you should state all three values in a common sub-multiple, and the easiest choice is to use picoFarads (pF). As 3.3nF is the same as 3300pF, the values can be stated as 3300pF, 910pF and 750pF.

$$\frac{1}{C_{a-b}} = \frac{1}{3300} + \frac{1}{910} + \frac{1}{750}$$

After calculation,  $C_{a-b} = 0.0003 + 0.0011 + 0.0013 = 0.0027$ . Inverting this figure gives us the answer of:

$$C_{a-b} = \frac{1}{0.0027} = 370.4\text{pF}$$

## Series Parallel Combination

Let's make it a little more complex, but just as easy! Look at the drawing of Fig. 3, and you will see three capacitors in a series parallel combination.

To work this one out, we attack it in two stages. First we work out the  $C_2/C_3$  combination, and then calculate this new value with the value of  $C_1$ . It couldn't be easier, could it?

Now we'll put a few figures into the problem. Let's assume  $C_1$  is 470pF,  $C_2$  and 100pF and  $C_3$  is 330p. Don't forget that when capacitors are in parallel we add their values. So, the combination of  $C_2$  and  $C_3$  (let's call it  $C_x$ ) is 100p+330p = 430pF.

The combination of  $C_x$  and  $C_1$  in series (this is  $C_{a-b}$ ) is:

$$C_{a-b} = \frac{470 * 430}{470 + 430} = \frac{202100}{900}$$

This gives us an answer of 224.6pF when it's rounded up.

Well that wasn't so bad was it? I'll leave you with your homework for this month, with just a few easy questions to set this session in your mind:

Using the arrangement of Fig. 1, find  $C_{a-b}$  when:

- $C_1=10\mu\text{F}$ ,  $C_2=22\mu\text{F}$  and  $C_3$  is 47μF
- $C_1=470\text{pF}$ ,  $C_2=560\text{pF}$  and  $C_3$  is 2.2nF
- $C_1=10\text{nF}$ ,  $C_2=1\text{nF}$  and  $C_3$  is 2200pF

Now use the arrangement of Fig. 2, to work out  $C_{a-b}$  for the following values

- $C_1=10\mu\text{F}$ ,  $C_2=22\mu\text{F}$  and  $C_3$  is 47μF
- $C_1=470\text{pF}$ ,  $C_2=560\text{pF}$  and  $C_3$  is 2.2nF
- $C_1=10\text{nF}$ ,  $C_2=1\text{nF}$  and  $C_3$  is 2200pF

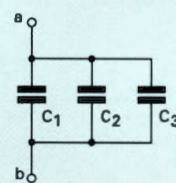
Finally, I'll leave you with a combination using the circuit of Fig. 3.

Find  $C_{a-b}$  when:

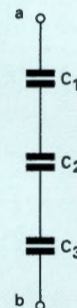
- $C_1=2.2\text{nF}$ ,  $C_2=1.1\text{nF}$  and  $C$  is 2200pF.

## Theory

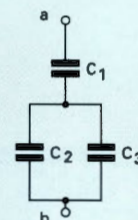
*If you're following Ray Fautley G3ASG's series, the last lesson dealt with inductors in series and parallel. This month will be just as easy, as Ray deals with capacitors in the various circuit combinations found in radio.*



**Fig. 1: Capacitors in parallel (see text).**



**Fig. 2: Capacitors in series (see text).**



**Fig. 3: A circuit made up from capacitors in a series-parallel combination.**

*Cheerio for now, and don't forget that maths isn't difficult really. It's just another tool in your workshop, to help you get the most out of radio!*



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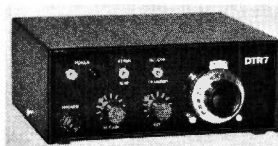
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## Dayton Digest

Well, yes, I did make my pilgrimage to Dayton once more. And yes, I did end up mixing with the *PW* crowd (one must be social!), although my visits and journeys in the USA meant that I couldn't take advantage of the magazine's travel and hotel arrangements. Next year I think I will.

As usual there was plenty to interest the ATVer, from goodies in the fleamarket (discarded professional video gear and even a World War II airborne TV transmitter!) to the organised events. In the latter category there was a lecture stream on ATV at the Hamfest itself (Bob G80ZP told disbelieving Americans about out progress on 10GHz) plus two hospitality evenings provided by the two rival commercial ATV magazines.

These latter were most pleasant events of drinking and informal presentations lasting to midnight and beyond. They weren't cheap to lay on, yet the amateurs who partook were remarkably ungenerous with their donations afterwards!

The fact that there's only one Monopolies Commission may be seen as anti-competitive by some folk, and a bit of rivalry does wonders in the amateur radio magazine field for instance. It seems a shame, however, that the publishers of the two American ATV magazines are still slugging it out in a circulation war that is costing them dearly and apparently indulging in a "dirty tricks" battle that doesn't reflect credit on either side. Both have released ATV handbooks that compliment (but do not compliment) each other.

## Loads Of Novelties

The HamVention covers the whole gamut of amateur radio and computing and there were loads of other novelties to catch the eye (and tempt the wallet). I brought back some PC software (not much this year) and noticed that one stand was selling "Smutware" - at least they were honest and there was a pretty foxy-looking lady behind the table! No, I didn't buy any...! Also loads of PD stuff on CD-ROM (mostly boring stuff you'd never find a use for, I'll warrant!) and zillions of Windows icons but I'm not into Windows.

How about a ground co-operative antenna? It's an h.f. antenna you lay on the ground or bury. I thought this was a joke but the manufacturer said it was the "h.f. antenna of choice" in the 'Desert Storm' operation, as any other antenna would have given away the surveillance detachments' position.

I did buy an f.m. trap, a nifty gadget that you stick in your antenna feedline. This puts a 30dB notch filter between 88 and 108MHz, yet causes only 1dB insertion loss at 130MHz. Ideal for scanner users, amateur radio operators and even TV viewers who, like me, suffer intermods from a strong local Band II transmitter.

"The Enforcer stops speeders dead in their tracks - hottest gadget to hit the automotive market since the 1970 CB invasion." What on

# FOCAL The World of ATV POINT

For his bi-monthly look at the world of ATV, Andy Emmerson G8PTH looks back at the Dayton HamVention in April.

earth is it? Well, this palm-sized radar transmitter simulates police radar up to 1.6km. Simply aim and watch the brake lights come on. Drivers slow down and look for police but never find them! Not bad for \$50, especially if you are troubled by speeding cars in your residential neighbourhood, though you could probably make one yourself for a tenner by retuning a Solfan head to just above 10.5GHz.

## Peepy Creepy

Tiny cameras for video use were being snapped up at \$285, and boy were they tiny!?! Smaller than a pack of cigarettes and ideal for peepy-creepy operation or desk-top videophones. The lens is hardly larger than a big l.e.d., and you can also buy the same c.c.d. chip camera built into a smoke detector or other household objects. Pretty subversive, huh? A similar camera built into a small box with a low power ATV transmitter costs \$500 and one was demonstrated at the ATVQ "ATV party". The PC Electronics Company is selling it and has named it the 'handy-lookie'!

Talking of videophones, AT&T in the States has released a domestic videophone, comparable with the one being sold by Amstrad and BT in Britain. It was suggested that the narrow-band TV signals produced by these devices - or the new digital video compression systems being developed for business television, could form the basis of a new world-wide amateur video standard. Offering more 'motion' than SSTV, this kind of signal would be suitable for transmitting by amateur satellite - if people can agree a world-wide standard.

Still on the transmit side, a company called Bestlink Corporation has taken over the 430MHz transmitter range of TD Systems. Bestlink is related to the Best outfit who are well known here for satellite receivers, and are said to be producing their amateur range in Hong Kong. However smart these products may look, they still produce a double sideband signal, which is considered a bit anti-social if you don't use an effective vestigial sideband filter.

These filters are sold in the USA by two firms and very nice they are - and expensive as well, as you would expect for a huge lump of precision-crafted brass. The AEA company were making a lot of noise about the merits of their 430MHz vestigial sideband transmitter. Its output is a rather modest 1W peak sync power, and the masthead power amplifier

they sell operates only in class AB and probably restores the shaved-off sideband. The performance figures they publish are pretty meaningless in this respect, and everyone is awaiting a proper review of this product before endorsing it.

Nicest ATV product (for me) was a text superimposition module for putting idents, call signs or numerical information onto a video signal. This tiny board could be adjusted for our 625 line video and costs \$175. Because the text is a graphic image you can have your own artwork scanned into its memory.

Slow-scan is another world as far as I am concerned, but I must say the SSTV fraternity made an excellent job of publicising their chosen mode. The SSTV hospitality evening was well attended and they put out a lot of informative colour literature on slow-scan.

## Near Broadcast Standard

Remember that old *TV Times* commercial - I never knew there was so much in it? Well, the same applies to Avid, *The Amiga-Video Journal*. I picked up a copy in Tower Records, Chicago and was stunned by the near-broadcast standard accessories available for this computer.

Starting with a 19" rackmount Professional Video Chassis, the products range from an internal timebase corrector to a complete video and audio routing system operating under the Amiga's control. Broadcast-quality maps, titling fonts and pictorial backgrounds are offered in profusion, together with dozens of add-ons for the Video Toaster all with desperately catchy names!

Now these products don't exactly have pocket-money prices, but they do mean that a self-employed professional has a chance to build a studio and make a

living, producing the same kind of results that hitherto only big outfits could muster. Of course you also need the creative flair and artistic ability, but this is understood.

Up to now, the Amiga has made all the running, but over in the States at least the IBM PC is fighting back. You can of course now get output converters which will turn VGA graphics into NTSC (or PAL) video, and genlocks are also available. Some very tasty software has been released lately, and I have ordered some demo disks.

## Restored Vehicles

At the Vintage Sound and Vision Collectors Fair at Birmingham in May, there were two nicely restored old GPO vehicles, a lineman's van and more interestingly, a Radio Interference van of circa 1950. The shade of green was a bit pale and the signwriting looked far too modern, but otherwise it was spot-on.

The owner would be very pleased to know what sort of apparatus his van would have carried in its day. If you can help, please write to **Mr E. Irish, 56 Shobnall Street, Burton-on-Trent, Staffs. DE14 2HH.**

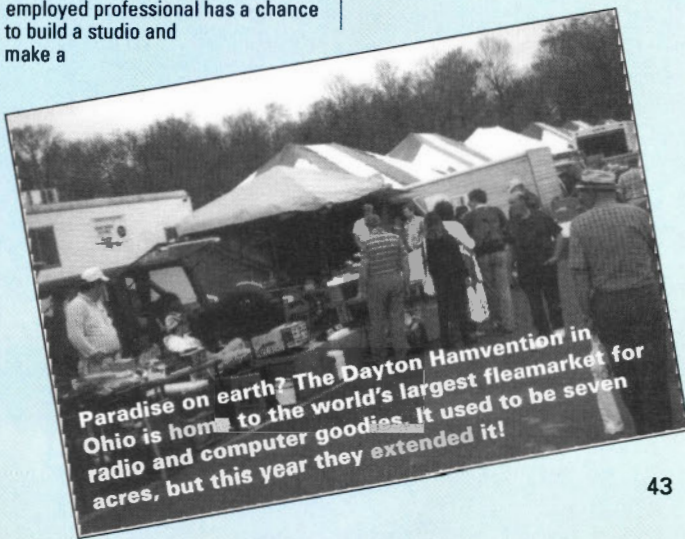
By the way, if the idea of a collector's fair specialising in old TV, wirelenses, juke boxes, gramophones and records appeals to you, make a note in your next year's diary for May 16th. It will be held again at the National Exhibition Centre.

## ATV Interference

Having read in this column about unauthorised television transmission in the 23cm band, a reader contacted me about a similar (accidental) case where a TV signal was apparently wiping out the beacon segment of the 23cm band.

This time it was a real amateur station, not a pirate, but the matter has now been seen to. The good thing is that the whole affair was sorted out amicably within the amateur community, which is how these things are best handled.

And that's it once more. Please keep your reports coming in so that we can all keep up with what's going on in amateur radio's most highly developed mode!





# PACKET PANORAMA

*This time round Roger Cooke G3LDI has some information on the event of the year, the BARTG rally, news of packet activity in Korea and how Phil Bridges can help your pocket!*

The British Amateur Radio Teledata Group's rally is the event of the year for keyboard enthusiasts. The BARTG's 1992 Rally now has a confirmed date, and it's Sunday 13th September. This will take place at the Sandown Park Exhibition Centre, Esher, Surrey.

The person to contact for further details is: **Peter Nichol, G8VXY, 38, Mitten Avenue, Ruhery, Rednal, Birmingham B45 0JB. Tel: 021-453 2676.**

## For All Amateurs

The BARTG rally is of general interest for all amateurs, with most aspects catered for, but with an emphasis on data communications. A new feature this year, owing to popular demand, will be a bring and buy stand.

Parking is available for 5000 cars, and talk-in will be on S22 and SU22 and there's on-site catering. Peter has organised other successful rallies and he tries to cater for a wide range of data interests, not just RTTY, hence the name change to the British Amateur Radio Teledata Group.

The 'T's originally stood for Teletype in the early days. This was when I operated very loud, oily machinery, which had a charisma that doesn't seem to be shared by its electronic counterpart! Even so, I don't think I shall be changing my PC for a 7B!

## Sysop Robert

For this month's sysop, I'm featuring Robert G4XDD, Sysop of the central London CITY BBS, GB7XDD. This BBS is located in Kensington, and it's shown in Fig 1. As one of the new breed of packet BBSs which appeared two to three years ago, GB7XDD is only intended to serve the local user, feeding the network with personal mail through larger, regional nodes.

In the case of GB7XDD, the link is primarily with the large 7-port GB7HSN BBS in Mottingham, Greater London, although links exist with other feeder nodes. Robert is also an extra class US amateur, and licensed as NV3Y.

As you would expect, he forwards to and from New York via

the LONNY wormhole. This facility is also increasingly used as a multiple link to chat nodes on Long Island for conferencing.

As a matter of interest, FCC testing sessions are administered by Robert four times a year for anyone wishing to obtain a full US licence.

Returning to packet, the equipment at GB7XDD is small scale but powerful, in keeping with

where many people give up, but he also has to translate every manual, doc-file, instruction and bulletin into his own language.

With a developing network like they have in Korea, it's also particularly commendable that they do it all themselves. There's not many 'Elmers' in Korea!!

Perhaps we could learn a salutary lesson here! Why not take



**Fig. 1: Robert G4XDD, SYSOP of GB7XDD.**

the intention of the BBS. The prime mover is the new Amstrad 386SX Notebook, running DR DOS 6 with a fully compressed and cached hard drive. The BBS software is BPQ v4.05 and NNA v1.12.

Also active on the h.f. bands, Robert has now worked 120 countries. He can often be found competing in ARRL and CQ RTTY contests.

Best of luck in the future Robert, and if YOU would like to join Robert and be featured as 'Sysop Of The Month', please send me a photograph together with your particular interests, etc.

## Activity In Korea

I'm pleased to say I've got news of activity in Korea, sent to me by Ahn HL2INO. Ahn's home BBS is HL0EMC.KOR.AS.

I have purposely left the text exactly as it was sent to me, to show the tenacity of people like Ahn. Not only does he have to contend with the complexity of the mode itself,

some time out, and send Ahn some information. I'm sure he would be **MORE** than grateful for anything you might send.

## Ahn's Message

Here's what I received from Ahn. Operational BBS:  
HL0EMC. 21.111. 144.700.  
KAM. IBM AT CLONE. SYSOP: HL3EKI.  
HL3ADI. 14.111. 144.700.  
KAM. IBM AT CLONE. " : HL3ADI.  
HL3EAL. 7.040. 144.700. KAM. 386 MACHINE. " : HL3EAL.  
HL0BTW. 7.040. 144.700.  
KAM. IBM AT CLONE. SYSOP: HL5LH.  
NETROM: THENET VERSION 1.0.  
HL1ABL-5: MOO. 1200 METER MT TOP.  
HL3ADI-5: BAE. 600 METER MT TOP.  
HL2DJW-7: TOP. 1700 METER MT TOP.  
HL3EEV-5: EMS. 700 METER

MT TOP.

HL9DA-1: MAD. 600 METER MT TOP. SYSOP: U.S.A. RADIO CLUB IN KOREA.

THE NETROM FREQ IS 144.700 MHZ 1200 BPS WITH TINY-2 AND

27C256. BUT WILL CHANGE TO MORE NEWEST ONE IN PRETTY SOON.

PACKET USERS ARE APPROXIMATELY 100 STATIONS IN ALL OF

KOREA. KOREA BEGAN PACKET OPERATION ON 1986 WITH GLB PK1-L. HL9IO

MR.JODY CROSS (USA PEOPLE BUT HAVE GONE TO USA) MADE ABT 10 PKIL

OLD MODEL TNC AND DISTRIBUTED THEM TO HIS LOCAL HAM FRIEND. MAY

BE THAT WAS THE FIRST OPERATION IN KOREA. WHEN HL FRIEND GOT MORE PACKET KNOWLEDGE, THEY COULD GET MANY KIND OF TNC2 LIKE KAM,

PK232, TINY-2, MFJ1274.. BUT TNC PRICES ARE MUCH EXPENSIVE AND

MUCH HARD TO GET IN KOREA. THESE DAYS MANY HAM ARE INTERESTED IN PACKET AND NOW CAN FIND MANY NEW PACKETEERS ON MONITOR BUT THEY

SAID ME TNC MANUAL AND NETROM AND BBS ARE SO MUCH DIFFICULT FOR

THEM BECAUSE ALL INFORMATION TEXT ARE WRITTEN IN ENGLISH OR JAPANESE.. THIS FOREIGNER LANGUAGE IS THE ONE OF THE REASON WHY

SLOWLY INCREASE PACKET GROW. HL3EKI, HL2INO, HL1ABL, HL3ADI, HL3EEV, HL3EAL, HL3ELR, HL2DJW, THESE 9 PEOPLE ARE

MOST ACTIVE ON PACKET AND GAVE MUCH COOPERATION AND DONATION FOR

DEVELOPMENT OF KOREA PACKET. FOR EXAMPLE: BUILD MANY NETROM ON

HIGH A TOP AND LET OTHER BBS SYSOP TO INSTALL BBS AND EDUCATE MANY PACKETEERS THROUGH VHF QSO...



# PACKET PANORAMA

8 PACKETEERS WHO I MENTIONED ON UPPER LINE ORGANIZED KOREA AMATEUR PACKET EXPERIMENTATION CLUB. SHORT WORD IS KAPEC. WE WILL DO MANY THINGS FOR KOREA PACKET. WE HAVE TO DO MANY THINGS FUTURE.

WE WILL TRY TO SET NEW HIGHER BAUD NETROM, AND INSTALL MULTI

CONNECTION BBS LIKE AA4RE AND PACKET SATELLITE AND GATEWAY..

WELL, GETTING PACSAT INFORMATION IS REALLY DIFFICULT IN KOREA. I THINK KOREA HAS NO PACSAT OPERATOR ONLY EXCEPT COMMERCIAL STATION BY GOVERNMENT. IF U GIVE US MORE PACSAT INFORM, I WILL TRY TO DO

MY BEST FOR THAT.. WE KNOW NOTHING OF PACSAT FREQ AND WHAT WE

MUST USE FOR THOSE OPERATION. WOULD U LET ME HEAR MORE INFORMATION OF PACSAT LATER?? I WILL GIVE U MORE INFORMATION IF U NEED

MORE INFORM..OM..

NOW JUST BACK HOME FROM WORK SO I AM SO TIRED NOW..OM.. TNXS FOR

UR MAIL.. HOPE SEE U LTR THROUGH PACKET BBS MAIL.

BEST 73'S..DE AHN. HL2INO @ HLOEMC. KOR.AS.

## Regional Sysop Meetings

Unfortunately, regional sysop meetings are difficult to organise. This is due to the high and sometimes prohibitive cost, both in terms of money and time, of attending national sysop meetings.

Despite the problems, regional meetings seem to be gaining in popularity. Recently, I received copy from Brian G8ASO, with the details of the West Midlands Sysop meeting in February.

Indeed, by the time you read this, they will have already held their next meeting! Here in East Anglia, we have a similar situation and have just held a meeting of the East Anglian Data Group (EADG) in Thetford.

Brian G8ASO, suggested that as this seemed to be the way meetings were evolving, perhaps a National meeting was only needed about once per year. Representatives could then attend from the various areas. Any issue that needed a national vote

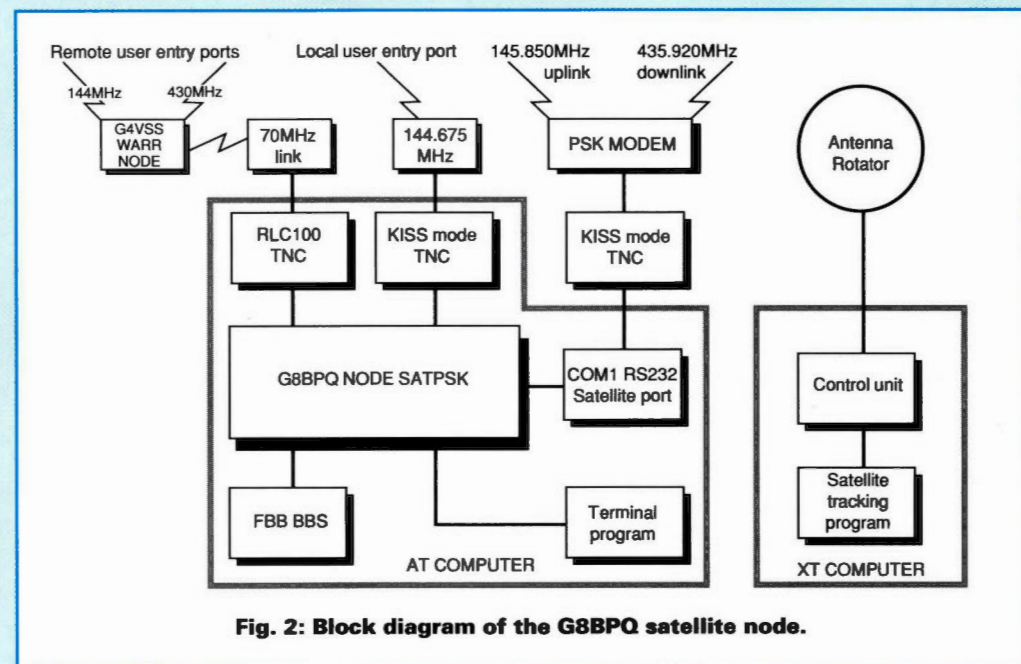


Fig. 2: Block diagram of the G8BPQ satellite node.

would obviously be referred to the national meeting.

In East Anglia, we've found that local meetings can be much more beneficial to the local network. We have also found that much more can be achieved, plus of course, that the travelling time is much less!

Perhaps you could let me have your views on this. Drop me a line, together with any reports of your local meetings?

## More Pactor

Phil Bridges from Siskin Electronics, has sent me a huge pile of information about the various products that he handles. One in particular, is the new Pactor controller from PacComm.

Designed by a German team of amateurs, it was described in last month's 'Packet Panorama'. It's now being produced by PacComm under licence.

In order to stimulate interest, Phil will be selling the first batch at cost. So, if you are interested, get your name on his list! PacComm's Pactor features are given in Fig. 2.

Phil tells me that he is holding back on the DSP modem from AEA at present, owing to the incompleteness of the unit and the unfair rate of exchange. It certainly does carry a very large price tag, so I think it will be relegated to a privileged few!

## Looks Interesting

One product that looks interesting, is the 4-port USCC slot card. This offers the sort of thing I

really wanted myself, instead of the two DRSI cards that I bought at the show! These are the features:-

Port 1 300/1200baud (h.f./v.h.f.) packet using a AM 7911 chip.

Port 2 1200baud v.h.f. using a TCM 3105 as used with the Tiny 2, KAM and KPC4.

Port 3 9600baud G3RUH compatible using the DF9IC design.

Port 4 High speed disconnect header - can be used to add PSK or additional RUH modem.

Supplied with G8BPQ networking software and the very popular BayCom PC software for conventional terminal operation.

By simply altering a few capacitors and resistors port 4 can be altered to 2400, 4800, 19200 or even 38400baud.

As an introduction, Phil is offering this at special prices for Node/BBS sysops.

## PacComm's Pactor

- \* PACTOR, AMTOR and RTTYmodes
- \* Error-free data transmission
- \* Four times faster than AMTOR
- \* Complete ASCII character set
- \* Memory-ARQ restores bad data packets
- \* On-line data compression
- \* Automatic speed adaption
- \* UNPROTO mode (FEC)
- \* Listen mode to monitor PACTOR QSOs
- \* ID capability (c.w.)
- \* Built-in message system
- \* Automatic log-book function accessible over the air
- \* Digital tuning display (l.e.d.s)
- \* 15 status l.e.d.s

## Satellite Gateway

Andrew G8TZJ, now has the first UK satellite gateway up and running under the callsign GB7LAN. Mail can be forwarded using UO-5, Oscar 22.

Please restrict traffic to personal mail only, and keep the messages reasonably short. Traffic on the satellite has increased enormously just lately, and even at 9600bauds with a low-flying satellite, it can take several passes to forward traffic.

## Software Problem

I'm hoping to complete my gateway shortly, using GB7LDI. I have only to sort out a software problem with the PC and shall then be operational.

However, with the increase in traffic comes the increase in problems. Quite a considerable amount of money is donated by the AMSAT organisations, to say nothing of time, in order to put a satellite into orbit.

If you are considering passing mail to/from places using SatGats, then please also consider making a donation to or even join AMSAT UK. This way, it will be possible to organise future satellites and hopefully, one day even have a geostationary orbiter! My BBS will certainly carry a 'prompt' beacon.

That's it for another month. Photo's, news and comments please to G3LDI @ GB7LDI or (0508) 70278 or QTHR.

73 and Happy Packeting



## New OSCAR

On July 23, the ARIANE V-52 launch will carry aloft the oceanographic TOPEX/POSEIDON primary satellite payload plus two microsatellites, S-80-T and KITSAT-A. The term KITSAT is an acronym for the 'Korean (Advanced) Institute of Technology SATellite' which will become OSCAR-24.

The satellite has been made under the expert guidance of the University of Surrey engineers by three Korean students, and is a near clone of its forerunners UoSAT-OSCAR-14 and UoSAT-OSCAR-22.

## New Orbit

Jeff Ward G0/K8KA of the UoSAT team explains that KITSAT will be placed into a nearly circular orbit with a semi-major axis 7700km and an inclination 66°, a totally new orbit for any OSCAR. The frequencies currently planned for use will be 145.900 and 145.850MHz (f.s.k.) uplinks with a single 435.175MHz downlink.

## Using The Satellite

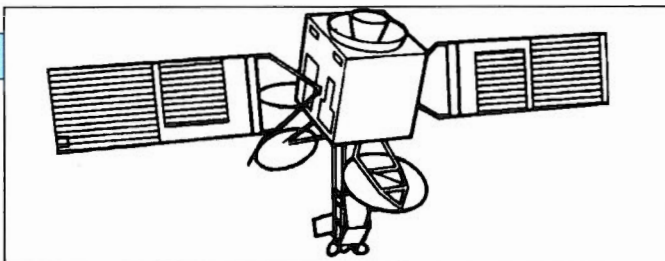
How do you start using the satellite? Like its predecessors, the KITSAT-A PCs will provide open access store-and-forward digital communications for stations in the Amateur Satellite service. This system will use the standard protocols of the PACSAT Suite for message forwarding.

The PCs will have 13 Megabytes of CMOS RAM available for message storage, and will use data links of 9.6kbps (9600 bauds) or higher. The KITSAT will become the second 9.6kbps PACSAT available in the Amateur Satellite Service.

The satellite will help take the ever growing load from U-o-22, and 200 users and mail forwarding gateways stations will be immediately able to access the KITSAT system using identical equipment and software programs.

## French Satellite

Although there's been no recent confirmation, some three months ago RACE president Jean Gruau F8ZS, told us that the French 'ARSENE' OSCAR (an acronym for 'Arianne Radio Amateur Satellite



# Satellite Scene

by Pat Gowen G3IOR

*This month Pat Gowen G3IOR looks at the coming OSCAR satellites, the latest Shuttle 'SAREX' mission, discusses the OSCAR-13 operations and the exciting DX activities on this satellite.*

pour l'Enseignement de l'Espace') was to be launched by the ESA ARIANE V-53 flight, together with the main HISPASAT satellite in July 1992.

The ARSENE satellite is designed by student engineers and has its electronic modules built by radio amateurs from 'ATEPRA' ('Association Technique pour l'Experimentation du Packet Radio Amateur'). It will carry three packet transponders, using standard AX25 f.s.k. at 1200 bauds.

The three uplink frequencies will be in the 435MHz band and the single downlink frequency in the 145MHz satellite band. The exact planned frequencies have yet to be released. A Mode S linear transponder will also be available. The 18W of transmitter output power from the satellite will provide a comfortable link budget allowing connections through the packet transponder of ARSENE between stations without special equipment.

## High Orbit

The high orbit of the ARSENE satellite is also a new one for any OSCAR, and it will provide a mean access time of nearly 12 hours per day for stations up to 40° latitude. Its orbit will be equatorial at an inclination of 0°. The perigee will be around 20 000km and the apogee around 36 000km, so giving an earth orbital period of 17 hours and 30 minutes.

## Shuttle Amateur Radio Experiment

The Shuttle Amateur Radio Experiment (SAREX) which flew on STS-45 was a huge success. It was long awaited by many European amateurs who wanted a high inclination Shuttle mission in range over their horizons.

The onboard amateur radio operators Dave Leetsma N5WQC and Dirk Frimout ON1AFD, who are shown in Fig. 1, Brian Duffy N5WQW; Kathy Sullivan N5YYV shown in Fig. 2, were all using the callsign N5WQC.

The whole crew can be seen in Fig. 3. During the mission they made numerous general QSOs, and those they worked included Stu G0JUL, Ted G6HMS, Stan G3RRL, Ted G3TMD, Roger G3LDI and myself G3IOR.

## School Contacts

Among the 17 scheduled school contacts for the SAREX mission in England, Wales, Norway, Canada, Brazil, Spain, Belgium, Saipan and five US States was GB2HC, the club station of Harrogate Young Ladies College, who were so successful with the GB1MIR mission. They're pictured in Fig. 4.

## Most Impressed

Richard Horton G3XWH, head of GB2HC, was most impressed

with NASA's efficiency and enthusiasm in the planned contact. During the mission, NASA were on both telephone and FAX from an hour prior to the schedule, until half an hour after, to assure full co-operation.

The spacecraft, which had been flying with the payload bay pointing towards the earth, with the nose in the direction of travel, meant screening of the antenna to earth, hence the sometimes very feeble paths.

For the special contact *Atlantis* flew in nose-to-earth attitude with the wings parallel to the direction of motion. This provided an unrestricted view of the antenna, and a full 10 minute session of uninterrupted questions and answers.

## Interactive Space Experiment

As well as the planned educational QSO, GB2HC also took part in earth observation of the 'INSPIRE' (INteractive Space Physics Experiment) which had the crew firing an 8kW electron beam modulated with audio tones from 50Hz to 7kHz. radio amateurs were asked to listen for the produced signals at v.l.f. noting time, frequency, type of signal, duration of signal, and to record where possible.

John Branegan GM4IHJ, says "Previous space v.l.f. experiments have re-transmitted their signals down through the ionosphere on 430MHz f.m. This time only the v.l.f. signal was propagated. If propagation is similar to that of the v.l.f. 'whistlers' and 'sliders' that travel from pole-to-pole, the main query is 'how will they get down to earth'? This mostly depends on levels of D and E-layer absorption which can be massive in daytime in this very active solar period.

At night, D and E-layer absorption may be minimal, and signals may propagate from the Antarctic to the Arctic, hence possibly audible in the UK. By tuning a v.l.f. receiver to an otherwise quiet frequency below the Omega signals (i.e. below 7kHz), and using a wire antenna (as long as you can get) in a north south direction, you listen for obvious audio-keyed tones". The RSGB's *Space Radio Handbook*, page 154, reports the previous *Challenger* v.l.f. experiment.



**Fig. 1: David N5WQC logging while Dirk ON1AFD makes a QSO with U8MIR from W5RRR, the Johnson Spacecraft Centre's club station.**



**Fig. 2: Kathy N5YYV practising making QSOs from W5RRR.**





**Fig. 3: The crew of the STS-45 SAREX mission. Standing, left to right, are Byron Lichtenbug, British astronaut Michael Foale and David Leestma N5WQW, then Kathryn Sullivan N5YYV, and Dirk Frimout ON1AFD. Sitting in front are Brian Duffy N5WQW, and Charles Bolden.**



**Fig. 4: Harrogate Ladies College Amateur Radio Club station GB2HC preparing for their STS-45 Shuttle QSO. From left to right are Richard G3XWH, Winnie G7LHY, Anna G7IPR and Jenny G7KZO.**

## A Special Card

A special QSL card is planned for the STS-45 mission. If you made a two-way contact, or even heard the SAREX-downlink, you qualify for a QSL card. Please send your QSLs to: Sterling Park ARC, PO BOX 599, Sterling, VA 22170, USA. Enclose a large s.a.e. plus one US Dollar to cover postage, marking the outside of the envelope 'STS-45 SWL' or 'STS-45 QSL-2 way'.

## Coming Shuttle Missions

Future SAREX missions look assured. This is because in addition to the crew of STS-45 who I've already mentioned, we now have eight other NASA Astronauts who are licensed amateur radio operators.

The operators include: Steve Nagle N5RAW, Linda Godwin N5RAX, Ron Parise WA4SIR, Jerry Ross N5SCW, Jay Apt N5QWL, Richard Richards KB5SIW, Ellen Baker KB5SIX and Ken Cameron KB5AWP.

## Increasing Ellipticity

The OSCAR-13 satellite still appears to be increasing its ellipticity, with little sign of arrest. In late May, the apogee was still rising, and the perigee had come down to 576km.

It's hoped that the complex calculations that have been made, predicting a reversal soon, will come about. If they are correct, then OSCAR-13 will not re-enter atmosphere until the time that Phase III-D is placed into orbit.

All users report that OSCAR-13 has been providing excellent communications with both 'JL' and 'B' modes of operation recently. The transponders have been giving good strong downlinks, and the many stations using it, are providing lots of activity. The new schedule appears to be working well and is meeting with the approval of old and new users alike.

## Reliable Predictions

James Miller G3RUH, always has reliable predictions of the future planned operating schedule for OSCAR-13, well ahead of the events. He says "I like to keep my flock well informed".

Like me, James gets very annoyed about planned AMSAT and OSCAR events that are either not passed on, or if they are publicised, are far too late to get into print before the event happens. You would be surprised at what we miss because no-one thought or planned ahead in time!

Date	Event	Modes	Sun Angle	SEL/SAZ
June 8	Move to 210/0	B, JL, S	5	-24/126
June 29	L OFF	B	24	-33/149
July 20	Move to 150/0	B	43 to 44	-34/176
Aug. 17	L ON	B, JL, S	28	-26/208
Sep. 21	Move to 180/0	B, JL, S	-1 to 29	-2/241
Nov. 23	Move to 210/0	B, JL, S	-29 to -4	33/305
Dec. 14	L OFF	B	-27	33/333
Dec. 28	t.b.a.	-	43	29/351

**Table 1.**

Mode-B:	MA 000 to MA 165 !	Mode-JL on Mon, Wed
Mode-JL:	MA 165 to MA 200 !	Fri. and Sat. UTC.
Mode-LS:	MA 200 to MA 215 !	S Beacon on 'L' days
Mode-B:	MA 215 to MA 256 !	S Transp. on 'B' days
Omni Ants on from	MA 250 to MA 060. ALON/ALAT 210/0	

**Table 2.**

To help you, James has provided **Table 1** of OSCAR-13 calendar of events to the end of 1992. It provides the sun position, and the Monday dates from which adjustments will be made by the command team:

James adds that "From July 20 via Alon/Alat 180/15 you may expect poor performance for a few days. The illumination is  $100 \times \cos(\text{sun\_Angle})$  %, and needs to be better than 70%, i.e. to have the sun angle within  $\pm 45^\circ$ . The 'SEL/SAZ' is Sun's position in orbit plane (like Alon/Alat).

The move planned on July 20 to 150/0 is because the Sun is at SAZ = 176 i.e. apogee direction, so the antennas cannot point there as the solar panels would not be illuminated. The Sun then gradually moves to SAZ around 208 so we cannot use attitude 210/0 as has been customary".

James also tells us that from the current time until July 20 the schedule is shown in **Table 2**.

After this, Mode L will stay off until August 17. The next attitude change scheduled for July 20 is to 150/0 until September 21. He adds "Note that modes will only change at the above MA counts, so if Mode L has hung over through midnight UTC into a non-L day, it will switch off at any subsequent scheduled MA change point. Similarly if midnight UTC begins a Mode L day, the L transponder will switch on at any subsequent scheduled MA change point, if appropriate".

## OSCAR-13 Information

Up-to-date information about AO-13 (OSCAR 13) operations is always available on the beacons, 145.812MHz or 435.658MHz in c.w., RTTY and 400bps p.s.k. The active command stations listed below with their packet radio addresses welcome constructive feed-back about operations. They are Peter DB2OS @ DK0MAV, James G3RUH @ GB7DDX and Graham

VK5AGR @ VK5WI. All of them are available on UoSAT-22.

## DX On OSCAR-13

When I first came on the v.h.f. bands forty years ago, it was rare to work outside your own county. It was rarer still to work beyond your own country on v.h.f., and hardly ever did you make QSOs outside the continent.

When the first 'B' licences were issued, I confidently assumed that due to the restrictions mentioned, many operators would make rapid transitions from the 'B' to the 'A' licence. Then, along came satellites!

To emphasise the change, a look at the list provided by **Bernhard DG6MGP** and **Mike DG7MHU** composed mainly from OSCAR-13 contacts; a mass of recently active DX stations active shows that this mode is quite competitive with any of the h.f. bands!

## Uplinking From Europe

Busy on the satellites, and heard uplinking from Europe were: CT1AVR, BBS, WW and XC, CU2CE, YU3DXU, EI9GO (on both 'J' and 'B' modes), LZ1DP, JH and MH, EB5IDZ, OK1UPR, YO3AC; HA2RI, HB0FL, IS0IGD, IW9s BNB, ARY and BJU all /IT9; LA1K, LA1BR, OKs 3AU, 1UFC and 2AQK, OZ1KIM, OZ4IP, OZ8AQ, OY9JD, LX2LA, LA8LV/P, SP4MBP, SP5MNF, SP5FKW, SP7UFT, SV1AB, SV1NR, OK3AU, RC2WBH, IW0UL/IS0, UZ4PWA, YZ3TTI, 9H1SW ('J' mode), SV5QR, SV9BAY, GM3NUF, LA6GH, HB0UTF, YT2OK, YT3OK, EA5IEA, EB1DMS, EA4CMV (B+J), EA5ZM, EA2A, EA2CLS, EA4LE, EB5IQU, EI4AEB, EI9GO, EA4LH, OG6AI, OG2LQO, GJ3YLI and GJ7DNI, UB5EIE, UZ4PWA, YO2IS, YO2LGY, YO3AC, YP0A, YT2VD, TA1D, TA1ZD, 3A/ON1AIG/P, 4U1ITU,

TF8/K4HPB.

There were of course, lots of the less unusual callsigns particularly from stations active from DL, F, G, GW, HB9, I, OE, OH, ON, PA and SM.

## African Continent Activity

From the African continent, activity was heard from A22BW, C53GS, EA8LS, FR3EK, FR5DL, TR8CA, TL/FC10MZ/P, VQ9GR, ZR6ARP, ZR6COL, CN8GI (Ahmed, also going to TL8 soon), V51DM, Z21HJ, ZS4PV and 5V7JG.

## Asian Sources

Asia sources of activity provided 4X1MK, HL1EJ, HL5QQ, HZ1HZ (on c.w.), YI1BGD, UL0/UM8MM, RL7GD, VU2MBG, VU2NBT, BV4VB, 4S7AVR, UA0DG, UA0ALA, UA0SNV, UL7T/UM8MM, 9M2CR and YB1CS, and many JA stations.

## The Americas

The Americas provided action from the north with C6ANY (Modes A and J) FM5AB, FO0CI (Clipperton Island), J39JM, VP25E/WB6LYI, KP4EKG, ZF1RC, XE1HOS, WP4KJJ, PJ2CU, PJ2MI, XE1ZOG, XE1OE, VP2V/KK3K, OX3DB, XE1PM, XE1HOS, VO1TX, WB4BSJ/KL7, J39GM, XE1OE and FM5AB, with lots of VEs and Ws in all call areas and states. South America provided PJ2CU, PJ2MI, PP5MK, PT9SH, PY2ACM, PY6ASV, PZ5OC, and KP4s EKG and ETT.

## Oceania

From Oceania the activity came from FK1BK, H44KA, VK2PK and VK2DRJ, VK4s LE, ZQ and TQ, VK8s KTC and SO, VK5DI, VK9CK, VK9CL, 3D2RR, V73BQ, KH6JI, KH6IBA YB1CS and YC1TLY.

## Other Reports

**Hardy DC8TS**, worked Bruce TA1ZA in Istanbul, whose QSL manager is WA6JCD. **John G6ZQE** worked J39GM on Grenada, both VK9CK and VK9CL on Cocos Keeling Island, but was sad to miss out on FO0CI from Clipperton Island.

For those who would like to participate in OSCAR-13 DXing, next month's column will include some hints and tips from experts on how to get that satellite DX into your log-book.



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**"A GENUINE PRICE FROM A GENUINE DEALER"**



I don't get a lot of time in the workshop nowadays, and it's a pity because I love building my own radio gear. Recently however, several fascinating projects for *PW* have passed through my hands and this has meant more time building prototypes in the shack.

At the same time as I got busy with building, I got the chance to borrow a very useful hand-held frequency counter from Waters & Stanton. I'd never had the chance of using one in my own workshop when building a project, so this was an ideal opportunity.

We get many chances to review equipment in *PW*. But this time, rather than treat it in the usual fashion, I thought it better to share the experience of using a hand-held frequency counter in the workshop, after all, this is *Practical Wireless*!

## Not A Review

So, bearing in mind what I've said, this is not a review. Instead, it's me sharing the experience as if you've joined me in the shack!

My workshop at home is basic. I have one end of our garage, with my radio gear packed into one end. Apart from good lighting, and a very good stock of components, it's no different from many other workshops.

I get very hot, and one thing I'm never without is a good fan in the workshop. Fortunately, it's very cool in the summer as the building is built from solid bricks, and the roof and windows are covered with creeper-type plants.

The ordinary, every day type of test equipment can be found in my shack. It consists of my valved grid-dip oscillator, multimeter and a rather unreliable oscilloscope.

I'm of the opinion that one of the most useful (perhaps the most versatile) instruments available to the amateur is the dip-meter. Like Tex Swann G1TEX, I tend to use the g.d.o. a great deal, and I found the Optoelectronics 2300 frequency meter to be a very useful aid in conjunction with the dip-meter.

## Dipper Calibration Doubtful

My faithful dip-meter is old, and frequency calibration is only approximate and rather doubtful. It was useful to have the 2300 around, because all I had to do was let the hand-held instrument 'sniff' the signal from the dip-meter.

The frequency counter has its own antenna, and the instrument proved very sensitive. I quickly compared and checked the frequencies shown on the g.d.o. against those on the 2300. Very useful and it saved me time and improved the final results.

Once I was sure that I was on frequency, I was able to finish the project (the valved transmitter for 'Mobile And Portable Operation On A Shoestring' published last month) successfully. I was also able to use the 2300 to check for unwanted harmonics.

The next job I had to do, was up on v.h.f. and involved a frequency multiplier chain. The project I was experimenting with, a home-brew 70MHz transmitter, proved to be very interesting to work with in conjunction with the frequency meter.

## Tuning Transformed

Normally, I find tuning and adjusting frequency multiplier stages very tedious. However, when you've got a hand-held frequency meter, the job is transformed.

I had already found that the instrument was very sensitive. The 2300 had given me a surprise when I had first switched it on (it comes complete with NiCad batteries and a charger) when it started displaying frequencies on the aircraft band!

I soon realised what was happening, as yet another aircraft made its way into Hum (Bournemouth) airport. As the aircraft pilot answered Hum's air traffic control radio calls, the frequency meter 'sniffed' the frequency and displayed it!

The sensitivity of the 2300 proved to be very useful in this respect. I soon found that with the meter sat on the workbench a metre or so away from the multiplier chain, that it provided a digital display of my progress.

The 70MHz multiplier chain was on a basic p.c.b. In

other words, it wasn't screened. When I started the operation, the crystal fundamental was displayed, but I found that as I tuned the multiplier chain, the various harmonics were displayed.

Eventually, with a little care (plus temporary screens made from p.c.b. material) and using a small 'sniffer' loop on the end of a short length of 50Ω coaxial cable, I completed the tuning.

I was very pleased to see the final 70.260MHz being displayed on the frequency meter's I.e.d.s, and it had been so easy to use! What had been such a tedious job before, has now become much easier.

## Suffering From Interference

Like many other radio enthusiasts, I'm always suffering from interference on the h.f. bands. And in common with many amateurs, in the past I've had to grin and bear the interference.

However, I was determined to track down one particularly annoying signal affecting 14MHz. It had been a nuisance for a long time, but only appeared when my daughters were home from school.

Using the 2300, I was able to locate the source of the signal in my eldest daughter's room. The frequency meter soon locked on a frequency that looked suspiciously like a high Band IV channel, and that's what it turned out to be.

The source of the problem was a modulator unit used in conjunction with an early home computer. When the frequency meter was close enough to the modulator (in a badly-screened box hanging at the rear of the computer), I found it was radiating spurious signals on h.f., v.h.f. and of course on the u.h.f. TV bands.

## Soon Cured

The computer modulator problem was soon cured, by the purchase (at a rally of course) of another modulator for just £1. Not a bad price for a cure!

I then remembered a problem I had helped solve for another radio amateur during 1991. This, to cut a long and sad story short, involved a satellite TV low noise block (l.n.b.).

The radio amateur concerned could not operate on the higher h.f. bands at all because of very bad interference. They'd tried everything except changing the l.n.b., which fortunately (or unfortunately!) been installed for the benefit of the amateur's disabled and housebound wife.

The problem was found to be on the l.n.b. The culprit had been found and changed, after I'd suggested that someone with a portable spectrum analyser should be called in. So, remembering that, I walked along the road where I live, taking the frequency meter with me.

## Radiating Signals

I soon found other l.n.b.s radiating signals on h.f. strong enough to be locked onto by the Optoelectronics 2300. After some research, I've discovered that the problems are probably caused by the high level of local oscillator injection on the satellite equipment.

I'd come across the problem before, as our Hotel in Dayton, during the HamVention, had 'piped' satellite TV. The main dish was just below my bedroom window, and the spurious signals coming from that source made all the h.f. bands virtually useless.

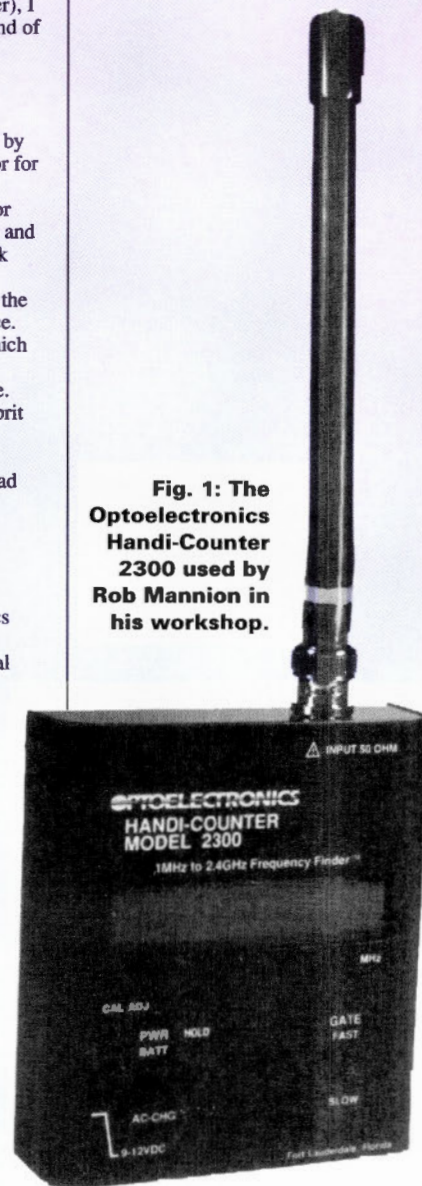
Trying to hear the BBC World Service was a painful process! And unfortunately, I think that this form of interference could become a real problem, especially with our modern high-density housing in the UK.

So, you'll realise that there are many uses for a hand-held frequency meter in and out of the workshop. Some are obvious, and they'll save you much time. Others will no doubt occur as you work.

In summing up, I can honestly say that a portable frequency meter in the workshop is an extremely useful 'tool'. My thanks go to Waters & Stanton of 22 Main Road, Hockley, Essex SS5 4QS, Tel. (0702) 206835, for the loan of the model 2300 Handi-Counter which costs £149, including VAT plus £3.50 p&p (UK).

**Rob Mannion**  
*G3XFD, is trying to find time to build more home-brew projects for later publication in PW. Recently, he's had the chance to use the Model 2300 frequency counter from Optoelectronics while he's been busy building.*

Fig. 1: The Optoelectronics Handi-Counter 2300 used by Rob Mannion in his workshop.



# In The Workshop With The Optoelectronics Handi-Counter 2300



# Back-Scatter

## HF Bands

Reports to

Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

Between April-end and now - late May - we have seen a very large change in the Sun's condition, as those who listen to the RSGB news each week will have noticed. Seemingly we have dropped off the plateau and are plunging into the depths of a sunspot minimum.

Of course, with all this, the weather has hardly been of the variety that keeps any of us indoors. But at least lack of rain is keeping the garden weeds down!

Here's the quote of the month! Standing on bridge as steam train passes, working hard; whiff of exhaust steam/smoke/oil. Plaintive 'old timer', taking photographs of event: 'Why can't my FT101 smell like that?'

### The 1.8MHz Band

This, alas, is the static season, when only the diehards try 1.8 MHz. Ted G2HKU used sideband from Sheppey for his regular ON7BW contacts, while the key was used upon LY2BVJ and HB0/DL6SDW/P.

John G3BDQ in his hideaway in Hastings is suffering a lack of enthusiasm, excess of gardening, days out and the rest of it. Perhaps if John shut out more light with wire, the gardening would reduce? Anyway, LY2BVQ, LY2BVZ and I5TGC were hooked on s.s.b., while c.w. accounted for OK2PMT, OK3TKG, DK6ED, LA0CX and UA1WDR.

Incidentally, the area 1.950-2.000MHz is the part set aside for Novice operation. It's not a bad idea to come on in that area and give the novices a contact, as they have been allocated a chunk of band where activity is a mite sparse. For example, 2W1ACD is reported to have been on for a week with just two QSOs - but he was reported as a good strong signal in mid-Wales!

### Pirates

Pirates have been busy again. The HA5BUS/A5 activity was imposter Bhutan Slim, alas. Of course the HA5BUS call is genuine enough - they just have a spurious alter ego.

Another on 21MHz c.w. March 20-26 as VP9KD was Bermuda Slim, and CY0SAB, same band and mode in late March and early June was

probably the same operator. However, VE3CBK, the real CY0SAB, says he might get to Sable in June, mostly on s.s.b. On the other hand at the time of writing, it is rumoured that a major move is imminent in Bangladesh to fully legalise amateur radio there.

Changing tack now, Mr P. Manoj (Trivandrum, India) wrote to note that in a recent column, G3NOF reported he had worked VU2RG on 24MHz; but of course VU2RG was the call of Rajiv Gandhi, the Premier of India, assassinated a year ago. Ergo someone is pirating VU2RG on s.s.b.; thanks to reader Manoj for passing on the word.

### The 3.5MHz Band

Another band suffering summer static is 3.5MHz. Indeed, thoughts have been forcibly directed chez GW3KFE at reducing sparks jumping across capacitor plates! Where oh where can one find a nice old-fashioned d.p.c.o. knife switch for earthing feeders down?

Over the water, Pat ON7PQ in Kortrijk stuck to his c.w. and raised KP5/N1DX, PY6WT, PY0FZ, JW0D, YA5MM, JA6JBT, PJ4/DK9FN, TU4SR, ZL1AXQ, S9AGD, 1A0KM, PY5XH, Z21HS, JW0E, VP8BZL, OA4JR, FY5FY, FG5BG, HF0POL, 9Y4KB and XE2CQ.

### Contests

Contests are always a useful source of new countries. July 11/12 is down for the IARU HF World Championship. July 18/19 shows both the Barcelona Olympics HF and the SEANET c.w. Over the August 1-2 period the YO DX Contest will be well audible here, as indeed will the WAE CW contest over August 8 and 9th.

### The 7MHz Band

The band you love - to hate - 7MHz! The better the antenna system, the more you need an attenuator in the receive side. Those who have caught on to this, are the ones who love the band.

Eric Masters G0KRT reports from Surrey's Worcester Park, where he runs a Lake DTR-7 transceiver on the key with about 1W out. This goes into an antenna comprising the 26m

top of the W3EDP antenna, but fed against a quarter-wave counterpoise.

There were seven two-way QRP contacts with G stations, plus six other Gs, DJ6BW, DK2EF, DK7QB, DL1LIZ, DL4KQ, DL5MGK, DL6YBM, F2WW, F8TM, FD1OQK/P, HA6IOB, HB9LCF, IK2SGV, LA7AK, OH6LYV for a new one, ON4GU, ON4TA, PA3FSC, PA3DIY, SM0COX, SM6UGI, UA9CM, UC2WEL and YL2BI.

Pat ON7PQ mentions that he keyed with 8Q7CW, VK9CL, HL2IVL, EP2EU, PY0FZ, VP8SSI, VK9NS, VP5/WB9HRO, HK7DSZ, CX4SB, JW0E, OX3GL, VK6HD, FY5EW, CN8ST, 5N0ZKJ, 6W6JX, FM5BH, G4SMC/8R1, YN/SM00IG and KP4YD. There's not much in the way of c.w. that Pat misses!

The one-and-only from Ted G2HKU on this band was UA0QFC, raised on c.w.

### The WARC Bands

Over now to Don G3NOF in Yeovil to start off on the WARC bands, where on 18MHz he made s.s.b. contact with FF0XX and GM4JDS, while on 24MHz he found A71BS, CM6LE, OD5RF, P21EL, U18ZAC, VP2EOH, VP8CFM (S. Orkneys), YB0WWL and 5N0HKB.

The c.w. mode was preferred at G2HKU; Ted tried 10MHz for 9H3GQ and TA7A, and 18MHz for VE2EXR, 3B8CF, UB9X/UB2KA, 4L3D, SV0HS/SV5 - and the last-named again on QRP. That left 7Q7XX to be brought to book on 24MHz.

Next we come to Vince 9H1IP in M'Scala, Malta. He looked at 18MHz and pulled forth C6AFP, TI2TB, VP2EOH, 7Q7XX, 5H3RA, 6Y5CE, Y11RM, 5U7M, FK8CP and S79CK/D. Cranking the bandswitch to 24MHz resulted in bookings for S9AGD, VS6CT, OY9JD, VP2EOH, FK8CP via long path at 2048Z, 7Q7XX, S79HP, JY5GA, ZF2SD and JT1JA. All were s.s.b.

John G3BDQ tried s.s.b. for WW7Q on 18MHz, plus UM8MBA and UZ0AXX on 24MHz; changing over to c.w. on the latter band for VQ9RS.

### The 14MHz Band

With the summer static level, the noise on the 14MHz band has been

quite fierce whenever I have looked. Don G3NOF notes that his s.s.b. raised EP2AG, IL10TWA, IV3VFR/IL3, S2/HA5BUS, VP8CGK on S. Georgia, ZA1BM, 5H3DC, 9K2DT and 9M2SH.

By contrast the ON7PQ listing includes c.w. only, to TI7/TI4SU, 8P6AU, 7Q7XX, A61AC, BV4CT, HS1CDX, VP8BZL, YA5MM, 1A0KM, BY8AC, VP8SSI, KH4/N7TNL, XU0RA, S9AGD, S2/HA5BUS, FM5BH, HZ1AB and F05FQ.

Now to Ted G2HKU, who only mentions one c.w. contact, with VG7FJE.

### The 21MHz Band

The 21MHz band seems to have been the best place to be for most of the time. Thus the G3NOF sideband signals were able to use this band to raise A71BK, AH0M/W7 (Romeo of XY0RR fame, in Reno, Nevada), BV4AO, C02MA, CP5HG, DU1EIU, EM5T, E08BED, FR/DJ8CR/G, FY5AN, G4SMC/8R1, GW3CCY/5N0, HC1EEV, HH2Z, H16UD, HF0POL (S. Shetlands), HL2KAT, HL5JRS, HL9TK, HK30JY, HZ1AB, HZ1TA, J37PP, JD1BFI (Minami Torishima), JX9EHA, JY3ZH, OD5ZZ, P29GC, RA0QD, RH0E, RL7PC, T20AA, TL8JWH, TU2JL, TZ6NU, UA0FF, UA0ICC, UA0KBY, UL8LWA, V44KAA, V85CJ, VKs, VU2DK, VU2JJQ, VU200, Y11RJ, ZF1DX, ZF2SD, ZP2AA, ZP8AA, 5H3GM, 5H3SW, 5Z4BI, 7Q7XX, 8J31TU, 9K2JR, 9M2CW and 9M8BL.

John G3BDQ stresses his current un-enthusiasm by recording just the one contact; c.w. to 4K3BB.

Over to Pat ON7PQ, who records his c.w. as going out to VP8SSI, S2/HA5BUS, HH3HK, VP8CBA, 1A0KM, 9V1YW, 9X5HG, BV4HB, AH6JF, Z21HS, VP5/WB9HRO, A22GH, ZS9/DL3ECK, A71/NX7K, TR8LVP, 7Z2AB and N6AV/VP9.

More c.w., this from Ted G2HKU, by way of E08BED, LU1LHM, IL7/I0RKV, WB2TSL, W5/HK0BKX, TU4SR, VG1NH, W08L and VP5/WB9HRO.

### QSL Addresses

Thanks to Ted G2HKU for these QSL addresses: 9H3GQ goes to DK4SW; VP2EY to HB9SL; OD5SK to KB5RA; VP8BZL to KA6V; J28FO to F6FNU; SV0HS/SV5 to DJ8MT; TU4SR to OH8SR. Finally, 3B8CF who says



QSL via the *Call Book* address only, enclosing a dollar bill as i.r.c.s are no good there.

### Operating For Profit!

I've come to the firm conclusion that there are an increasing number of stations who operate from or activate DX spots purely in hopes of profit. My own view is that any station or expedition which refuses to QSL via the Bureau, should **not** be accepted as valid for DXCC.

There are many aspirants to a OXCC who just cannot afford the repeated demands for dollar bills, not to mention demands for donations to mount the expeditions. And of course, we all know of several so-called QSL Managers who never reply until the third or fourth try; so even if a QSL and its postage actually cost a dollar, they'd be a couple of dollars or more a card in profit. While there are still lots of good QSLers and managers, there is an increasing minority who are no more than racketeers.

## Back-Scatter

### The 28MHz Band

On the 28MHz band, Ted G2HKU notes that he keyed with PY3CJI, TA7L, ZP6CW, TA2EC, PY2SHS, 7P8SR, PU2FDN, N9ND, plus a 4W effort with N9ND.

Picking the microphone up, Don G3NOF was able to work BZ4RBD, CT3FT, HC7SK, LU3CQ/P, JA4OK, JA5QJD, ON4AVO/5N0, VU2KFC, VU2VMI, XX9AW, ZD7SM, ZF2SO, ZP4AA, 5H3GM, 6T2YD/5A, 7Z1AB, 7P8DX, 7P8EB and 9L1MR.

At ON7PQ, the keyer was the means of entering VK9CL, VP8SSI, VP8CBA, S92AA, VP8BZL, HF0POL, XQ0YAF, O05/LA4GHA, JW0E, PJ2AM, S2/HA5BUS, HS1CDX, BY4STV, N6AV/VP9, WL7E, 7P8SR, 5N0KZJ and JY2FR into the log.

Finally, John G3BDQ who looked in the s.s.b. segment of the band, and snapped up 8P6BL, VP2EOH, G4SMC/8R1 and FH8CB.

### Slower Contact Rate

Over the past few months there have been many comments in the letters about the practice of using 'last two' when calling into a pile-up. All of them note how much slower the contact rate becomes with operators who accept partial calls; and all of them report cases where two stations in the pile-up have the same last two letters in their calls, and wonder which of them got the QSO!

Liddery, and comic with it, for sure. However, if the operator at the sharp-end of the pile-up insisted on

full callsigns - as, incidentally, is required by licences world-wide - then there would be no need for insurance contacts. Since about 20% of the total seem to be insurance contacts, overall there would be an immediate improvement in pile-up sizes. But then, liddery, by definition almost, requires an inability to see the obvious!

### Deadline

I can ALWAYS use more reports and input; and I am selfish enough to admit I get a lot of interest and entertainment from your letters and their pithy comments on all sorts of things! Letters, addressed as above, to arrive here please by July 17, August 21 and September 18.

### Solar Data for May 1992

We are now in month 70 of solar cycle 22, and solar flux levels are continuing to plunge from the high levels sustained over the last two years. Solar cycle 22 which officially began in September 1986, had a very steep rise and then reached a plateau of generally high values. The downside of the cycle is now starting to show itself and the forecasters are turning their attention to just when solar minimum will be, with the latest predictions ranging from early 1995 to well into 1996.

There were only two small disturbances during the first week of May, on the 3rd and 4th, caused by small M type flares, but little came of them. However, on May 8 a major M7.4/4B flare took place, starting a massive magnetic storm and proton event, and by the morning of May 10 a widespread aurora encompassing all of Europe was taking place. The geomagnetic A index peaked at 99 units and was still high on May 11 measuring 35 units, but by the 12th the levels had declined to seven units.

Two smaller magnetic events, both caused by the passage of coronal holes, occurred on May 18 and May 22, but apart from a small aurora on the 22nd nothing significant came of them. The solar flux levels have also dropped dramatically and on May 28 it measured 111 units, this being the lowest level for over four years, when on May 2 1988, it recorded 113 units.

## Back-Scatter

### VHF Up

Reports to  
David Butler G4ASR  
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

The flux level continued on its slippery down-hill slope and on May 31 it only measured 99 units. This may be depressing to the so-called experts who worry about the 'numbers', but to the real v.h.f. DXer it isn't anything to be concerned about, as there will always be DX kicking around via some propagation mode or other, as the following reports show!

### The 50MHz Band

Conditions during May on the 50MHz band were very exciting with Sp-E propagation effecting the band on most days. This allowed contacts to be made all over Europe and into the nearer parts of Asia such as X70IF (a special call), 5B4JE, DK9IP/5B4, G3K0X/5B4, ZC4KS and TA5ZA.

During many of these events there were brief openings into Africa and many UK stations managed to work A22BW, CN8ST, D68BR, FR/DJ30S, Z23JO, 7Q7CM, 7Q7JL, 7Q7RM, 7Q7XX and 9J2MK on a number of occasions during the month. It also opened up to South America and contacts could be

made with CX4HS, LU1DMA, LU2EIO, LU2EX, LU8AJK, PY5CC and G4SMC/8R1.

The beacon CX1CCC (50.0185MHz) which only runs 5W into a ground-plane antenna was also heard. On May 13, between 1950-2030UTC, a multi-hop Sp-E opening took place to Canada, allowing stations in northern England to work many VE operators including VE1RG and VE1YX.

### Auroral Openings

There were a few auroral openings and events during May, but most of them were very weak and hardly worth reporting. However, an opening on May 10 was tremendous and contacts could be made on all bands from 50MHz-430MHz with stations situated throughout Europe.

It commenced quite early, around 1030UTC in central England (up in Scotland it was detected on 50MHz at 0900UTC!), continuing through to about 1800UTC, and then started up again later in the evening from 2130UTC for a few more hours.

I'll now deal with the 50MHz reports, and the first one out of the

bag comes from Philip Lancaster G0ISW (I084) who worked a number of stations in the aurora on s.s.b. including GD7JQI (I074), G100TC (I065), GM3WIL (I075), GW0GEI (I073), FC1BHB (JN09) and F6HRP (IN88).

Terry Chaplin G1UGH (J002) first heard the opening at 1236UTC and then went on to make 17 s.s.b. QSOs with stations in DL, F, GU, ON and PA. Interestingly, all of his contacts were located within a fairly small geographical area in locators IN89, 99, JN09, 19, JO11, 21, 31, 22, 32, 33 and 53.

Ela Martyr G6HKM (J001) also caught the aurora in the afternoon and had an excellent time on the 50MHz band by working 15 countries, including HB9, I, LA, OK, OZ and SM.

### Many Stations Active

The DX Cluster reported many stations active on the 50MHz band during the aurora and among the operators noted were LA3EDA (JP50), OK1IBL (JO60), OZ1LO (JO55) and SM6CMU (JO65). However, these were just locals compared to the real DX worked by Chris Tran GM3WOJ. Having spent a number of hours working stations all over Europe, Chris decided to do a spot of listening, and whilst idly tuning around at 1322UTC he was amazed to hear ZS6RAD calling CQ on 50.105MHz c.w. peaking 55A.

The South African station was then worked before GM3WOJ QSYed to 28.885MHz to arrange c.w. tests with ZS6AXT and ZS6PT on 50.005MHz. Both of these stations



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INSIDE STORY  
FROM OUR  
UNDERCOVER REPORTERS

**RADIO SHOPPER** have placed several investigators at strategic locations throughout the country. Their job is to report any peculiar activities from *INSIDE* the industry. This month's report comes from Mr Wood operating somewhere near Nottingham. Apparently, **RADIO SHOPPER** are being constantly bad mouthed by a number of unhappy dealers & distributors. During operation "**MONOPOLY**" Ken managed to overhear the following: "Hey, don't buy from Radio Shopper - we've repaired 6 or 7 of the rigs they've sold already". We can now exclusively reveal that this is not completely true! In fact, we can **GUARANTEE** that we have not had **ONE SINGLE** fault with any of the rigs which we have sold. Any repairs which we may carry out will all be done in the UK. Finally, have you noticed how we have had to change our logo's for Kenwood, Icom and Yaesu? Draw your own conclusions. - Sorry Guys - **RADIO SHOPPER** is here to stay. Watch this space....

By Mr Ken Wood & Ms I Comm

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# Back-Scatter

were also worked, ZS6AXT at 1330UTC peaking 59A, and ZS6PT directly afterwards at 55A. A little later, at 1336UTC, ZS4S was heard at strength 55A calling CQ on 50.107MHz c.w. and within seconds another DX contact was in the log.

The mechanism for these contacts would appear to be a link-up from the aurora into a trans-equatorial propagation (t.e.p.) path, or possibly aurora linking into Sp-E linking into t.e.p. I'll have to leave it up to the 'experts' to work that one out but one thing is certain. If GM3WQJ hadn't been the opportunist that he is, then none of this would have been noticed and recorded. Well done Chris!

## Intense Opening

The auroral opening on May 10 wasn't just restricted to the 50MHz band, but was of such an intensity that many contacts were made over considerable distances on the 144MHz band, and although I haven't received any reports directly I did hear that G3LQR (JO02) managed to work a YO, possibly Y02IS on the 430MHz band.

For those operators located in central England, the event on the 144MHz band was characterised by an opening initially into Scandinavia, with contacts being made with SM and OH from 1030UTC. By 1230UTC, contacts into this area disappeared to be replaced by stations throughout large areas of mainland Europe.

Unfortunately I've had to restrict reports to those of **Richard Gardner G4WKN** (IO92) and myself (it's the only perk I get!), but I think they adequately describe the intense opening.

Richard runs a TS711E and a 300W amplifier into a 17-element

Yagi and was active from 1050-1736UTC and 2134-2301UTC during which time he made 114 c.w. contacts in 59 locators and 14 countries. The total included 13 \* OK, 7 \* HG, 5 \* YU, 4 \* I, 2 \* SM and many others such as OH1CF (KP00), OH3NQW (KP21) at 1830km, RB5PA (K021), HG9RC (KN08), HG0DG/P (KN07), HG5ABC/8 (KN06), 4N2CCY (JN85) and YT3NO (JN76).

At my QTH (IO81) I run a much modified FT221RD into a pair of 8874 triodes giving 400W into an 18-element Yagi. My activity periods were from 1108-1118UTC, 1150-1800UTC and 2135-2200UTC, with the gap between 1118-1150UTC being used to make the sandwiches, fill up the 'Thermos' and explain to Marion, my wife, why I wasn't going to cut the grass that day! In total I made 146 c.w. contacts in 68 locators and 18 countries, including 25 \* OK, 13 \* HG, 8 \* YU, 8 \* I, 6 \* HB9 and much DX such as YU1EV (KN04) at 1907km, HG8CE (KN06), HG9RC (KN08), YU7BW (JN95), HG6ZB (JN96), HG7PL (JN97), OK3CPY (JN98) and OK2SUP (JN99). I've shown all the locator squares worked by myself (shaded) and G4WKN (crossed) in the diagram **Fig. 1**, and you can easily see that we both worked very similar geographical areas.

## Sporadic-E

Conditions on the lower frequency bands, especially 50MHz, have been tremendous via this mode, with openings occurring virtually every day during May. Of

course, many of you were waiting for conditions to break on the 144MHz band and it came very close to it on a number of occasions.

What may have been a Sp-E contact (or it might have been via meteor scatter) occurred during the 144MHz contest on May 17, when G4WKN and G00RC were operating G4ZAP/P from Flamborough Head. At 1206UTC they were called by YU1PPX (KN04PP) and he was worked at 52 and with sufficient duration to exchange callsigns, reports, serial numbers and locators for two full overs plus 73s.

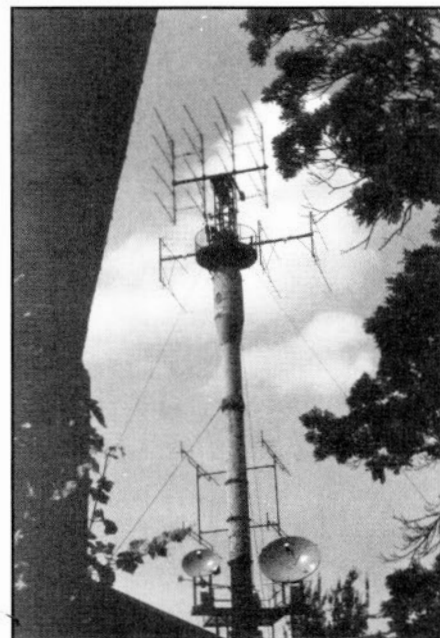
A little while later, at 1229UTC, IW6BLH was heard whistling up his amplifier for about five seconds before calling them. The contest exchange was quickly given, but the Italian station came back with "negative, negative, please all again", by which time of course the signals had faded out. It is difficult to determine exactly what propagation mode this was, but as G4WKN points out, it was strange that during the whole weekend only two 'bursts' were heard and these were both around midday on the Sunday.

At the end of the month, on May 30 at 1830UTC, I heard an I7 calling CQ on 144.300MHz, but he disappeared before I could put out a call. A few minutes later, at 1837UTC, I did manage to work IK7HIN (JN81KC) at 59 bothways and he remained audible with me for nearly 10 minutes, so it was definitely Sp-E. By way of confirmation, PE1NMC heard IT9TVF at 1841UTC and G8ESB worked I8KPV at 1843UTC. By the time you read this there should have been some very good 144MHz openings with contacts numbering in the hundreds. I'll report about them next month!

## Tropospheric Openings

Conditions for the tropospheric openings during May generally, and between May 13-19 in particular, were very good and allowed many long distance contacts to be made on the v.h.f. and u.h.f. bands. A major IARU contest on May 16-17, and a French contest on May 30-31, kept activity at a high level. From May 13,

**Fig. 2: The large antenna array at Y240L. Photo by GW8VHI.**



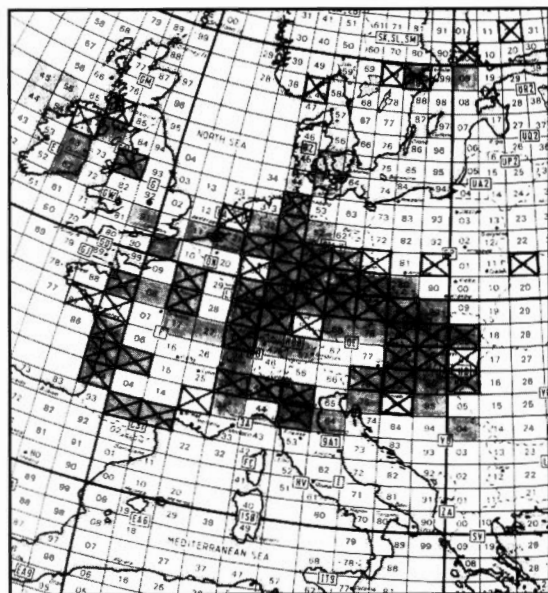
stations in central England were working into northern Germany on the 144MHz, 430MHz and 1296MHz bands. During the next few days the opening spread into northern England and Scotland, allowing many contacts to be made into continental Europe. Stations located on the North Sea coast fared particularly well and G4IFX (IO94), using a 50MHz antenna, reported LA1ZE peaking 59+ on the 144MHz band. A number of stations situated near the eastern side of England, such as G4PIQ (JO02) and G8ESB (IO94), reported contacts with GM1YOA/P (IO67) Benbecula, GM4CAQ (IP90) Shetland and GM4PSX (IO89) Orkney.

**Kevin Griffiths G1VDF**, a member of the Hereford Amateur Radio Society, reports that their v.h.f. contest group had an excellent outing during the 144MHz contest on May 16. Operating as GW1VDF/P from the Black Mountains, Powys, the group worked 1027 stations in 73 locator squares and 17 countries including HB9, LA, OE, OK, OZ and SP, with the best DX being OK2KFM (JO99FN) at 1534km. The final claimed score for the contest was 1 608 993 points, and although not a winning score, they were very happy with it.

## Meteor Showers

The months of July and August provide not only an increase in the daily sporadic meteor count, but also include periods of some of the better meteor showers.

The Delta Aquarids occur between July 12 to August 18, with



**Fig. 1: Aurora on May 10. The 144MHz contacts of G4ASR (shaded) and G4WKN (crossed). Locator maps can be obtained from the RSGB.**



the best activity being around Tuesday 28 July. Unfortunately, it is below the horizon from 0500 to 2200UTC, but does produce very good results on the east-west path between 0000 to 0300UTC.

The big shower of the year is of course the Perseids, and this will be encountered by the earth between July 20 to August 23. Most amateur activity will take place between August 8-16, much of it during the period August 11-13. The shower is circumpolar, which means that it does not set, and is therefore usable, in particular directions, throughout the 24 hours. Between 0900 to 1300UTC beam north-east or south-west, 1300 to 2100UTC beam east or west, 2100 to 0100UTC beam south-east or north-west. There is no well defined peak for the north-south path, it generally being good at all times except between 0400-0800UTC and 1600-2000UTC.

For those of you that have not tried meteor scatter, but would like to, I will give you a simple piece of advice. Don't! Well, not until you've actually started hearing signals anyway. First of all I will assume that you have a reasonably sensitive receiver and a directional antenna, say a Yagi of between 9 to 18 elements, (actually I really should quote a Yagi in terms of boom length, rather than the number of directors that can be crammed along it!) I'll also assume that you will be listening on the 144MHz band, and that, as a beginner, you'll want to listen to s.s.b., rather than c.w., although many would argue that c.w. operation is better.

Before you actually hear some signals, it is worth noting that there are specific recommendations regarding meteor scatter. Firstly, there are two types of contacts, random (which means without any pre-arranged schedule) and scheduled. Random operation is concentrated around 144.200MHz (but not recommended by IARU) and 144.400MHz. Schedules are normally arranged somewhere in the narrow-mode section, generally 144.160-144.240MHz or 144.430-144.460MHz.

Secondly, contacts are made during accurately timed TX/RX periods, one minute for s.s.b. and two and a half minutes for c.w., with the UK end normally transmitting during the second period. Therefore, on s.s.b. you listen for signals on 144.400MHz from 1400-1401, 1402-1403, etc. And that's all you do! Just sit there and listen for an hour or so and see what you can hear. I don't recommend that you transmit until you know the correct operational procedures, and these are definitely not picked up by listening to the rabble on 144.200MHz! Ask a real operator what to do or send me an A4 s.a.e. for a 20-page explanation of the latest IARU recommendations.

I'll also send you details of the Bavarian Contest Club meteor scatter contest, being held between August 8-14.

## Meeting In Vienna

In March of this year I attended the International Amateur Radio Union Region 1 v.h.f./u.h.f./microwave meeting in Vienna, on behalf of the RSGB and in the capacity as the society's v.h.f. manager. At this meeting many items were discussed in preparation for the IARU Region 1 Conference to be held in Antwerp, September 1993, and a small number of recommendations were made which could be implemented immediately. The first concerns the 50MHz band, and it was agreed that the recommended frequency for a.f.s.k. SSTV working should be 50.510MHz.

A problem becoming more prevalent, is one of computers using clock frequencies at 8MHz or 16MHz. Harmonics of these are producing interference to the weak signal e.m.e. sub-band, 144.000-144.025MHz, and therefore it was suggested that publicity should be given to the use of 144.140-144.160MHz as an alternative for e.m.e. operation. The results of the recommendation will be monitored with the aim of incorporation into the usage part of the band plan if successful. (However in hindsight I don't think this move will meet with much favour and it may be better to move the h.f. end of the e.m.e. sub-band allocation by an extra 5 or 10kHz.)

The last recommendation concerns the 3.4GHz band, and it was agreed that from the end of 1993 the narrow band segment of the 3.4GHz band should be from 3400-3402MHz, and the centre of activity should be 3400.100MHz. This recommendation was made to support the harmonisation of allocations in the UK, Germany and Holland, the only European countries with access to this band.

## Full Scale Conference

As I have already mentioned, there will be a full scale conference of the Region 1 International Amateur Radio Union (IARU) in September 1993. Incidentally, the IARU is split into three world-wide regions exactly matching the three International Telecommunication Union (ITU) regions, with Region 1 encompassing all of Europe, Africa,

the Middle East and Asiatic Russia.

The conference, held every three years, is the only opportunity for national societies to voice how they want the amateur bands structured, and proposals from many countries are put forward. Perhaps you might care to add something to the way our v.h.f. bands are run? Do the meteor scatter procedures need changing? Should e.m.e. timing periods be brought into line with m.s. periods? Should the beacon sub-band on 144MHz be reduced in bandwidth? What usage would you put to the space created? Should there be repeaters on the 50MHz band?

If you have any ideas or proposals please send them to me immediately, as the time scales involved in getting papers ready for the conference are incredibly short.

## Beacon News

The microwave beacon GB3MHX, located at the BT laboratories on Martlesham Heath, Suffolk, went off the air during a thunder-storm on May 23. Following repairs and upgrade it has now returned to service on 10368.830MHz running 200mW output.

**Frank Evans GW8AWM** is proposing to operate a new beacon GB3BSL on 432.934MHz from a site 8km south-west of Bristol (IO81QJ). The unit is expected to run 100W e.r.p. from four stacked 3-element Yagis beaming east, and as the site has an excellent take-off it should provide coverage through southern England into Belgium, Holland and Germany.

## Expedition Update

First I have an update on the South Sandwich Island expedition VP8SSI, which took place earlier this year. The group had originally planned to operate on the 50MHz band, but because of the bad weather and the need to give priority to the h.f. bands, no operation was possible. They also tried to erect a large antenna system for e.m.e. operation on the 144MHz band but were defeated by 10km per hour freezing winds. The 50MHz equipment, presumably the 100W transmitter and 5-element Yagi, were left with VP8WA in the Falkland Islands.

News has also reached me that two expeditions, to Malyj Vysotskij Island 4J1FS and Kaliningrad 4L2FM, both failed in their attempts to obtain

a permit allowing operation on the 50MHz band. However, the expedition to Glorioso Island (LH38) by FR/DJ30S/G did manage to get a permit and many contacts were made into the UK on May 14, 15 and 16. Following the activity from Glorioso a stop was made on Comoros Island (LH18) operating as D68BR and further UK contacts were made on May 23. All QSL cards for these operations should be sent to Herr. **Bernd Ritter DJ30S**, Schuesslerstrasse 16, D-6145 Lindenfels, Odenwald, Germany.

Now that summer is upon us, many operators are planning to activate rare locator squares and countries. The first of these to get a mention is the expedition to Turkey, between July 14-29, by **Uffe Lindhardt OZ1DOQ** and **Soeren Pedersen OZ1FTU**, which I mentioned in last month's column. In addition to the operation on the 144MHz and 430MHz bands, permission has now been obtained to operate on the 50MHz band, but only in an area 200km east of Istanbul and eastward. Activity will therefore be concentrated in locators KN61, 62, 71, 72 on the Black Sea coast and OZ1DOQ and OZ1FTU will use their call signs prefixed with either TA2 or TA6, depending in which area they are located. Operation on the 50MHz band will be mainly via Sp-E, using 80W into a 5-element Yagi, but they will be QRV on 14.345MHz and 28.885MHz for talkback and to arrange schedules.

The 50MHz band is very popular for expeditions during the Sp-E season because low power and small antennas can provide excellent results. Keep an ear out for **Angelo Anna IZADN** as he operates from a number of Italian islands in the Mediterranean this summer.

Angelo has already been QRV from Lampedusa Island (JM65HL) as IZADN/IG9 and Pantelleria Island (JM66AT) as IZADN/IH9, and by the time you read this he should be operating with the latter call sign from Panrellaria Island (JM56XT) between July 11-31. Angelo then plans to operate as IZADN/IA5 from Capria Island (JM43WB), between August 1-18. All of these only count as Italy of course (but are useful as rare locators), but if you want a new DXCC country try listening for C31/ON4ANT operating from Andorra between July 19-31. I don't know if he has a permit though!

Apart from sunbathing on some Greek Island, DC3QB will also find time to operate on the 144MHz band. He will be active between July 26 and August 19 from locator KM07PP with an FT225RD, 75W and a pair of 9-element Yagis. I know what I'd rather be doing!

The rare Czechoslovakian locator square KN09 is going to be



activated on the 144MHz and 430MHz bands, between August 8-14, by DJ2QV and DL5YET, primarily for meteor scatter contacts, but also for tropo contacts (if conditions allow). On the 144MHz band they will use 300W and a 9-element DZ5HF Yagi, whilst on the 430MHz band they plan to use 150W and a 21-element Yagi.

Operation via c.w. meteor scatter will take place with two callsigns, OKDL5YET (no dashes and no /P) for scheduled contacts on 144.141MHz, and OKDJ2QV for random contacts on 144.105MHz. Either callsign will transmit during the first two and a half minute period at a maximum speed of 1200 l.p.m., and will follow IARU recommendations. The frequency for s.s.b. schedules will be arranged via the v.h.f. net on 14.345MHz, but they will also be active on random operation, around the peak of the Perseids meteor shower on 144.200MHz and 144.400MHz.

### Contest Details

I have received details of two low power contests organised by the RSGB Contest Committee. The first, a 144MHz event limited to 25W p.e.p. output, will take place on Saturday 25 July between 1400-2200UTC. The contest exchange consists of callsigns, report, serial number, locator and county. The other event is very similar, with the exception that it is for the 430MHz band and is being held on Sunday 26 July, between 0800-1400UTC. In both contests there are sections for the



## Back-Scatter

### Annual v.h.f./u.h.f. table

January to December 1992

50MHz	70MHz	144MHz	430MHz	1296MHz							
Station	Countries	Countries	Countries	Countries	Countries						
Countries	Countries	Countries	Countries	Countries	Total points						
G4FCD	16	12	—	—	72	20	46	17	18	9	210
G6HKM	38	26	—	—	39	16	20	12	3	6	160
G4ASR	8	34	38	5	43	21	—	—	—	—	149
G1SWH	8	20	18	5	37	10	21	9	2	1	131
G8ESB	7	3	15	2	37	9	14	3	7	2	99
G4LDR	2	4	22	2	10	9	23	9	—	—	81
G7CLY	—	—	—	—	17	8	1	1	—	-	27
G1THG	4	3	—	—	2	2	—	—	—	—	11

### Annual c.w. ladder

Band (MHz)				
Station	50	70	144	Points
G4ASR	30	6	275	311
G4OUT	—	5	53	58
G0DJA	—	—	27	27

Number of different c.w. stations worked since January 1 1992

single operator fixed station, single operator portable station, all others and listeners. However, you do have to be a member of the RSGB to enter.

Summer microwave contests have been scheduled by the RSGB Microwave Committee to take place between 0900-2100UTC on the following Sundays: July 19, August 16, September 13 and October 4, the latter to coincide with the IARU contest arranged for the same weekend.

Scandinavian activity contests will be held between 1800-2200UTC on the following dates: 50MHz on July 28 and August 25, 144MHz on August 4 and September 1, 430MHz on July 14 and August 11,

Microwaves on July 21 and August 18. A full set of rules can be obtained from myself on receipt of an s.a.e.

### Diamond Jubilee

I am still looking for information and examples of v.h.f. work in the early 1930s to assist me in the preparation of a very special 60th anniversary issue of *PW* later in the year. Any details of bands, contacts, equipment, in fact anything that reflects the history of v.h.f., will be very much appreciated. If you don't go back that far, you may still be able to help by digging out any old photographs or logs for the period 1940-1970.

### Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first week of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM and I can also be contacted at my DX cluster GB7DXC.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. They will all be returned to you.

Short wave radio seems very complicated to many people who listen only occasionally. International broadcasters and receiver manufacturers are spending much time looking at ways to make it easier.

At the Consumer Electronics Fair in Chicago at the end of May, it was announced that the PRS Corporation, developers of ID LOGIC technology, BBC World Service and the Voice of America have agreed to co-operate with an application of ID LOGIC's automatic station identification and scan system for short wave radio broadcasting.

The ID LOGIC system is used by a.m. and f.m. stations in the United



## Back-Scatter

### Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

States and allows users of suitable receivers to scan for stations by format - perhaps a news station, or country music - or by name wherever they are in the continent.

The ID LOGIC works by sending a data stream which contains details once a day of stations and frequencies. In a short wave version, a data stream lasting about

one minute would be sent during the station's interval signal.

The data would carry a station's entire frequency schedule for each language. This would be stored by the set and the user would be able to call up a station by simply entering a geographical location and selecting the desired station and language. The set would do the

rest.

It will be at least two years before ID LOGIC for short wave gets off the ground. But implementation of the system might give a welcome boost to short wave listening world-wide.

If you are planning a last minute holiday, why not combine it with some DXing? This year's European DX Council Conference will take place in Finland's second city, Tampere, between the August 21st and 24th. Places are still available and you can be sure of a worthwhile weekend if you travel to the land of the all-night day.

Keen DXers from all over the world will be making use of the



splendid facilities which the local organisers are laying on. There will be a listening shack filled with a large variety of receivers connected to a huge outdoor antenna farm. There will be workshops on every aspect of the hobby, and lectures given by well known characters from the DX world. Further details are available from EDXC Conference 92, PO Box 212, SF-33101 Tampere, Finland. Telephone +358 0 191 3133 or FAX +358 31 161 857.

In its 60th year of international broadcasting, BBC World Service has launched a new language service, Ukrainian, and published two books about the station's history and role in the world of cross-frontier radio.

Journalist Andrew Walker has written *A Skyful of Freedom* recalling the first 60 years of broadcasts around the world from Britain. A colourful and entertaining work, it explains about the evolution of World Service from the Empire Service inaugurated in 1932.

The Managing Director of World Service, John Tusa, has collected together a series of essays written during his six year tenure at Bush House. Called *A World In Your Ear*, it catalogues the role of World Service in helping to bring the end of communism in the eastern part of Europe. It makes for fascinating reading. Both books are available from the BBC World Service mail order department on 071-257 2575.

Radio Vilnius in Lithuania appealed for help at the end of April. The station reported that it is having trouble paying for the cost of landlines and short wave transmission facilities in Moldova. As a result, the station had to restrict its operations to transmitters in Lithuania and the Russian Federation. "If anyone can offer practical proposals", said a FAX reiterating what had been broadcast on the air, "please let us know. FAX us on Vilnius 660526". Can any of PW's readers help?

## European Stations

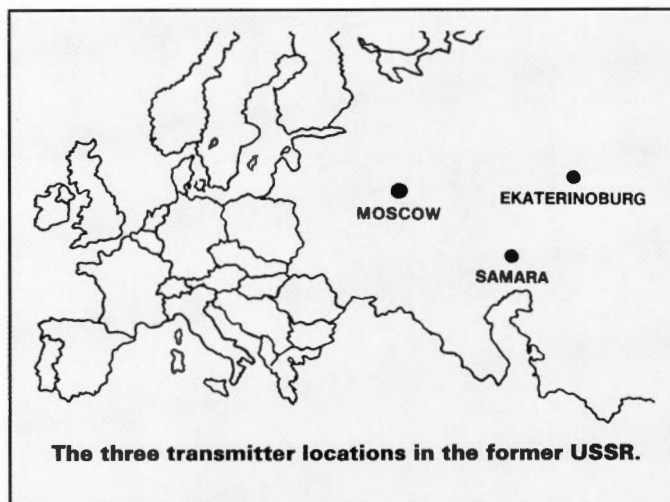
All times UTC(=GMT)

The French international service of Belgium, RTBF, stopped all short wave transmissions in early May. A subsequent report in Radio Netherlands' *Media Network* suggested that the final transmissions were heard on May 11. Funding for the station had been in doubt for some months, and it now seems that time has simply run out. English and other languages continue to be broadcast by the Flemish BRTN from Brussels.

Radio Sofia in Bulgaria transmits English broadcasts:

1100-1230 on 11.63MHz  
1730-1900 on 17.825, 17.78, 15.33,

# Back-Scatter



11.72, 11.765 and 9.70MHz  
1945-2030 on 17.825, 17.78 and 11.765MHz  
2145-2315 on 15.33, 11.72 and 11.66MHz  
0000-0045 on 15.33, 11.72 and 11.66MHz  
0300-0400 on 15.16, 11.72 and 9.85MHz

Radio Moscow's World Service is no more. Programmes are now transmitted on Radio Moscow International.

A round-up of stations in the Russian Federation from Roy Merrill:

Radio Ala in Russia has expanded its coverage and can now be heard on a fairly flexible schedule using the following frequencies in combination at different times:

0000-1400 on 15.255, 12.03, 11.965, 11.925, 11.685, 7.40, 7.38, 7.37, 7.315, 6.015, 5.04, 3.995 plus medium wave channels of 1.386MHz, 684 and 579kHz  
1400-0000 on 7.40, 7.38, 7.37, 6.025, 6.015, 5.04, 3.995 plus medium wave 684kHz and long wave 279kHz

Radio Alef, a Jewish produced programme aired at 1600-1630 on Sunday, Tuesday and Thursday is aimed at Russian Jews at home and in Israel. Frequencies are 12.075, 7.13, 1.467 and 1.17MHz. Announces in Russian as *Radiostansiya Alef* and rates up to SIO343 on their 25m band.

Radio Rezonans also has Russian on 12.075MHz at 0300-0500, 1100-1200 and 1800-2000, although Roy reports generally poor reception.

Radio Galaxy had returned to 9.88MHz in early April but subsequently moved to 11.88 between 1900 and 2200 with pop music and commercials with SIO 543 or better. Some identifications and

commercials are in English.

The latest edition of Adventist World Radio's *Current* programme guide gives details of the station's operations from three sites in Russia. Using 200kW transmitters in Ekaterinburg, Samara and Moscow, coverage of Europe has been greatly enhanced. The complete schedule (with transmitter shown by the suffix after the frequency) is:

0230-0300 in Arabic on 11.785M  
0300-0330 in Russian on 11.785E  
0330-0400 in Yugoslavian languages on 11.90E  
0400-1430 in Romanian on 11.90E  
0430-0500 in English on 15.125S  
0500-0530 in German on 15.125S  
0530-0600 in Polish on 12.01S  
0600-0630 in Arabic on 11.775M  
1400-1500 in Italian on 9.775M  
1500-1530 in Yugoslavian languages on 9.775M  
1530-1600 in Romanian on 9.775M  
1600-1630 in English on 15.125S  
1630-1700 in Swedish on 15.125S  
1700-1800 in Russian on 15.125S  
1800-1900 in Russian on 7.31E  
1900-1930 in German on 7.31E  
1930-2000 on 7.31E

The BBC World Service Ukrainian Service started on June 1 with a special hour-long transmission at 1900, although normal programmes will be 30 minutes duration at 1930. Two frequencies are used: 9.585 and 6.06MHz.

Radio Yugoslavia's present schedule from its studios in Belgrade:

0030-0100 and 0130-0200 on 11.87MHz  
1130-1200 on 21.605, 17.74 and 17.71MHz  
2100-2130 on 11.735 and 6.10MHz

Macedonian follows at 0100 on

11.87MHz, also at 1100-1130 on 21.605 and 1900-1930 on 6.10MHz. All of these are relays of Macedonian Radio in Skopje. An Arabic service can be heard on 15.14MHz at 1715-1800 with quite strong signals, says Roy Merrill. He noted this service in early April, co-channel with AIR in Russian signing off as Belgrade signs-on.

## African And Middle Eastern Stations

The RDT Centrafricaine service signs on at 0427 on 5.0336 with a repeated four note piano sequence to 0429. The national anthem follows with rapid French identification and frequency schedule. There's usually very heavy QRN.

Radio Djibouti has been observed at 0259 on 4.78MHz with very poor signal. The national anthem followed by rapid announcements and identifications possibly in Somali, then an apparent call to prayer.

The Voice of Ethiopia has improved steadily through April and May, and it is heard as early as 1615 on 9.56MHz in Somali and Amharic, despite co-channel interference from Amman. At 1700 the distinctive electronic organ interval signal precedes the French identification "La Voix de l'Ethiopie".

A new schedule from Teheran's Voice of the Islamic Republic of Iran shows some changes to English language output. Programmes in English are now:

1030 on 11.93, 11.91, 11.790, 11.715 and 9.525MHz  
1830 on 15.26, 9.022MHz  
2330 on 15.315, 15.26 and 9.022MHz

Radio Iraq International has expanded some of its operations. English transmissions are noted at 1300-1600 on 15.40 and 11.25MHz and at 1800-2000 on 15.21MHz.

Radio Jordan often predominates with English from around 1500 until abrupt sign-off at variable 1630 on 9.56MHz. Radio Ukraine is often heard in the background.

ORT du Niger can be heard signing on at 0454 on 5.0201MHz. A standard tuning tone is followed by a choral ensemble and a short solo on a horn or local woodwind. A rapid and rather indistinct identification follows in French, with a frequency schedule and programme preview. Suffers from heavy commercial QRM.

Qatar Broadcasting Service can frequently be heard, albeit with some difficulty, on 17.8253MHz with quite strong signals at 1600 and later. At around 1700 to 1710 the frequency changes to 17.8653MHz, but in both cases there are strong co-channel Europeans. Identifies strongly as "l'dhat Qatar min al Doha".



# Back-Scatter

Roy Merrall has been trying out the new Radio RSA frequencies listed in last month's column. To date, he reports that on the 0400-0600 transmission on 9.695MHz is audible. The station has dropped its long running French service frequency on 15.364 at 1800, in favour of 15.44MHz which has a very strong YLE at the same time.

Radio Tanzania signs-on with quite strong signals at 0156 on 5.0501MHz. A repeated celeste chord sequence is followed by announcements and identification in Swahili. A choir with orchestral accompaniment follows until 0200, followed by what appears to be a call to prayer.

## Asian And Pacific Stations

Roy Merrall reports a much expanded French service from Radio Australia at 0000-0030 on 21.74, 17.795, 17.715, 15.365, 15.24, 11.88 and 11.72MHz. Some of these are clearly audible in the UK. There is also a special English service to the south west Pacific at 0800-0900 on 11.72, 9.71, 7.24, 6.08 and 6.02, although only 9.71 has been heard and identified to date with fairly weak but clear signals at 0850.

As this edition of *Practical Wireless* went to press, Radio Japan was starting test transmissions from the BBC's Skelton transmitting station in Cumbria. Official broadcasts were due to commence on July 1, but the test schedule was:

Schedule One:  
0400-0600 on 9.695MHz  
0600-0900 on 9.67 and 9.77MHz

1930-2130 on 6.025MHz  
2130-2200 on 6.11MHz  
2200-0030 on 6.16 and 6.025MHz

Schedule Two:  
0500-0600 on 9.695 and 9.77MHz  
0600-0700 on 9.67 and 9.77MHz  
2000-2100 on 6.025MHz  
2200-2400 on 6.16 and 6.025MHz

## The Americas

A letter has reached me from **Chris Gare G3WOS**. Chris is secretary of the UK Six Metre Group, and says that he was interested to read in 'Broadcast Round-up' a piece about Havana Radio. On Tuesday and Saturdays at around 2035, Arnie Coro C02KK hosts a programme *DXers Unlimited*. This is aimed at both short wave and amateur radio enthusiasts, with material of interest to beginners and old hands alike. Arnie is a very keen 50MHz operator and can often be found on 28.885MHz, the international 50MHz liaison frequency.

Chris goes on to say that Arnie made his first European contact on 50MHz in January this year, working G3WOS and Nick G3K0X. Nick was Arnie's first European contact on 50MHz and went on holiday to Cuba in January. There he was able to collect QSL cards for G3K0X and G4AHN! Chris reports Radio Havana on the air 2000-2100 on 17.705 and 9.67 and recommends the *DXers Unlimited* programme, saying "there aren't many like it"! Details of the UK 6M Group from **Old White Lodge, 183 Sycamore Road, Farnborough, Hampshire GU14 6RF**. Do please enclose a stamped addressed envelope.

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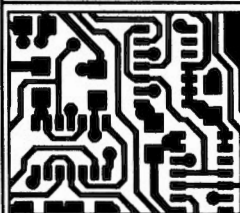
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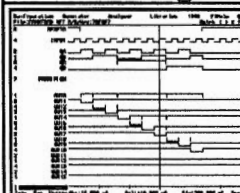
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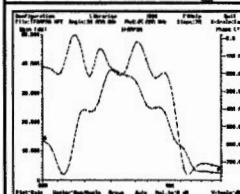
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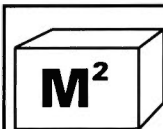
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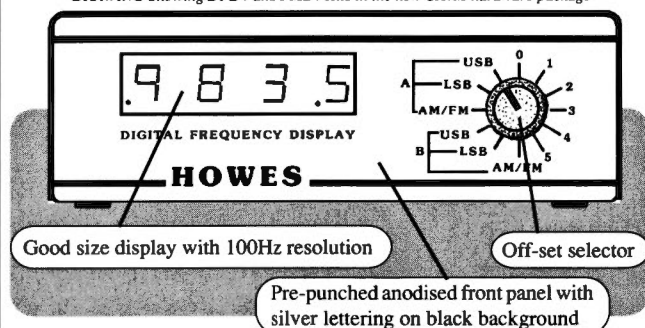


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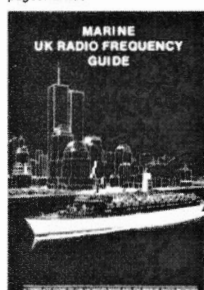
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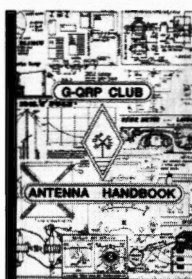
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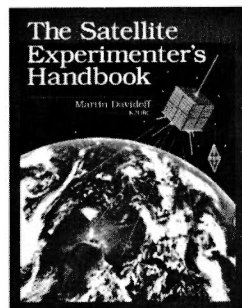
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