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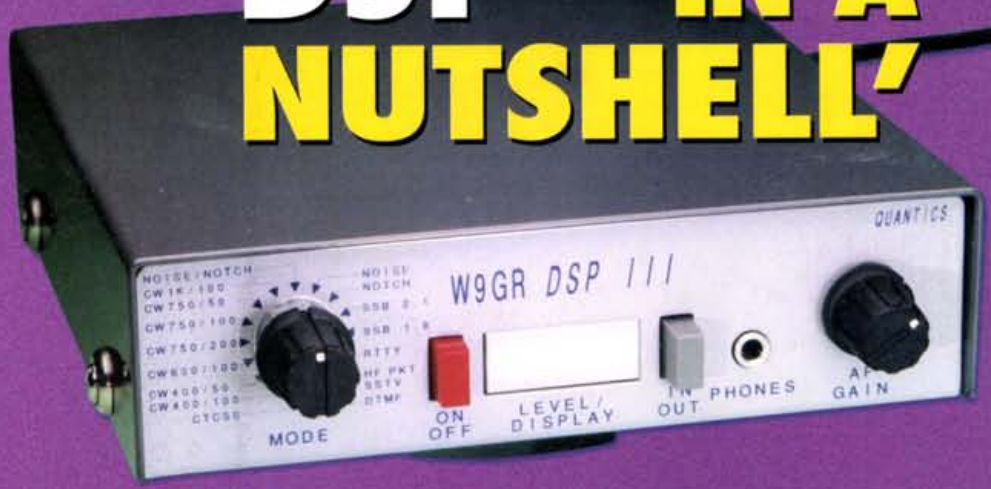

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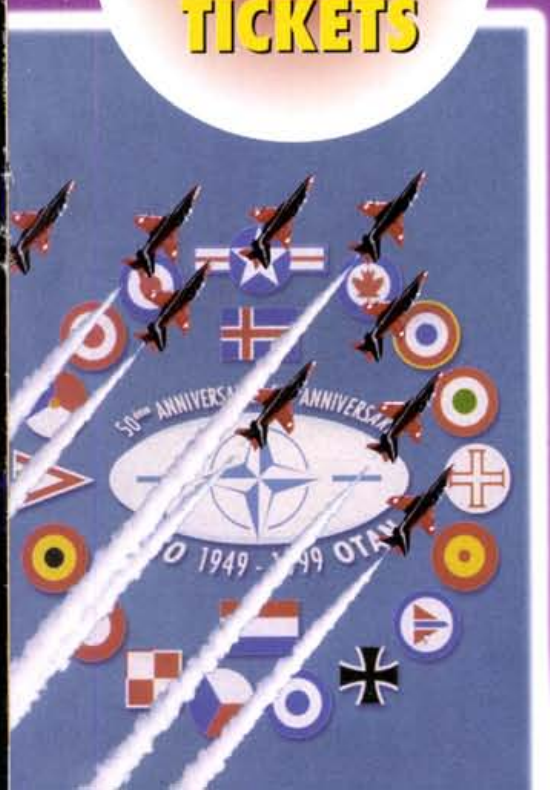

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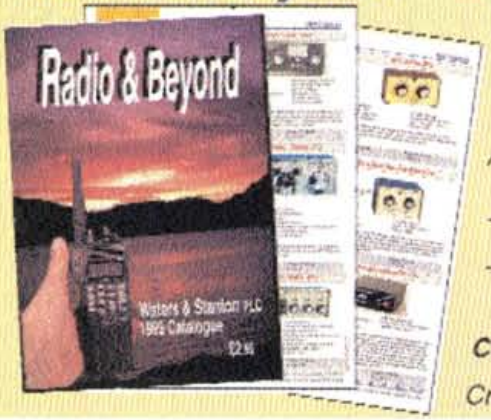

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KEYLINES

ROB ENTHUSES ABOUT 'LOCAL' RADIO CLUB MEETINGS AND THE BENEFIT OF EXTRA INFORMAL GATHERINGS

Regular *PW* readers will be in no doubt as to how important I feel that 'local' radio clubs are to our hobby. My own enjoyment of the Amateur Radio hobby was nurtured by the (old) Southampton Radio Society of Great Britain Group which for many years met at the Southampton University. I owe much to the likes of **G3CTM** and **G3RJY** (now Silent Keys), and (still very much with us!) **Alan Partner G3HKT** who welcomed me to meetings.

It's because I think the local club scene **is so important** that I spend so much time travelling to visit clubs in the British Isles. All the visits are worthwhile and some result in memorable meetings - and occasionally there can be rather surprising 'after effects'!

One surprising 'after' effect that comes to mind, came my way on my long journey back to Dorset from North Wales on 5th March, following my visit to the **Aberystwyth & District Amateur Radio Society** on the previous evening. The 'surprise' after effect was so successful that I'm hoping that it can be repeated!

I'd arranged to visit **Wyn GW8AWT and Eileen 2W1BPS Mainwaring.** Wyn is one of our authors and the couple are both keen supporters of *PW* who live in Manordeilo, near Llandeilo in Mid Wales. However, what was intended to be a truly 'flying visit' to see Wyn and Eileen with perhaps a cup of tea and a chat - turned into a memorable social occasion and although I didn't have room to mention it in the May issue of *PW* - I'm determined to do so here!

Informal Gathering

When I arrived at Wyn & Eileen Mainwaring's home, tucked up behind Llangadog in the attractive mid-Wales countryside, I realised that there was a surprise in store. I had a clue because of the number of cars parked outside their cottage made it look as though he's gone into the 'pre-owned' car business!

Wyn and his delightful wife Eileen had invited six or so of the local Amateur Radio community to join us for an informal gathering. Once the surprise had worn off - and I'd been able to apologise for being late (not knowing of the gathering I'd arranged with Wyn to put back my arrival time and he'd still not let me in on the secret) we all had a truly wonderful afternoon and early evening.

Sitting around the fireside, chatting about every aspect of Amateur Radio was truly relaxing. Being informal, the group discussed everything imaginable, from Morse to RAE and from Novice Licence frequencies to club activities.

And to round off a truly delightful evening Wyn and Eileen had provided an evening meal. Thanks you both - and to everyone who attended - it was an excellent idea! I even had time to pay a visit to the Wyn and Eileen's goats - plus their pet sheep. (What a peaceful way of life they have).

Following the success of GW8WNT's 'surprise gathering' I would like to suggest that other similar afternoon/early evening events could be arranged. Obviously, because of the timing, such arrangements would suit readers who are retired or are in similar situations where they are available during normal working hours. I could meet up with them on my long journeys back to the 'deep south', breaking my journey and taking the ideal opportunity in meeting readers at the same time.

So, if you would like the chance to have an informal chat with myself and others during the daytime, why not drop me a line? In return I'll let you know when I'm next in your area or when I should be passing through on the way back to Dorset from a 'Club Visit. It'll give me a break from driving, a chance to meet more *PW* readers and to enjoy your company.

Thanks again for the excellent idea Wyn and Eileen. You may have really started something!

London Show Feedback

Following my comments in the May 'Keylines' regarding the London Show (poor ventilation, visitors and exhibits cigarette smoking) I've received some feedback in the form of a letter from **Bernie Godfrey G4AOG of Radiosport Ltd.**, the commercial organisation who organise the event. Bernie was responding to the courtesy pre-publication copy 'Keylines' I'd sent him.

Bernie commented: "We do understand the need for extra ventilation when the halls become crowded but as all doors are now constantly alarmed it does mean that we are unable to keep them open and maintain a reasonable amount of security, which past experience has shown to be of utmost importance. We will of course bring this problem to the notice of the Lea Valley Centre at our next meeting.

"Finally, on the problem of smoking, as you are aware, there is a 'No Smoking' policy in force within the precincts of the buildings, but this has become impossible to enforce. Unlike other organisers of similar shows, we abhor the policy of forceful removal of visitors, and we can just appeal to their sense of goodwill; to obey the 'rules of the house' at Picketts Lock".

Thanks for your response and explanation Bernie! However, I still regard it as being possible to keep several doors open - especially as there seem to be 'spare capacity' with the Security Guards. Surely one or two can be spared to watch over the open doors?

As regards the 'No Smoking' policy I'm afraid that not once during the whole 1999 show did I hear an announcement informing everyone that there was a 'No Smoking' rule within the building. If regular announcements were made during the show I think it would be easier to get visitors to co-operate. Some action is certainly better than none! So, let's hope that it will at least be made obvious to everyone attending next year that there's a 'No Smoking' rule in force and we can enjoy the show even more.

The QRP Contest

I'm planning to join in the fun on Sunday June 20th by coming on air to support the *PW* 144MHz QRP Contest. I hope to be active on both n.b.f.m. and s.s.b. during the whole duration of the event from 0900 to 1600UTC.

Operation of G3XFD/P will be from one of my favourite 'high spots' on the borders of Dorset and Wiltshire. Hopefully I'll be able to work many stations on 144MHz and also on 70MHz n.b.f.m. during the day. Let's hope for good weather - that'll have to be left to chance but at least I'll have a good picnic (incorporating my 'home brewed' bread of course) and freshly made tea available! Good luck everyone and I hope to work you on the day!

Modern Microwaves

I'm very sorry to say that the two part 'Modern Microwaves' article, originally promoted in the April issue and planned for the May issue and subsequently 'held over' along with other articles due to a lack of space, will not now appear in *Practical Wireless*.

The first article was in the final preparation stages for the June issue and I hope readers will accept my apologies because we have been told that the especially commissioned article is no longer available to *PW*. However, on the bright side I'm pleased to report that the Editorial team are keen to encourage activity on microwaves and to this end **David Butler G4ASR** - our v.h.f. and u.h.f. specialist author and keen microwave constructor/operator - is now preparing an article on the same subject. We hope to bring what promises to be a fascinating series to you later on in the year...so watch this space!

Writing To Rob

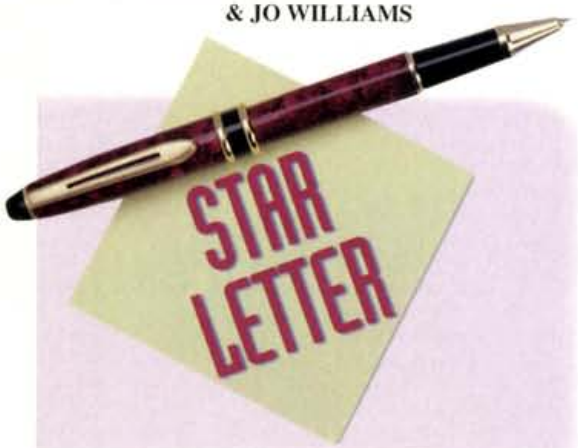
I'm very sorry to say that 'Writing to Rob' (and expecting a reply within a reasonable time) has required much patience this year. Please accept my sincere apologies as in some cases I'm many months behind with replies.

Sometimes I can quickly dash off a reply to E-mails or telephone, **but please be assured that I do read all your letters**. I'm doing my utmost to answer your letters personally or pass them on to someone who can help. Can anyone loan me an electronic typing arm I can dictate to at 200 words per minute?

Rob G3XFD

LETTERS

COMPILED BY ROB MANNION
& JO WILLIAMS



Remembering A Friend

Dear Sir
I was sorry to read of the passing of Mandy, the Editor's four-legged friend, in his April 1999 editorial. As a dog lover myself, I know what it means to lose a life-long canine companion. Life after such a loss is never the same. At every turn and to whomsoever he speaks, Rob will be reminded of Mandy.

May I suggest an appropriate memorial? As Mandy belonged to the Labrador Retriever breed, the same breed that make good guide dogs for the blind, would it not be a good idea to train a guide dog in her name? I am sure that Mandy's many friends from club visits (where I first met her myself), rallies and shows would be only too ready to contribute to such a fund for the training of a guide dog. To keep it within our craft, why not stipulate that the dog, when trained, be made available to a blind Radio Amateur? Mandy's memory will then be enshrined in Amateur Radio.

To this end, I enclose a modest donation, confident that many readers of *PW* will follow suit.
Maurice de Silva G0WMD
Hounslow

Editor's reply: What a lovely idea Maurice - it brought another tear to my eye. It's an especially appropriate suggestion because Mandy was originally bred as a potential guide dog. I will make a donation myself and also await other possible tributes from readers. If we raise enough money ... a dog can be named after her. In the meantime, I await the response with interest!

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

Mystery Receiver?

Dear Sir
With reference to the letter about a mystery receiver on your 'Letters' page in *Practical Wireless* March. I think that it's the *PW* Epsom general coverage receiver (1970s), the speaker was in the separate power supply (see enclosed). I enclose all the information I've got. So maybe you can find the article in your files.
Gary Sparks G0VHW
North Lincolnshire

Editor: Thank you Gary.

The Great 'Morse Debate' Continues onwards....

Dear Sir
On the subject of licensing A or B ... "Oh no, not another one of those c.w. letters"! I hear you cry. Well, yes and no, actually more to do with class distinction, either real or imagined. Firstly, have you ever noticed how it is only 'B' licensees who ever mention it?

To be honest, I find that 'A' licensees are as willing to talk to us humble 'B' licensees as any other. (There you go, now I'm at it!) I have also found that it is 'A' licensees who are willing to help me in learning Morse and improving my reading and sending speeds.

If there is a class distinction, don't they deserve to consider themselves better? After all, didn't they have to work hard to obtain the privileges that they enjoy? Isn't it these privileges that the anti-c.w. protesters are wanting for themselves without having to do any work for them? Surely, if Morse testing were abolished - giving everybody access to the h.f. bands (or as I heard it said "a licence in a cornflake box") it would only lead to a greater rift in our community? These 'Old Timers' or even relatively new 'Timers' would surely feel some resentment towards those to whom the licence was just handed. I can only see doom on the horizon. Can't the authorities see - it's not the Morse test that is causing the demise in our hobby, but the computer and the Internet - referred to recently as "the rich man's CB".
Nigel Booth M1DKN
Norfolk

And On.....

Dear Sir
A Morse test is now an unnecessary hurdle to getting into Amateur Radio. It was obviously needed when high powered spark gear was the order of the day. Anyone producing a lousy signal today would get hounded off the air.

Why test for 12w.p.m. Morse proficiency when no one can manage c.w. QSOs at that speed when they first get on the air anyway? No way! When first licensed, I had access to all the bands but was very much a novice that first year! Did anyone mind how inept I was? Not a bit of it. They were very helpful, because my callsign was new.

Radical revision is needed. By all means test Morse ability for those who want to use it but they must then be given mandatory sub-bands to use it in. "Gentlemen's agreement" band plans are disregarded by many.

Scrap Novice and 'B' class licensing and have reduced power for everyone for the first year! Maybe use /L after the callsign to indicate learner status? To lose this suffix, everyone must then pass an 'end-of-year' 'L' check. This would test the operator's ability to tune-up and operate their own rigs and log contacts correctly. Is there a wavemeter and can it be used correctly? These tests would not take very long to carry out either.

I realise, home visits for the tests would not be easy to implement. However, the RSGB runs the Morse tests very well and could arrange teams to do these practical tests? Yes, the integrity of the examiners would be high. So, use certificated old timers and no fees. Travelling expenses for testers of course, but paid by the test administrators. The RSGB should do all this and set the written exams, in my opinion.

The present exam/licensing system discriminates against the disabled, the elderly and house-bound who really need Amateur Radio as their hobby. Youngsters use the Internet and Cellnet for their 'easy-to-come-by' thrills, so something must be done to encourage entry to our hobby. Sensible licensing with cheaper, more realistic and easily available exams would be a beginning.
M J Street G3JKX
Shropshire

Dear Sir
During the Bosnian crisis I picked up the following c.w. message on 14MHz: "SOS, SOS, SOS. This is G0RAZDE. We need help. Please inform United Nations. SOS, SOS, SOS".

At the time, the town was under heavy shell fire with many buildings destroyed and power supplies cut off. The call was picked up by many Radio Amateurs and passed to the authorities.

More recently, a Doctor from a Nottingham hospital (who is a Radio Amateur), was on holiday in Australia with a group of friends. Their vehicle broke down in the Outback, about 100 miles from the nearest habitation. After several unsuccessful attempts to call for help using the telephone, they realised that the radio was faulty. Calls were then made using c.w. and these were picked up by a pilot from the Flying Doctor Service who said that c.w. was redundant!?
Brian Jones
Nottingham

Undisciplined Class B?

Dear Sir
I write in response to Nigel Booth's recent letter in your columns ('Letters', April). Nigel seems to imply that class 'B' licensees are an undisciplined lot, who, because of this, should be denied access to the h.f. bands.

I am willing to concede that there is a small minority of Amateurs, and not just class 'B' licensees, who do not observe band plans on v.h.f. or, for that matter, any other band. Examples of bad operating practice are not only the

preserve of the v.h.f. amateur band, try listening to the h.f. bands during a contest! Clearly the 'code test' does not prohibit idiots from gaining access to the h.f. bands and disturbing the enjoyment of others.

On the topic of the Morse exam and access to the h.f. bands I have to say that in Scotland, juries and the Judiciary have three options open to them. In addition to 'guilty' and 'not guilty' - they have a third choice of 'not proven'.

I am of the view that the 'not proven' verdict is the most appropriate at this stage of the debate.

Colin Topping
Fife

Round Three.....! (Howes versus Pemberton)

Dear Sir

With regard to Ray Howes' letter in the April edition, I respectfully request that he read my letter (January 'Letters') again. It is not me who is trying to "widen the goal posts" but the goal posts are being moved by the changing method of emergency communications, etc.

I said: "On shared bands we could be required by the primary user to move or stop transmitting. The given mode of passing this information to us was to be Morse code. Therefore it was then essential that we had to be proficient in its use".

There were no other reasons for a Morse test to be instigated. The 'B' license came about because there would be no requirement for us to be moved from using even shared frequencies on v.h.f./u.h.f. bands. This is now exactly the same situation that exists on h.f. today.

To perhaps overstate the obvious, if we are no longer being required to obey instructions given to us by way of Morse code, then there is no need to learn it as a compulsory obligation. Therefore, there is no longer a requirement for a Morse test. If there is no longer a requirement for a Morse test, then it would be hypocritical to advocate the withholding of access to h.f. from the 'B' licence holder.

Ray may have let the 'cat out of the bag' when he talked about "... to rip out the requirement for a Morse test for an 'A' class licence ...". There still seems to be a need for some, to try and promote a hierarchy in Amateur Radio. At the top of this heap would presumably be the Class 'A' licence holder. Proclaiming their superiority by flourishing their pass certificate on every occasion. Fortunately, these are not in the majority but all the same, they are very vocal in the defence of their station in life.

Malcolm Pemberton G6DAY
Surrey

Editor's comment: To round off this month's debate - and writing from the position of 'referee' - I must ask readers to 'fight' cleanly and with the pen and ink only. No vitriol! It's possible to get your point over very efficiently without our letters pages becoming a verbal battlefield. Please continue the debate - but please also remember that Amateur Radio is a hobby we should enjoy. I don't wish to 'hold over' letters that are becoming too 'personal' but I will do so if things get out of hand. Although our hobby is truly wonderful and absorbing ... it's all too easy to take things too seriously as the cartoon (below) from the June 1963 issue of *The Short Wave Magazine* graphically demonstrates!

Lisle Street Memories

Dear Sir

What memories the 'Lisle Street ... Radio's Memory Lane' article by **Peter Hyams GW4OZU** brought back. When I was a young man, myself and a friend used to cycle up to the city of London from Lewisham in the south east suburbs, just to look in the shop windows at all their ex-services radio equipment. The displays were wonderful, in fact works of art! We would cycle round all the surplus shops stopping and looking, eyes glued to the window, never went into the shops though ... as the equipment was so expensive.

I started work in 1950 and it was my soul aim to purchase an R107, my heart was set on it. It was the sheer size of the R107 - power went with size in a young man's imagination. It took me 12 months to save up the required £30 to purchase one, it was a lot of money - my wages were only £2 8s per week!

The great day came, I caught the train to Charing Cross Station, made my way to the particular surplus shop. On entering, you went into a smokey, burnt out transformers, acid-like smell ... and made my purchase of the R107T, complete with valves and a spare set of valves. When surplus equipment was offered in those days it more often than not came without valves.

Now the part that amazes me today is the fact that on purchase, I carried the R107T to Charing Cross Station and bought it home on the train. I have a job to lift it now! I still have (and use) this R107T for short wave listening and it has pride of place in my vintage shack.

Enclosed are some photos of the R107T and my shack.

John Easterbrook
Isle of Sheppey

Editor's comment: Thanks for sharing your memories John. And wow ... what a collection! From your (reproduced as a composite) photographs I could see an AR88, 18 Set, various Hallicrafters, HRO, Eddystone, Racal and KW equipment. Very impressive and nostalgic John.

Dear Sir

I read with interest the article by GW0ZU in the April issue of *PW*. In the 1950s, I spent hours looking around Lisle Street for government surplus bits and pieces. My first radio was an ex-RAF 1155 receiver, also I think an army radio Wireless Set 18. I also converted an oscilloscope for checking line and frame sawtooth timebase waveforms on the old 405 lines TV sets. Why is it, I wonder, that you never see surplus gear nowadays? These were the days when *PW* and *Practical Television* each cost one shilling (5p), both edited by F. J. Camm - happy days.

I was also interested in the article by G3XFD ('Radio Basics', May) about introducing a b.f.o. into an a.m. short wave receiver. I believe Ten-Tec used to market a kit for 455kHz converter coupled receiver and to resolve s.s.b. and c.w.

Finally, on the subject of Morse again - lets learn it. At the moment I am happy on 430MHz (as 2E1GYN) hoping to go for a full licence one day. I did have a CB for a few years but some of the nonsense and swearing over the air put me off. One good thing about the NRAE and Morse exam, it does keep some of the 'nanas' out. In closing, I would like to say the magazine is great, I like the old memory articles - keep them coming.

W G Ashley
Essex

Editor's comments: Thanks for your memories. Along with the hundreds of thousands (allegedly!) stored First World War 'Mule Boots' (you never know when they might come in useful again, kept by the Government I've no doubt there's still some Second World War equipment in hiding. Time will tell!

NEWS

COMPILED BY JO WILLIAMS

Headline News

Step Into The Spotlight Competition

A brief reminder to all Clubs and Societies that the 'Spotlight' is on again! Just in case you missed the entry on page 6 of the April issue of *Practical Wireless*, it's that time of year again where we invite you to enter your Club magazines into the **1999 *Practical Wireless* & Kenwood Club Spotlight Magazine Competition**.

Local clubs entering will be competing for the original trophy which was kindly donated by Kenwood - and **national clubs** will be competing for the 'Bert's Bell' Award, instituted in 1997 as a tribute to the late Bert Newman G2FIX.

All you have to do in order to take part in this competition is to send in to us **three most recent copies** of your club magazine and a covering letter. The covering letter should make it clear **which category of club you would like to enter your magazines into**. (For example, the **Benelux QRP Club** - winner of the 1998 national award, can only enter as a 'national club', whereas the **Crowborough & District ARS** - last year's winners of the 'local club' category, now have to specify that they are a local club).

Your covering letter should also contain the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired); how long the magazine has been established; how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel this year will include: **Jim Bacon G3YLA, David Barlow G3PLE, Tex Swann G1TEX (*PW* Technical Projects Sub Editor), Dave Wilkins G5HY** and **Rob Mannion G3XFD. Entry to the competition is open now and all entries should reach the *PW* offices in Broadstone no later than Thursday 1 July 1999.**

Make sure that your club's entry reaches us in good time by sending it to **Joanna Williams, Club Spotlight Magazine Competition, *Practical Wireless*, Arrowsmith Court, Broadstone, Dorset BH18 8PW. The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into**. Good Luck to all who take part!

Calling All Courses!

Just to let you know that in the **September 1999** issue of *Practical Wireless* we will be publishing our annual **RAE Courses List**. So, if you're a representative from a club, college, examination centre or a course tutor that's running an **RAE, Novice RAE** or **Morse course** (from September of this year) and you feel it would benefit from some advertising on our pages then please send in details of the course, **clearly marked 'RAE Course Info' to Joanna Williams (*PW* News & Production Editor), *Practical Wireless*, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**, or you can **E-mail: jo@pwpublishing.ltd.uk**

In order for your course to make it on to the September pages, you will have to get any details to me by the **15 July 1999**. The sort of details that I will need include **where** it takes place, **who** is running the course, **when** it will commence (what date) and **any contact details** where people can get some more information and/or enrol.

This will be the ideal opportunity for you to advertise your RAE Course - so don't miss out!

A Commercial Appointment

The **Radio Society of Great Britain (RSGB)** have been in contact with the *Practical Wireless* news desk concerning the appointment of their new Commercial Manager - **Barry Cooper G4KRO**. Some of you may recognise the name, as Barry G4KRO was General Manager of **Yaesu UK** for four years and no doubt some of you would have come into contact with him over your Amateur Radio career.

The RSGB say that Barry will be responsible for developing the various income streams of the Society which will include membership subscriptions, publication sales, sales of the Society's news-stand publication *Radio Today* and advertising income.

Peter Kirby, RSGB General Manager, has commented on the appointment: "I am pleased that Barry is joining us. He has excellent experience in both marketing and Amateur Radio and will bring increased focus and professionalism to our commercial activities". Barry himself has said that "There is a big task ahead to ensure that the RSGB has the income stream growth to fund its increasing range of membership services and I look forward to working with Peter Kirby and his team to do this".

Marconi's Radio World First

Marconi Communications have been in contact with *Practical Wireless* concerning their celebration of the 100th birthday of the global information age. They say that on the 27 March 1899, Guglielmo Marconi sent the first radio message from one country to

Princess Elettra, daughter of Guglielmo Marconi and Kim Dennis, Female Engineer of the Year, celebrate the 100th anniversary of the first transatlantic radio message at the South Foreland Lighthouse on 27th March.

Nevada's Comet

Nevada have announced the introduction of a new Tri-band 50/144/430MHz mobile antenna from **Comet antennas** in Japan - the **Comet SB15 Tri-band mobile antenna**.

They tell *Practical Wireless* that it gives 2.5dBi@50MHz, 4.5dBi@144MHz and 7.2dBi@430MHz. It is 1.53m long and can handle up to 120W on all bands.

The SB15, Nevada say, is an ideal match for the numerous v.h.f. plus 50MHz radios that are on the market and they say that it will sell for **£44.95**. If you would like some more information on this or any other Nevada products, please contact them on **Tel: (01705) 698113, FAX: (01705) 690626, 189 London Road, North End, Portsmouth PO2 9AE**. Look out for the review in next month's *PW*.

another using Morse code and to celebrate this, the transmission was recreated by members of the **Barry ARC (BARS)** who were dressed in period costume, (you may remember **Glyn Jones GW0ANA** and his fellow Radio Amateurs from a news item in the January 1999 news pages) on the 27 March 1999 and was witnessed by none other than Marconi's daughter, **Princess Elettra Marconi**.

The **GB100SFL** station was given the full co-operation of the **National Trust** and sponsorship came from Marconi Communications who said that "Today's information society has everything to thank Marconi for; although there were land-line communications before his crucial transmission 100 years ago, it was the unlocking of the airwaves ... that made mass communication between continents a reality".

All Change!

Practical Wireless received some important information from **Robin Sykes G3NFV** concerning a change of name and address of his company. With effect from the **1 June 1999**, **Sycom/Sycom Components/Syon Trading** will combine under the one name: **Sycom**.

The new address will be: **PO Box 148**, **Leatherhead**, **Surrey KT22 9YW**. The telephone number will stay the same, (01372) 372587 and the FAX number is (01372) 372587.

Someone will be available to answer the 'phone between 0900-1300 and 1400-1730, Monday to Friday, an answer phone will operate outside these hours.

WACRAL's Web Site

The **World Association of Christian Radio Amateurs and Listeners (WACRAL)** has been in touch with *PW* to tell us all about their brand new Web site which can be found at: **http://www.wacral.org**

The association tell us that it features "... information on their organisation and activities, net frequencies, extracts from newsletters and links to other Christian and Amateur Radio pages, including a callbook". They go on to say that the "... intriguing story behind the c.w. code '501' is given". So, why not take a look?

Still with WACRAL, we also received another press release from them concerning their new Awards which they have brought out. They tell us that there are 18 different awards which are now available for people contacting or hearing members of WACRAL. This new awards scheme is open to members and non-members of WACRAL and offers a series of certificates to both 'A' and 'B' licensees and to s.w.l.s. You can see an example of one of the certificates below.

There are a Bronze, Silver, Gold, Emerald and Diamond categories but an initial Basic Award can be obtained by working just ten WACRAL members (only five for 'B' licensees).

There is also a 'Heavenly Pilot Award' for confirmed QSOs with WACRAL 'Reverends' who may be either full time ministers, pastors or officers in the Church or Salvation Army and finally a DX award. Regular net frequencies worked by WACRAL members include 3747kHz at 0800 and 7047kHz at 1400 on Sundays.

If you would like more information on these awards please contact **Geoff G4YJW, 47 Northiam Road, Eastbourne, East Sussex BN20 8LP**. **G4YJW@GB7EBN**.

Southdown Success

Southdown Amateur Radio Society (SARS) have sent an interesting news item to the *PW* news desk, to tell us all about the success of one of their young, budding Radio Amateurs - **Kate Glover M1DRB** - who passed her Radio Amateur Examination (RAE) at the age of 13.

The SARS members tell us that Kate joined the society in September 1995 and embarked on their Novice licence course and went on to pass the Novice examination in May 1996 and was allocated the callsign: 2E1FHD.

Kate was always present at the SARS regular competitions and special events and in 1998 she began to study for the RAE. The SARS members say that she had a lot of support and encouragement from other members of the club and in December 1998 she finally achieved her goal and operates as M1DRB.

Well done Kate! As SARS say, "Age (or lack of it) is no barrier to members of SARS'. They go on to say that Kate was elected to the committee in May 1998 to represent the interests of Novice licensees which they say she still continues to do! Kate is now determined to get herself an 'A' licence - so all here at *PW* wish her the very best of luck!

Can You Help Please?

We received a 'plea for help' from a reader, **Chris Head**, who says that his father, **Peter Head G4BLG**, has a defective **Icom IC-255E 25W f.m. transceiver**. Can anyone suggest where he could lay his hands on a **service manual** for this particular model, or do you, yourself, have one which you wouldn't mind selling or loaning to him?

Chris tells us that Icom UK were unable to help on the matter and that his father doesn't know what else to do about it but would be extremely grateful for any help given.

If you feel that you can help then you can contact Peter Head

Kenwood's New Newsletter

A surprise was to land on the 'Welcome Mat' here at *PW* in the form of a brand new newsletter from the **Kenwood** camp! It seems that Kenwood have taken steps to ensure that dealers, Amateur distributors and - probably most importantly - Kenwood staff, are kept up-to-date with the things that they are involved with.

The first copy of ***Transmitter*** - 'News From Kenwood Communications' , has a number of interesting items including an introductory piece by **Mike Atkins,** Sales & Marketing Director for Communications at Kenwood, an item on the Puckrup Hall Conference and a host of new product information.

Also covered in the *Transmitter* is an item about **Earth 2000**, a project which Kenwood have announced that they are sponsoring. They will be supplying all the communication gear needed for this widespread project in aid of saving endangered species and environments.

In the year 2000, there will be 13 one-hour long TV programmes broadcast to every country with a terrestrial TV system and these programmes will incorporate "... a high tech, action adventure format with an appeal for action over endangered species and threatened environments". There will also be a "huge" Internet event and a multi-venue music event.

NEWS

COMPILED BY JO WILLIAMS

G4BLG at **19 Brodrick Grove, Abbey Wood, London SE2 0SR**. Alternatively, you could E-mail Chris: **chrishead@tesco.net** Chris said that his father is prepared to cover any costs incurred by persons helping.

*South Normanton - North ... Not South!

A rather red-faced *PW* Editor arrived at the **South Normanton, Alfreton & District Amateur Radio Club** in North Derbyshire on the evening of Monday 29 of March. Why the red face? The answer is simple...Rob Mannion G3XFD had temporarily forgotten that South Normanton is actually in North Derbyshire, heading towards the Yorkshire border rather than South Derbyshire!

Arriving at the SNA&DARC to a very hearty welcome Rob - fortunately not late because the M1 motorway was clear of heavy traffic - apologised to the large gathering for keeping them waiting from 1998 when he'd had to postpone the visit due to having to go into hospital himself, and that he'd also confused **South Normanton** with **Normanton** on the southern outskirts of Derby...only five minutes drive from his overnight accommodation. Fortunately, realising his mistake he was then able to take advantage of the good roads to recover from his temporary lapse back to his normal encyclopaedic sense of direction aided as always by following old railway lines to the proper destination well over 30 miles up the motorway!

"I should have had a good reminder - being a railway enthusiast" commented Rob wryly "when I saw directions on the club details describing the route to the club from Mansfield, with references to the Alfreton & Mansfield Parkway Railway Station which serves **Northern Derbyshire and Nottinghamshire**. But at least it gave everyone a laugh and we started on time thanks also to one of the members, **Brian Cooke G7TYP**, for being kind enough to 'pilot' me from the M1 to the community centre, thus saving a few more minutes"!

Despite the confusion, the evening was a very great success indeed with Radio Amateurs, short wave listeners and their families attending from Derbyshire, Nottinghamshire and Leicestershire. Welcomed by **Russell Bradley G0OKD** on behalf of the Club, Rob provided his talk '*Practical Wireless*, Origins, Past, Present & Future' which was followed by an interesting 'Question & Answer' session.

The evening was rounded off by an amusing photographic session where the large numbers attending tried to squeeze into the photographer's field of view. The excellent buffet which followed disappeared extremely rapidly - so quickly that by the time Rob had taken extra insulin most of it had gone and he was forced ("honestly' he says!!) to eat jam tarts to compensate...not that he needs an excuse to try something normally off his diet!

The formal part of the evening ended with a presentation of £50 to Rob to pass on to the **Radio Amateur Invalid & Blind Club** (RAIBC), on behalf of the SNA&DARC in appreciation of G3XFD's visit.

As often happens at the *PW* Club visits, the meeting 'over ran' because everyone wants to chat. So, before Rob left he had to apologise to the Community Centre Caretaker for keeping her up late, before heading to Melbourne in South Derbyshire and his own bed.

"It was a truly superb evening" Rob reports "I had a marvellous time, we really had much to talk about and they were such a friendly bunch from many different clubs and there were some interesting comments, 'thank yous' and suggestions for article ideas in the *PW* 'Comments Book' (which accompanies G3XFD on the visits). Rob says he's looking forward to visiting the club again some time and at least he'll know where to go next time!

Further details on the South Normanton, Alfreton & District ARC , and the video-tape recorded during the evening, can be obtained from Russell Bradley G0OKD at: **42 The Croft, South Normanton, Alfreton, Derbyshire DE5 7BP. Tel: (01773) 863892**.

Universal Catalogue?

Universal Radio Inc. have been in touch with *Practical Wireless* to tell us all about their brand new ***1999 Communications Catalog***. They say that all 120 pages of this new catalogue covers equipment for the Amateur, short wave and scanner enthusiast and carries, what they say is an "impressive" selection of antennas, headphones, books and accessories.

Universal Radio Inc state that there are several new items which are premiering in this catalogue. These items include the **Sony ICF-SW07** portable receiver, the **Icom IC-R75** communications receiver, the **Icom IC-PCR100** wide-band computer receiver, the **AOR AR7000B** wide-band communications receiver, the **Grundig YB-300PE** portable receiver, the **Kenwood TH-D&A** 144MHz amateur hand-held and the **Icom T81A** 50/144MHz hand-held.

The company claims that the 1999 catalogue is their biggest yet and is available **free** on request if you send five International Reply Coupons (IRCs). The address is **Universal Radio Inc., 6830 American Parkway, Reynoldsburg, Ohio 43068-4113 USA**.

Ongoing Novice Classes

The *Practical Wireless* News desk received a plea from **Eric Eastwood G1WCQ** of the **Preston Amateur Radio Society** who asked if we would advertise the fact that their Novice classes at the Preston ARS are ongoing. If you are interested,

the venue is the **Lonsdale Sports & Social Club, Fulwood Hall Lane' OFF of Watling Street Road, Fulwood, Preston**. The classes are held **EVERY Thursday** evening from **1845-2000**.

Eric goes on to say "I take any age group ... The cost of the course - for text books, pass certificate, notes folder and City & Guilds exam fee, with the cost of the 'Course Radio Kit', is approximately £40". I'm sure that Eric would like to hear from anyone interested so why not give him a ring on **(01772) 686708**?

Charitable Contacts

Alan Gardner of the **Brickfields Amateur Radio Society** has been in touch once again with another of their Special Events. This time, it was in aid of a special charity - **Red Nose Day**.

This "Red Nose Event" took place on Friday 12 March. The photograph you see here shows Ricky, Alan and Fred who were just three of those who took part in the Special Event.

Alan tells us that they only transmitted for four and a half hours with GB0RN and that UK stations were relatively quiet. He said that they gave a few red nose 'squeaks', but only made 55 contacts altogether. However, the sponsorship money helped to raise cash for the charity. Congratulations to Brickfields ARS! Keep up the good work.

Optional Special Prefixes

We have had news from the **RSGB** telling us of some special prefixes for Scotland and Wales in recognition of the elections on the 6 May for the Scottish Parliament and the Welsh Assembly.

During the period **6 May to 31 July**, the RSGB tell us that the **RA** have agreed that anyone operating in Wales and Scotland may change their prefix as follows: In Scotland, if your current prefix is **GM** then you can opt to use **2S**, those of you who use **MM**, can opt to use **2A** and those of you who use **2M** at the moment, can opt to use **2T**.

For those operating in Wales, if you use **GW** now, then you can opt to use **2C**, if you use **MW**, you can opt to use **2X** during this period, or if you use **2W**, then you can opt to use **2Y**. These are only optional and are for use in the period 6 May to 31 July only.

Lowe's Latest Literature

The *Practical Wireless* News desk have received news from **Lowe Electronics** who tell us about their latest catalogue. As you may be able to see from the picture of the front cover, it is a neat catalogue which details all the products which are available from them, including various products needed for communications, Amateur Radio, GPS navigation, short wave listening, Air band radio, scanners and weather monitoring.

Lowe state in the introduction of the catalogue that their 30 years of experience has enabled them to build on their reputation for "service and value" in everything they do. They claim that you can rely on them for "solid, impartial help and advice when it comes to choosing and using the new range of products we have to offer".

Lowe's products, they tell us, come from all over the world and they say that they have agents in the Far East, North America and Europe who are "constantly on the look out for new and innovative products". To get your hands on a copy of Lowe's new catalogue why not call them on **(01629) 580800 or write to them at Chesterfield Road, Matlock, Derbyshire DE4 5LE. Or you could E-mail them at: info@lowe.co.uk They have a Web site at: http://www.lowe.co.uk**

Bradford Council Now QRT?

PW received a letter from **Colin Evans M1BUU/M0CGH** who happened to see and photograph this Bradford Metropolitan District Council van. He found the wording on the side extremely humorous and would like the *PW* readers to be able to join in the joke. All here at *PW* wonder if Bradford Council would appreciate the irony here?

News Flash!

For **one month only**, all **books** from the *Practical Wireless* Book Store will come with **FREE P&P** (UK only). All readers wishing to take advantage of this very special offer should quote **PW699** when placing an order. But hurry! You can't afford to waste any time - the offer is only open until the **10th June 1999**!

RADIO DIARY

May 16: The Ripon & DARS are pleased to announce that the Northern Mobile Rally will take place at the Great Yorkshire Showground. There will be all the usual stalls, talk-in, Bring & Buy, free car park, disabled access, etc. Details on **(01765) 640229** or E-mail: **gerald@bronco.co.uk**

May 16: The Mid Ulster Amateur Radio Club Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open to the public from 1200. Traders will have access from 0900. **Jim Lappin GI0OND** on **(01762) 851179**.

May 16: The Dunstable Downs Radio Club will hold their 16th Annual National Radio Car Boot Sale at Stockwood Country Park, Luton, Bedfordshire. Doors open 0900 till 1500. Talk-in on S22. For a booking form to be sent, please write to **DDRC, PO Box 4053, Dunstable, Beds LU5 5ZJ** enclosing an s.a.e., FAX enquiries to **(01525) 383898** or E-mail: **ddrc@magstripe.demon.co.uk**

May 23: The Three Counties Radio & Computer Rally is to take place at the Perdiswell Leisure Centre, Bilford Road, Worcester. Full restaurant services from 0700, licensed bar from 1100. All traders in two adjoining halls, easy access to the halls (ground level) and convenient parking for traders. There will also be free parking for 900 cars and coaches. Being close to the City Centre, wives and children can spend a pleasant day in historic Worcester sightseeing and shopping, etc. **William E. Cotton G4PQZ** on **(01905) 773181**, for FAX please ring first.

May 30: The Plymouth Amateur Radio Society are holding their rally at the usual venue, which is at the Plymouth College of Further Education, Kings Road, Devonport, Plymouth. Doors open 1030 till 1430 and admission is just £1. There will be the usual traders, plus Morse testing on demand. The venue is large and spacious with ample free car parking. The display halls have plenty of room for visitors to mingle and browse. There is also a large canteen serving freshly cooked light meals and snacks at reasonable prices. Plymouth City Centre, the Hoe, and many major attractions are close by for the family. Signposting will be from the Manadon Junction on the A38 Devon Expressway, and there will also be a talk-in on S22. More information on **(01752) 662051**, during office hours.

May 30: The 23rd East Suffolk Wireless Revival, the Ipswich Amateur Radio Rally will be taking place at the Hollies Sports and Social Club, Bucklesham Road, Ipswich. Directions to get there are as follows: From the junction of the A14 and A12 east of Ipswich, follow the A1156 for just under one mile, turn right at the ESWR sign. Grid reference TM223422. Rally opens from 1000 (0930 for disabled visitors) until 1600. Vehicles for the large car boot sale will be admitted from 0800. Talk-in on S22. For further details contact **Sam Jewell G4DDK** on **(01394) 448495** (home) **(01473) 644520** (work), or E-mail: **jewell@btinternet.com**

June 6: A Radio Rally is to be held at the Medstead Village Hall, near Alton, Hampshire. Doors open 1000 and admission is just £1. Refreshments will be available and there will also be a Bring & Buy. More information from **Derek G0NFA** on **(01420) 22018** or **Chris G0WYF**, E-mail: **chris@g0wyf.freeserve.co.uk** or check out their Web site, which will be updated with any fresh information, at **http://www.g0wyf.freeserve.co.uk**

June 6: Spalding & District ARS are holding their annual rally at the Springfields Exhibition Centre, Spalding, Lincolnshire. Doors open 1000. This is a Radio, Electronics and Computer Rally and includes a 'Car Boot' area. Ample parking available on-site. Talk-in station G1DSP and refreshments will be available. Admission £1.50, overnight camping available if required. Contact **Ray Pearson G8ELV** on **(01775) 711953**.

June 13: The Elvaston Castle National Mobile Radio Rally are holding their rally at Elvaston Country Park, on the B5010, five miles south east of Derby. Further details from **Brian** on **(01332) 751412** or contact **Stuart** for trader enquiries on **(01283) 537778**.

June 20: The Newbury & District Amateur Radio Society will be holding their 13th Annual Amateur Radio Car Boot Sale at Cold Ash playing field, near Newbury. Sellers/Traders should arrive by 0800 as the sale is open from 0900 till 1500. **Ian Trusson**, Secretary, on **(01635) 826019**, E-mail **g3rvm@compuserve.com**

June 20: The Bangor & District Amateur Radio Rally will be held at the Clandeboye Lodge Hotel (formerly known as The George) just outside Bangor. Doors open between noon and 1600, with disabled access from 1130. All the usual radio and computer dealers will be in attendance, as well as the portable station GI3XRQ/P, should you wish to try before you buy. Full restaurant (may be wise to book as it's Father's Day), bar and bar snack facilities will be available and there is ample car parking. Talk-in will be on S22 and doors open at noon. Further details available from **Keith Stevenson** on **(01247) 884635**, E-mail: **gi0ssa@qsl.net**

June 20: The Mansfield ARS are holding their annual Radio, Computer & Electronics Car Boot Sale at Debdale Lane Sports and Social Club, Debdale Lane, Mansfield Woodhouse, Notts. Open from 0930-1400, bar and refreshments and ample parking available. For more details contact **Angela** on **(01623) 429218**, E-mail: **g6cuk.force9.co.uk** for the latest information, there's a Web site at: **http://www.g6cuk.force9.co.uk**

June 27: The Tir Conaill ARS (Ireland) are holding their annual Radio & Computer Fair in Jackson's Hotel, Ballybofey, Co. Donegal. Doors open at noon. There will be all the usual trade stands, with some new ones, a Bring & Buy stand and free parking will be available at the Hotel. Refreshments will also be available. **Gerry EI8HO** on **(072) 52598** (home) or mobile on **(086) 8391305.**

June 27: This will be the 42nd consecutive Rally at Longleat House. This large trade show, housed in five huge marquees, is a major attraction for all Radio, Computer and Electronics enthusiasts. The Craft Fair will once again be there, and there will be plenty of on-site catering. All enquiries and bookings to **Gordon Lindsay G0KGL** and his wife **Maureen**, with **Ron Ford** dealing with matters not directly affecting Traders. The combined telephone and FAX number is **0117-940 2950**.

July 4: The 10th York Radio Rally will be held in the Knavesmire Building, York Racecourse, York. Doors open 1030 and admission is £2. Children accompanied by adult free. There will be ample free parking. Features include Amateur Radio, electronics and computers, Morse tests and repeater groups. Refreshments will be available and a licensed bar, too. Talk-in on S22. **Pat Trask G0DRF** on **(01904) 628036**.

July 11 The 19th Sussex Amateur Radio and Computer Fair will take place at the Brighton Race Course from 1030-1600. There is free on site parking and admission is £2. The rally is one of the largest in the South of England with well over 100 trade stands covering Amateur Radio, Computers, Electronics, etc. There will also be a large Bring & Buy display area, refreshments and bars at reasonable prices, a picnic area with views over the South Downs. Further details on **(01323) 485704**.

July 18: The 16th McMichael Amateur Radio Rally and Car Boot Sale is being held at The Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Doors open at 1000 and admission is £1.50, car boot pitches are £10 on the day. There is free parking on-site, food, tea and coffee served and a licensed bar. The Thames Valley Packet BBS Group and the Berkshire Downs Repeater Group will also be in attendance. Talk-in on S22 GB6MMR. **Dave Chislett G4XDU** on **(01628) 625720** or E-mail **g4xdu@amsat.org** Trade enquiries and bookings should be made to **Min Standen G0JMS** on **0118-972 3504**, E-mail: **mins@clara.net**

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

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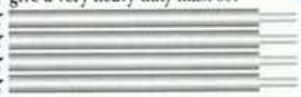

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Digital Signal Processing In A Nutshell

Looking at the W9GR DSP Filter Kit

Digital signal processing (DSP) comes fitted as standard in many new Amateur Radio transceivers. But what if you've got a rig which - apart from the lack of DSP - you're quite happy with? Rob Mannion G3XFD thinks he's got the answer and he calls it 'DSP In A Nutshell'!

There must be many other Radio Amateurs - who, like myself, are quite happy with their present transceivers. But on the other hand, with the truly diabolical levels of interference (some deliberate I'm afraid) on the amateur bands, I've no doubt that they, like me, would very much prefer to have DSP available 'at the push of a button'.

Well, I'm pleased to say that there's now a kit (ready built for you if you prefer) that I think can claim to (almost) be 'DSP In A Nutshell'. It really is small - measuring only 152mm deep (excluding the two small front panel knobs), 137mm wide and 38mm high. So, now having perhaps tempted you - let's take a look at the W9GR DSP-III kit which is built using standard miniature components.

The W9GR DSP-III Filter Kit from Sheldon Hands at Hands Electronics. The front of the DSP-III is shown here with an integrated circuit which proves that the DSP-III really is 'DSP In A Nutshell'!

Small Package & Big Results

From experience, I can tell readers that the unit (I had a ready made up kit) really is a "small package with big results". The publicity information with the kit states it's an "improved low cost digital signal processor for radio communications use" and like the adverts says, "it does what it says on the box".

The DSP-III features 18 main DSP functions (**however, for the purposes of this review I'll concentrate on the c.w. and s.s.b. modes**), a light emitting (l.e.d.) display and 13 bit audio precision coding. In use, the operator can choose to connect the unit either between the receiver audio output and the loudspeaker (3.5mm jack sockets on the rear - see **Fig. 1**) or to plug headphones into the 3.5mm jack socket on the front panel. (I tried both methods).

An external power supply providing 12V d.c. is required. The supply is connected via the standard coaxial plugs found on everything from hand-held transceivers right up to cordless battery powered drills. I tried the unit with 13.8V (stabilised) and a 'budget priced' battery eliminator with no ill effects.

Connections are quickly and simply made and as the DSP unit is so small it can sit on top of a transceiver such as my Alinco DX-70. In fact, when I used the DSP-III in my car I was able to slide-fit it in the very narrow gap between the passenger seat and the hand brake unit. With the l.e.d. display and front panel controls facing upwards ... it proved to be very convenient.

The front panel controls, from left to right are: **Mode switch (S3)**; this 16 position rotary switch selects the DSP-III unit's operating mode.

On/Off switch (**S1**): This switch turns the power on and off. When the switch is pushed in, the power is **On**. When it's out, the power is **Off**. When the DSP-III is turned off, the audio input is connected to the audio output. This will effectively bypass the unit when the power is off.

In/Out switch (S2): This switch enables or bypasses the DSP function. When this switch is pushed in, the output signal will have been digitally processed. When the switch is in the 'out' position (Off) the DSP functions are by-passed and the signal only passes through the analogue speaker amplifier.

The switch does not affect the l.e.d. front panel display. The bank of l.e.d.s will continue to indicate the relative level of audio or decoded tones (depending on the setting of the **Mode Switch**, **S3**).

Audio Frequency (**AF**) gain control: This controls the audio output level from the DSP unit to either the front panel headphone socket or the rear mounted loudspeaker socket.

The 10 segment l.e.d. provides a bargraph display. In most of the operating modes it displays audio level of the peak reading type with a delayed recovery characteristic. Each section of the bargraph represents a 3dB change in audio level. The maximum input level without clipping is 5V peak-to-peak, which is approximately 1.8V r.m.s.

Eighteen Functions

The 18 DSP-III functions include:

1. Simultaneous noise filter (QRN reducer) and automatic notch filter with selectable a.g.c.;
2. Optimised noise filter (QRN reducer) with selectable a.g.c.;
3. Optimised automatic notch filter with selectable a.g.c.;
4. 2.1kHz narrow voice FIR filter;
5. 1.8kHz narrow voice FIR filter;
6. North American RTTY filter (2.125/1.445kHz);
7. European RTTY filter (1.275/1.445kHz);
8. Packet (h.f.) filter (1.6/1.8kHz);
9. Slow Scan TV (SSTV) filter (1.2-2.3kHz;
10. Decoder for DTMF with tone playback memory;
11. Decoder for CTCSS and squelch with tone playback memory;
12. 400Hz c.w. filter (100Hz bandwidth);
13. 400Hz c.w. filter (50Hz bandwidth);
14. 600Hz c.w. filter (100Hz bandwidth);
15. 750Hz c.w. filter (200Hz bandwidth);
16. 750Hz c.w. filter (100Hz bandwidth);
17. 750Hz c.w. filter (50Hz bandwidth);
18. 1kHz c.w. filter (100Hz bandwidth).

Note: All the c.w. filters are tuneable to operator's preferences (by internal link removal. Fully documented instructions are provided with the kit/ready made unit).

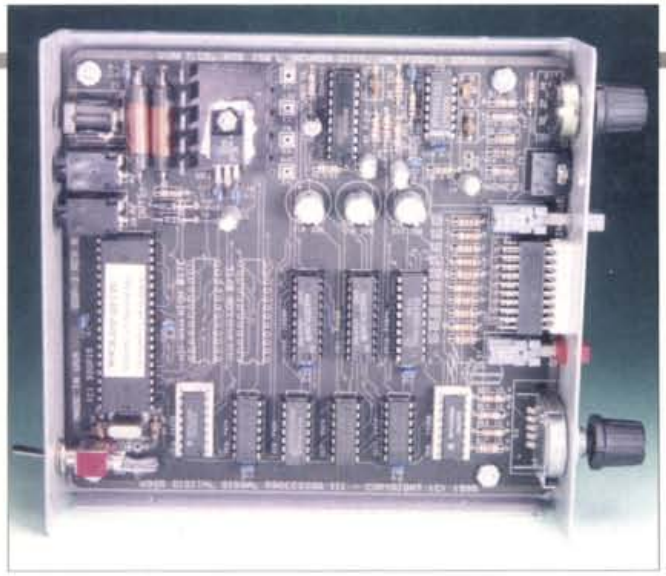
Listed Features

The listed features include: Effective (QRN) reduction, heterodyne removal (automatic notch reduction), DTMF

decoder with memory, CTCSS decoder with memory, seven tuneable c.w. filters, filters for special modes and narrow s.s.b.

How It Works

Let's now take a look at how the unit works. The W9GR DSP-III filter hardware uses a 13 bit analogue to digital (A to D) and digital to analogue (D to A) converter with switched capacitor filters for anti-aliasing and analogue re-construction. This, the manufacturers state, results in a much wider dynamic range than earlier W9GR DSP filters which used 8 bit converters.



Inside of W9GR DSP-III DSP filter unit.

The primary advantage of having 'more' bits is for the c.w. operator. It means that it becomes easier to 'pick out' weak c.w. signals from strong QRM.

The first three DSP filters are different combinations of noise reducers and automatic notch filters. These use the Widrow-Hoff LMS adaptive filtering algorithm. In the technical description provided with the unit, the manufacturers state that the noise reducer modes are most effective against 'hiss' and thermal noise but they also reduce impulse noise and static 'crashes'. They also state that these modes also reduce listener fatigue (I certainly agree with that statement!) and are recommended for long term monitoring.

The automatic notch mode eliminates multiple carriers very quickly ... within a few milliseconds (again I can confirm this. Select the automatic notch and they disappear immediately!). This means that the appalling problems caused by the 'tuner uppers' (obviously the Americans have them too!) c.w. interference and other forms of audio tones are quickly removed. When the mode is selected all the operator hears is a faint 'click' as the DSP unit comes into action. It's extremely effective indeed.

The three modes mentioned also include a defeatable digital a.g.c. This keeps the output level constant over variations of up to 30dB.

There are also two 'brick wall' narrow s.s.b. voice filters (1.8 and 2.1kHz) which provide the operator with extra selectivity for overlapping adjacent channel QRM.

The seven c.w. filters although provided with various centre frequencies, can be adjusted by the operator. Any of the filters can be tuned down to as low as 70% of the centre nominal frequency.

The information supplied by the manufacturers also states that the c.w., f.s.k., narrow voice and SSTV filter firmware programs are all linear phase bandpass filters. They also state that linear phase filtering, a significant advantage of DSP, allows filter bandwidth to be narrower than conventional filtering for a given c.w. speed or data rate.

Other Modes

Modes other than c.w. and s.s.b. aren't forgotten! For example, there's a selection of Frequency Shift Keying (f.s.k.) filters for RTTY, AMTOR h.f. Packet radio, etc., in the presence of QRM.

The SSTV operator is not forgotten either as there's a special SSTV filter which improves performance without introducing group delay distortion.

Tone De-coding

Tone decoding (DTMF) is provided using an interesting method on the DSP-III by using the built-in l.e.d. bargraph display to show the operator what tones are actually being received. Additionally, the last 16 decoded tones can be 'played back' from the DSP-III's memory.

The (also built-in) CTCSS decoder also uses the l.e.d. bargraph display to inform the operator what 'PL' tones are being used. The last 16 different decoded CTCSS tones can also be 'played back' from the memory.

On The Air

In the past four years or so I've had much experience with DSP 'on the air' and I can quite honestly say that the DSP-III performed very well indeed. In fact, I decided to take it out with me during some h.f. 'portable' operating and it certainly proved itself under difficult conditions, both in my car and at home.

Setting the DSP-III up to work with my DX-70 was very simply and speedily done. It seems to be capable of working with the audio output from any receiver with a nominal 8Ω impedance. I even used it with my Roberts Radio RC 828 'world band' type broadcast receiverf with excellent results!

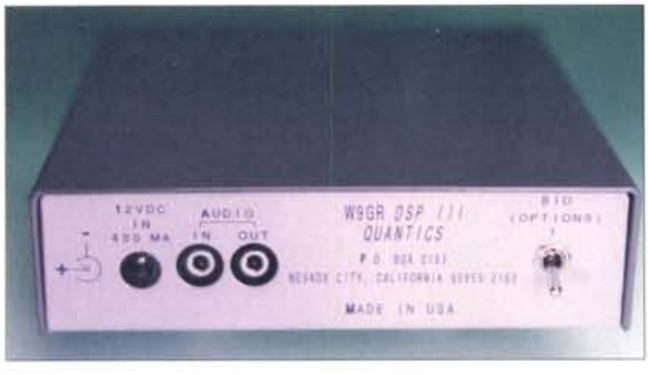
All you need to do is plug in the 3,5mm jack into the external audio output socket, plug the other end into the DSP-III, connect the power supply, switch on and adjust the (receiver) audio output so there's approximately 75% (best results from my experience) of the bargraph display illuminated on the DSP-III. It's as simple as that!

I used the DSP-III on c.w. and s.s.b. and found it exceptionally easy to use and very effective indeed. However, for the purposes of this review I must firmly state that I wasn't able to try the unit on Data Modes, SSTV, etc.

The spectacular results from the DSP filters on the h.f. bands have to be heard to be believed. On 3.5MHz the 'whistlers' , 'carrier swishers', QRM, QRN (static crashes) were all removed. I also found that it was far less tiring to listen to longer QSOs on both '80' and '40' metres.

Television line timebase noise - particular the multiple harmonics from the line timebases of TV receivers (often being radiated from the antennas as well as from the set itself) are very effectively reduced on all h.f. bands. In my opinion, despite the wholesale benefit of this unit, I would buy one just for this alone!

PW



Rear panel of the W9GR DSP-III unit.

Will G3XFD Buy One?

So, in providing a summary I can tell you that I will be buying one of the DSP-III units myself. They are so effective I cannot (as a keen c.w. and s.s.b. operator) afford to be without one. I'm in the 'classic position' of having (two) excellent ALinco DX-70 transceivers, already provided with good r.f. filtering. Some manufacturers fit DSP to 'mask' poor r.f. (or lack of) selectivity, but if you're also in possession of an otherwise good receiver...I cannot do more than to give you my highest recommendation to get one of these DSP units.

I reviewed the DSP-III in 'ready built' form. However, although there's not much difference in price between the kit and the ready-built option, both Tex Swann G1TEX (Our Technical Projects Sub-Editor) and I think that building a kit would be well within the average constructor's abilities if you'd like to try building one yourself.

In my opinion the DSP-III will complement any non-DSP equipped rig. And it's so small that you could probably mount it inside some receivers! So, next time you see me operating as G3XFD/P - the smart little grey box sitting next to me and connected between my DX-70 and the ludspeaker or headphones will be my DSP-III!

My thanks go to Sheldon Hands of Hands Electronics for the loan of the review unit which costs £169 with P&P paid for the kit version, or £185 with P&P paid for the built version. You can contact Hands Electronics at Tegryn, Llanfyrnach, Pembs SA35 0BL. Tel: (01239) 698427, FAX: (0870) 1641918.

Their E-mail address is: hands@rf-kits.demon.co.uk and they also have a Web site: www.rf-kits.demon.co.uk

A Cornish Radio

In our first feature on SSTV, John Newman G0VDU and Maurice Richards G3WKF relay the memories and experiences of their Amateur Radio and SSTV holiday in Cornwall, which they shared with a group of fellow enthusiasts.

Cornwall and the far south west of England have long been a favourite holiday destination for millions of people. The County is blessed with areas of outstanding natural beauty and superb beaches, so much so, that tourism is quite an industry. So, we feel sure that you will understand why it was that a group of Radio Amateurs decided to stay in their county and enjoy a 'stroke P' (/P) holiday. Field days are well understood by most Amateurs, however, a group of Cornish Amateurs decided that a field fortnight or 14 days, whichever was longer, would make a very nice holiday.

Accordingly, plans were made for all that would be required for a 14 day stint as portable stations. A decision was made very early in the planning stages to make the radio holiday a slow scan TV (SSTV) event, since most of us are keen SSTV enthusiasts.

The trip presented many challenges because we were to operate on both the h.f. and v.h.f. bands. Therefore, antennas would be required for the 14 and 144MHz bands, computers would be required along with peripherals and radio rigs capable of standing up to sustained duty cycles.

Electricity to power everything in a remote location would also be necessary. We decided that we would also have transmissions on other h.f. bands, but the main effort would be SSTV.

The Team

With outline planning completed, the various Amateurs in the team: **Maurice G3WKF**; **Keith G0TKD**; **Terry G4XOP**; **John G0VDU**; **Ron G0MSM**; **Roger G8CMG** and **Clyde G8XNH** (see **Fig. 1**) set about their individual arrangements.

For Maurice the task was to manufacture a new type of mast arrangement based upon his own design to put four cubical quads into the air stacked and bayed at around 12m high. The mast would rotate on command and could, if need be, be erected by one man. The results of his endeavours really demands an additional article because the complicated project worked extremely well (***Perhaps for 'Antennas In Action' - Tex G1TEX***).

In the meantime, Keith and Terry were busily transforming an old caravan into a mobile shack. Ingenuity was the name of the game here when they were trying to get three PCs and several rigs into a small space and still permit the operator some flexibility. (This was a triumph in itself). For the rest of us, the basic planning consisted of what antennas we were to erect for our chosen bands.

Fig. 1: Some of the holidaying Radio Amateurs: Terry G4XOP (top of the picture); (from far left to far right) Lynn; Maurice G3WKF; Val G0GAW (with Penny the cat); Ron G0MSM; Keith G0TKD (standing); Roger G8CMG (crouching) and Eve.

Preparing Images

Much work went into preparing SSTV images (see **Fig. 2**) because we all knew that, once on air, the system has a voracious appetite for material. In addition, we believe that once contact has been established, the whole QSO should take place in SSTV if possible. Because of this, it meant the production of several CQ call images - many over-printed with location details in large print so that it could be read at extreme range.

Additionally, QSL details were also prepared for sending to stations worked as an SSTV QSO. These preparations were to prove advantageous when 14MHz opened up and contact was established with Asia and the Far East.

It was discovered early on when 'on air', that many stations using SSTV failed to use a font of suitable size for legibility so that their details could be read, if necessary, from what may have been an S3 image (low signal strength).

Fig. 2: Two examples of SSTV images sent and received by the group.

Logistics

Logistics centred around the field we had chosen on the Lizard Peninsula, with the blessing of a local dairy farmer, who kindly allowed us to use his land for an antenna farm. Overnight, it seemed that a 14MHz mono band antenna was erected on a portable tower at around 20m, complete with Cornish flag flying proudly from the jack stay.

Some 21, 28 and 50MHz beams were also erected on guyed masts at 12m. For v.h.f. and u.h.f., 144 and 70MHz beams, along with a 430MHz beam, were erected on a variety of masts. A trapped dipole for 3.5 to 28MHz was put up between the 14 and 21MHz masts.

Finally, the new concept mast by Maurice was erected along with the four by two metre cubical quads. Great care was taken to prevent accidents to users and visitors. However, we all learned a lot about mutual interference and would, in future, arrange the antennas differently.

Good Conditions?

To survive for 14 days, we used camper vans, caravans and tents. It was not long after arriving on site that a mini village had been created and we were all very comfortable in the nice bright sunshine.

Sadly, the sunshine was not to last and the weather proved to be against us for most of the holiday. Apart from two thunderstorms - which put us off the air - the poor weather did not interfere with events - although a gale forced us to reduce the tower height temporarily.

The bad weather did, however, have one knock-on effect in that the XYLs who came along were not able to go out and about as much as they had hoped. Under difficult circumstances, Val, Lynn, Eve (and Keith!) produced some excellent meals.

Power for the holiday came from a 3.5kW diesel generator distributing electricity around the camp. The generator was run from an adjacent field to keep the noise down and failed only once when water got into the fuel - this was not a surprise, since it had rained heavily and for a considerable time!

The stations operated from around 0900 to 2200UTC when the generator was running, after this time, it was considered that the noise of the generator might lead to some complaints from adjacent caravan parks, so a peaceful night was had by everyone.

It came as no surprise that once on air and working stations far and near, we began to receive visitors who were keen to see what we were about. Many were members of the public attracted by antenna arrays, but quite a few Radio Amateurs called into the camp.

Notable amongst the Radio Amateurs was **Mike PA3FPZ**,

& SSTV Holiday

A TEAM OF ENTHUSIASTS SHARE THEIR RADIO & SSTV HOLIDAY MEMORIES

Maggie G0KEM and her OM **Mike G3JWX**, **Mike G1DDK**, **Mike G4WVD** (and that's quite a few Mikes!), **Steve G8TNA** and we mustn't forget **Ted G1UBY** who, under supervision, was able to work some old friends stateside.

Did It Work Out?

So, after all the hard work in setting up the camp, erecting the antennas and generally wiring up a Cornish field, how did it all turn out as the weather turned sour?

Maurice G3WKF, using his 80W on 144MHz SSTV, was soon working local stations in Devon and Cornwall. Requests for SSTV were sent out on 144 and 3.5MHz s.s.b., which helped to inform stations that he was active. Many contacts were made, although several were marginal as stations worked were using vertical co-linear antennas. (The Yagi needs to be rediscovered here!)

The furthest station worked was G3YCV in Ramsgate - a considerable achievement under flat v.h.f. conditions. Several nets were worked, the most notable being Corfe Mullen (Flight Refuelling ARS) where the net controller was G3RAN. Welsh nets were also worked where GW0JXS, GW8MTJ and GW0GIO gave particular pleasure. Attempts were made to access the Thanet SSTV repeater but this proved impossible at the time.

Fig. 3: The new mast project with the four 6-element quads in the field on one of the few fine days.

Lowering the new mast and changing the polarisation of the four cubical quads was completed in less than 30 minutes. Maurice was then back on air using s.s.b. along the south coast, where a notable contact took place with G7LWZ using only 4.5W. The new mast performed extremely well, but Maurice considered that for improved wind loading, guying would be useful and a better means of remotely indicating antenna direction would assist operations with a tight beam lobe.

Meanwhile, on 14MHz, using the huge 14MHz mono band beam built from the ***ARRL Beam Antenna Manual***, Keith G0KTD was waking the world up with his equipment. He used two PC486 DX computers linked together, running DL4SAW or *WinPix Pro v2* software for SSTV. The picture signal was driving his h.f. transceiver - a Trio TS-130V and a 2100Z linear running about 350W output.

Keith's combination worked splendidly and he was soon working all around the world. On SSTV, he worked 53 stations, as a full QSO, both ways video only - QRM permitting. Stations worked included: JA; IK; SV; YU; M; ON; DK; EA; HA; YO; U; G; OE; W1; W9; 5; KB; VA; DJ; SM; JR; JH and HL.

Competing for space on 14MHz is difficult at the best of times, working into the Far East on SSTV is a challenge! Keith considered that his contacts with Michael HL2KV in Korea along with Sugi JA2BWM/1 in Japan (amongst others) at 59 both ways, made all the effort worth while.

The QSL data was produced online and the contacted confirmation transmitted back to the station on air so completing a SSTV QSO. In between, G0KTD aired his callsign on 14MHz using s.s.b. whilst updating his picture library and completing his computerised log.

Openings On 50MHz

There were several openings on 50MHz during the holiday, permitting Terry G4XOP to work the band using c.w. and s.s.b. He was using a superb home-brew 50MHz, 5-element beam with a five metre boom, constructed by Bob G7BXS (also from the *ARRL Antenna Book*) at about 12m a.s.l.

To drive the antenna, Terry used his Yaesu FT-480R and a MuTek TVVF 50C transverter producing an output of 14W p.e.p. Contacts on c.w. included: ES; SM; OK; CT; S5 and IK. On s.s.b., stations worked included: OY; G; M; ES; SM; I4; OK; DL and HB.

All of the stations worked came in at 59 and Terry comments that listening for the beacons on 50MHz often warns of an opening on the band and 28MHz. He looks forward to the time when the sun spot cycle improves the band so that contacts outside of Europe can become possible.

John G0VDU, using an FT-990 barefoot and a beam antenna was having a wonderful time working many quality contacts on 21 and 28MHz. The best DX this time was Ossie ZS1NL, near Capetown, South Africa and David LU/CE3DPV in Mendoza, Argentina.

Perhaps best of all, however, on 21MHz was a 5/9 QSO both ways for over an hour with John 9G1BJ in Tamale Ghana, proving that 21MHz, when it's open, is a superb band to work.

There were several openings on 28MHz and many Europeans were worked on s.s.b. and the occasional station on 28MHz n.b.f.m., 7 and 3.5MHz produced many QSOs and much fun was had chasing the lighthouse and ship contest - of which 12 were worked on the 3.5/7MHz trapped dipole at about five metres. John was able to continue operations for a limited time using battery power and many contacts were had after the main generator had been shut down.

All Good Things ...

As with all good things, the holiday had to come to an end. We had all enjoyed the various aspects of being a Radio Amateur '/P' very much and had been able to experiment with antennas and powers that may have produced the dreaded TVI from the home station.

We all learned a lot about mutual interference and the discipline required to avoid expensive damage to the input circuitry of modern rigs. Operation on 430MHz was on low power only, due to our close proximity to a local TV repeater station. Blocking its front end would have made us very unpopular.

The weather had been unkind at our chosen location, it seemed to be fine everywhere else. Everyone had enjoyed themselves and now it was time to pack up and return home. The field reverted to pasture and we made plans for another year and another Cornish Radio holiday at WAB SW71. *PW*

Background Photo: After the rain had gone at dusk: the 18m tower with 4-element mono 14MHz and the 12m 3-element Elan, 21/28MHz beam.

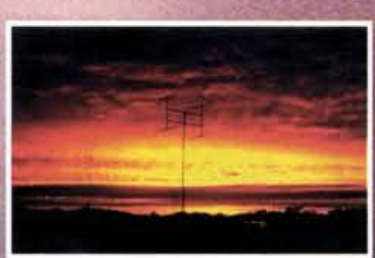


Fig. 4: Real sunset! The four 6-element quads on 144.50MHz.

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Communicating in Colour

Trying Slow Scan TV

Denis Payne G3KCR relays his experiences with Slow Scan TV (SSTV) and explains how it opened up a completely new aspect of Amateur Radio to him. If you fancy having a go - or perhaps you've never thought about it before - read this article and discover how you too could uncover another avenue to radio communications.

After many years of Amateur Radio I felt that I needed to try something new. I had recently purchased a computer for word processing and wanted to use it for some form of radio communications. At about the same time, our local club, the **Crowborough and District Radio Society (C&DARS)** had a demonstration of SSTV. One or two members were already operating this mode and gave me some good advice about what was required and I decided to have a go for myself.

Interface And Software

There are several interfaces available and various software packages. I use the interface and the ***DL4SAW*** software from **Pervisell Ltd**. I found that the *DL4SAW* software was much more user friendly than the *JVFAX* that I had tried before.

The interface is very small and built into a 25 way, D type connector - it's also available with 9 way D type. This interface can also be used for *JVFAX* and *HAMCOMM* (RTTY and Morse). Alternatively, if you wanted to have a go yourself, you can always build your own simple interface using the circuit in **Fig. 1.**

The interface arrives complete with a 3.5mm jack plug to go into your speaker or earphone socket. The other lead is for the microphone input on the transceiver and the 'Push to Talk' input - it is left for you to wire it to the appropriate connector. In order to enable me to quickly switch to phone from SSTV, I built myself a change-over box circuit, as in **Fig. 2.**

For this, you will need a two pole change-over toggle switch, a duplicate plug and socket for the microphone and a small plastic box. All of which are available from **Maplin**. Screening for the leads is important to prevent r.f. feedback when transmitting.

The *DL4SAW* program runs on MS-DOS and only needs 640kb of memory, but you will need much more memory for your pictures. Your PC will also need a 1Mb graphic adapter supporting 640 x 480 VESA-mode. An IBM or clone computer with a '386DX, or better processor, is recommended.

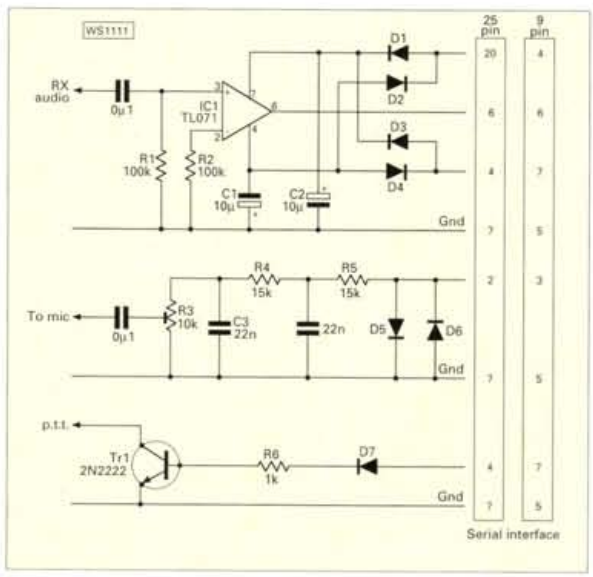

Fig. 1: Circuit diagram for a simple interface - why not have a go?

Denis G3KCR seen here sat at his SSTV set-up in his shack.

The software does **not** use *Windows* or *Windows 95*. As I use *Windows 95* normally, I have created an on-screen shortcut to DOS and the program *GSHPC*, which is the program used. This saves the time of reverting back to DOS, and keying in the command to load the program.

It is advisable to print out the instruction for the software from GSHPC_E.DOC before proceeding. These instructions are very thorough, but have a few spelling mistakes, probably because it has been translated from German.

Receiving SSTV

The wiser thing to do, I believe, is to start by SSTV receiving only. I found the results quite surprising. There are many stations now operating this mode, and 14MHz seems to be the most popular band. The signals are quite distinctive and can be found on the following h.f. frequencies: 3.730 - 3.740, 7.035 - 7.045,14.225 - 14.235, 21.335 - 21.345 and 28.675 - 28.685MHz.

Most of the pictures to be found are of good quality and the callsigns readable. One station, **VK6ET**, produced a good quality picture with only an S5 signal and when he switched to phone he was only just readable.

The procedure for operating SSTV is the same as other QSOs - you can send a CQ picture and wait for a reply, or search for a CQ picture and reply with your own.

The picture in **Fig. 3** shows a typical screen you will see when using the program. The left hand picture is where you load the picture ready to transmit, the right hand picture is the position where the received pictures will slowly scan down the frame. Everything is clearly labelled, showing the facilities available, together with the appropriate key to press underlined.

When I first tried the program, I found that no picture was forthcoming and there was no signal in the tuning window! What did I do? Well, I asked a friend, who informed me that I was probably using COM2: port on the computer. This turned out to be the case, so pressing F2 allowed me to configure the software by using the cursor movement keys. I only had to press the side movement key to change the port to COM2:, then the CTRL + Return to store it. I changed no other items in the configuration panel.

Did it work then? The answer, I'm afraid, was "No"! The problem turned out to be that the small potentiometer marked 'A', on the side of the interface, was set to zero and by turning this clockwise slightly, I

allowed the signal to be received. After that it was easy. Press 'R' to receive and your tuning aid appears. The printed instructions tell you almost everything you need to operate the system. Read them carefully!

The other potentiometer on the interface, marked 'H', should **not** be adjusted. It's only needed when using the *POCSAG* software which is another application.

By watching QSOs on the screen, it's possible to learn the protocol and the styles of picture presentation - all very similar to other mode QSOs, but instead of RST for the report, you will find RSV - the 'V' being the vision quality from 1 - 5.

Another fact is that when you tune into a picture being transmitted, it starts to appear at the top of your Receive window. You may have tuned in part of the way through a transmission and only get part of it, so stay on that frequency until another complete image is received.

If you're also listening to the signal you will know when it ends. You can then quickly switch to 'H' (Hold), then 'R' (Receive) to obtain the start of the next picture at the top of the window. This is much the same as tuning into a 'phone QSO and only getting part of what was said. Stay with it until you get a complete picture, or the reply from the other station.

It's always interesting to save some of the better pictures by just pressing 'S' for Save. This will put you on Hold. A second press will reveal a box where you can choose to save as 'BMP' or 'TIFF' file format. Make the selection and press Return.

If a picture appears to be distorted in any way, it may be because it's in the wrong mode. Press 'M' to go to Hold and then again to reveal the mode selection box. Use the up/down movement keys to change mode and then Return followed by 'R' to receive. The most common modes used on h.f. are Martin 1 and Martin 3.

Press F10 to find more key functions. This is also the key to exit to DOS after clearing the 'TX' and 'RX' screens. 'H' and then 'R' will clear 'RX', then F6 to clear 'TX'.

Transmitting A Picture

You can transmit without a picture and send just words. This is, in my opinion, however, very dull. 'W' for words brings down a panel ready for your captions and callsign to be placed in your 'TX' window and you can select the colour of the lettering and the background by pressing the TAB key and using the movement keys. You can also use this facility to add print over a previously loaded picture in the 'TX' frame.

There's no choice of font or size of lettering, though - press CTRL. and Return to load the print onto the picture. I do have to recommend that you should really have a few practice attempts with this before you 'take the plunge' for real! When you're happy with the 'TX' window all you have to do is just press 'T' and you transmit your SSTV image.

Pictures are what SSTV is all about, in my opinion at least! You need pictures to edit and add your personal touch to and there are plenty for you to choose from - or you can always paint your own using the Paint facility.

Public Domain libraries have many pictures to choose from and if you have a CDROM drive then you can obtain CDs containing hundreds of pictures and photographs. I've also found several on CDs that are free with many magazines. Scanners and digital cameras are another source, if you are lucky enough to have them.

The program requires 'BMP' or 'TIFF' format, but don't worry, any picture you collect can be converted to these formats with a Public Domain viewer/converter program at very low cost. In fact, you may already have one!

The viewer/converter program that I use is *COREL Photo Paint 3*, which happened to come free with a magazine. It includes a picture editor/converter. With this program you can overlay your callsign and other information onto the selected picture. By using *Photo Paint*, you can also change the aspect ratio of the picture to fit the transmit window.

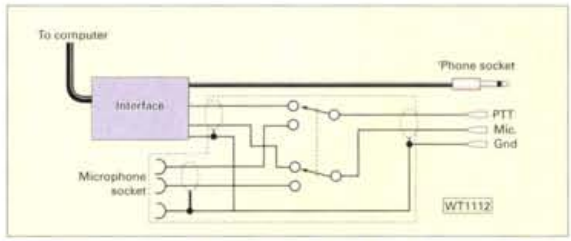

Fig. 2: (a) Denis G3KCR's change-over box circuit which he built himself. (b) Denis' change-over box circuit in diagrammatical form.

The method which I use is to search and view pictures, then save them on floppy discs. Using the *Photo Paint* program, I then edit for size, add my wording and then save/convert to a picture folder for later use. I also make sure that I choose a colour for the lettering that will stand out clearly against the background of the picture.

Try Loading

Having prepared some pictures, try loading some into the 'TX' frame by pressing 'L' twice and selecting your picture folder from the menu. You now have a choice between a CQ picture, or a reply to call. If you are replying to a CQ, then don't forget to use the Word facility (W) to add in the station's callsign before transmitting your reply.

On single sideband (s.s.b.) SSTV you must never use more than 50% of your maximum power, or you will overload the transmitter. It's advisable, before searching for a CQ signal, to load your reply picture and the colour of your added wording. This will save time between 'overs'. Remember that you cannot use the Load facility without stopping the Receive picture.

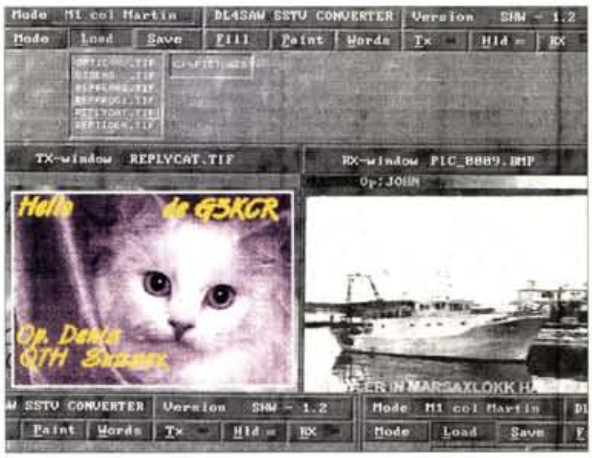

Fig. 3: This picture shows a typical screen from the *DL4SAW* SSTV Converter Software, which Denis himself uses.

I always think that it's better to plan for a QSO. This means deciding in advance which pictures you will use and in which order. Trying to choose a picture from a long list can waste some time. I title my pictures with a code that tells me if it's a CQ, first reply, or ending a QSO. This saves some time if you have a long list of pictures.

Other Facilities

Other facilities on the program include 'F' for Fill, which allows you to load a prepared test pattern. You can also zoom the 'TX' or 'RX' windows to full screen, or send a reduced size 'RX' picture back to the other operator together with your comments.

Final Advice

My final advice is ... why not try using low power into a dummy load before going on the air for the first time. I, fortunately, had the assistance of a local fellow amateur for my first transmitting test on minimum power - a precaution against sending rubbish onto the band!

My time on the air in recent years has been limited to QSOs to test new antenna designs and a local weekly net on v.h.f. SSTV has now put me back on the air and added some rewarding QSOs to my log book. One or two more local stations are already 'listening' and hopefully will soon be ready to transmit. So, why don't you give SSTV a try? It could do the same for you! *PW*

The 17th Annual Practical Wireless 144MHz QRP Contest

0900-1600UTC, Sunday 20 June 1999

With summer on its way - well, it almost is! - it's time for Neill Taylor G4HLX, our very own *PW* 144MHz QRP Contest adjudicator, to remind you that the annual QRP Contest is just around the corner!

After last month's look at how you can get started in VHF Contests (*PW* May, p.28), it's time now to get down to the details of this year's ***PW* 144MHz QRP Contest**. I think that it's the ideal event for having a first go at contests, as well as being a challenge for the more experienced operators and groups. Remember, all you need is a simple **144MHz station** with a **maximum** of **3W transmitter output power** - look back at the May issue of *PW* for more advice if you're not sure what equipment to use. This year, we hope to be welcoming plenty of new stations on the band for the contest, as well as hearing all our regular entrants trying their best to get one of our certificates or prizes.

The Highest Honour

The highest honour is for the outright winners, who will receive the ***PW* QRP Contest Winner's Cup**. The **leading Scottish station** will be awarded the **Tennamast Trophy** in Memoriam to **Frank Hall GM8BZX** and the **leading station in Eire or Northern Ireland** wins the ***PW* EI/GI Trophy Clock**.

Mike Devereux G3SED is presenting a prize this year which will help the main winner to radiate the best signal possible - by donating a **100m drum of Japanese-made 'Super Low Loss' 5D-5B coaxial cable**. This superb quality cable only has an outside diameter of 7.6mm and will enable the users to squeeze every last milliwatt of the 3W limit to their antenna! Also, **Bob Keyes GW4IED** of Key Solar Products will be donating some solar panels to the runners-up.

Plenty To Compete For

For those who feel that they can't quite achieve these elevated positions, there's still plenty to compete for. The **leading station** in each **locator square** will be awarded a ***PW* Contest Certificate**, as will the leading stations in a number of other categories including **leading single operator**.

Contests results, along with a review, will be published in *Practical Wireless* later in the year. A full detailed results listing will be published on the **Contest Web site** (see below) and sent by post to any entrant who submits an s.a.e. with their logs.

After last year's contest, I invited anyone with a view about the contest and it's rules to send me their comments. My thanks to those people who did so and the clear message was: **"Don't change anything"!** Coupled with comments received with logs over the years, I concluded that the format of the QRP Contest is just about right as it is.

There were some calls for a restriction on the size or number of antennas, but since there were also some strong views suggesting that this should be left unlimited, there will be no change here. But we will continue to tabulate the top ten stations using just one antenna as an additional separate results list.

One Important Addition

One important addition to the rules this year is that **I will be happy to accept entries by E-mail**, which several entrants have asked about. I can cope with most formats and encodings of E-mails and attachments but, if in doubt, keep it as simple as possible (a plain text file is just fine). The golden rule is that if I printed out whatever you sent me, it should be equivalent to a paper entry sent by post. There's more about this on the Web site.

If you prefer to send in your logs in the traditional manner, by post, then you may find it helpful to download the stationery for log sheets and covering information (Rule 6) sheets from the Web site. The address of the Contest Web site is **http://home.neill.org/contest**

Whichever way you choose to send in your entry, do make sure that you include **all the information required**. Every year some entrants lose points because they don't pay full attention to **Rule 6**, or forget to highlight in the log the first contact in each locator square.

No matter how familiar you may think you are with the rules, please make sure that everyone in your group has read all the rules before the event and check them again before sending in your entry.

Let's hope we get some good weather and good propagation - and that everyone has a great day of v.h.f. contesting!

Neill Taylor **G4HLX**

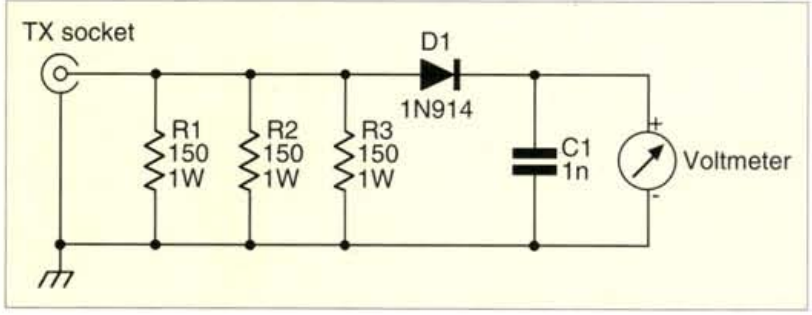

Fig. 1: Simple power reduction circuit (see text).

Contest Rules

IN THE FINAL RUN-UP TO THE ANNUAL QRP CONTEST, NEILL G4HLX BRINGS YOU THE CONTEST RULES.

1. General

The contest is open to all **licensed** Radio Amateurs, **fixed stations** or **portable**, using **s.s.b.**, **c.w.** or **f.m.** in the **144MHz (2m) band**. Entries may be from **individuals** or from **groups**, **clubs**, etc. The duration will be from **0900 to 1600UTC** on **20th June 1999**.

All stations must operate within the terms of the licence. Entrants must observe the band plan and must keep clear of normal calling frequencies (144.300MHz and 145.500MHz) even for CQ calls. Avoid frequencies used by GB2RS during the morning (144.250MHz and 145.525MHz) and any other frequency that is obviously in use for non-contest purposes. Contest stations must allow other users of the band to carry out their activities without hindrance.

The station must **use the same callsign throughout** the contest and **may not change its location**. Special event callsigns may **not** be used.

2. Contacts

Contacts will consist of the exchange of the following minimum information:

(i) callsigns of both stations;
(ii) signal report, standard RS(T) system;
(iii) serial number - a three digit number incremented by one for each contact, starting at 001 for the first;
(iv) locator (i.e. full six character IARU Universal Locator for the location of the station).

Information must be sent to, and received from, each station individually, and **contact may not be established with more than one station at a time**. Simultaneous operation on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send his full universal locator, his location may be logged instead. However, for a square to count as a multiplier (see rule 4), a full six character IARU universal locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power

The **output power** of the transmitter final stage **shall not exceed 3W p.e.p**. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line, reached via the accessory socket.

The output power can be accurately measured using the simple circuit of **Fig. 1**. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

4. Scoring

Each contact will score one point. The total number of points gained in the seven-hour period will then be multiplied by the number of different locator squares in which contacts were made (a 'square' here, is the area defined by the first four characters of a universal locator).

For example, 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares will get a final score = 5 x 52 = 260.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log and clearly marked as a duplicate.

5. Log

The log submitted as an entry must be **clearly written** on **one side only of A4** sized paper (210 mm width x 297 mm height), ruled into columns showing:

(i) time GMT
(ii) callsign of station worked
(iii) report and serial number sent
(iv) report and serial number received
(v) locator received (or location).

Underline or highlight the first contact in each of the locator squares worked.

At the top of each sheet, write:

(a) callsign of your station
(b) your locator as sent
(c) sheet number and total number of sheets (e.g. "sheet no. 3 of 5").

The sample shown in **Fig. 2** illustrates how each sheet should be headed.

6. Entries

Accompanying each entry must be a separate sheet of A4 sized paper bearing the following information: (Please see over page...)

Fig. 2: Sample log sheet for *PW* 144MHz QRP Contest (see text).

Practical Wireless 144MHz QRP Contest 1999

Date	Callsign	Locator	Sheet No Of

Time UTC	Callsign	Report & Serial No		Locator
		Sent	Received	

Contest Rules

(a) name of entrant (or of club, etc., in a group entry) as it is to appear in the results table;
(b) callsign used during contest (including any suffix);
(c) name and address for correspondence;
(d) details of location of station during contest, for portable stations, a national grid reference is preferred;
(e) locator as sent;
(f) whether single or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her), if multi-operator, include a list of operators' names and callsigns
(g) total number of contacts and locator squares worked;
(h) list of the locator squares worked;
(i) a full description of the equipment used including transceiver p.e.p. output power;
(j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used to reduce and measure the output power;
(k) antenna used and approximate station height a.s.l.

Failure to supply the previous information may lead to loss of points or disqualification. The following declaration must then be written and signed by the entrant (by one responsible person in the case of a group entry): "I confirm that the station was operated within the rules and spirit of the event, and that the above information is correct".

This declaration concludes the entry, which should be sent, with the log sheets, to: ***Practical Wireless*** **Contest, c/o Dr. N.P. Taylor G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8LX**. A large s.a.e. should be enclosed if a full set of contest results is required. Alternatively, entries may be submitted by E-mail to **g4hlx@breathemail.net** in a format which, if printed, would satisfy the requirements of Rule 5 for printed logs. Remember to include all information required by Rule 6. For more information about E-mailing entries, see the Web page http://home.neill.org/contest

Entries must be postmarked or sent by E-mail **no later than 5th July 1999**. Late entries will incur a heavy points penalty or may be disallowed.

Any other general comments about the station, the contest and conditions during it are welcome, but should be written on a separate sheet of paper. Photographs of the station are also invited (but please note that these cannot be returned), if these are not available by the time the entry is submitted they may be sent later, to arrive by 9th August 1999.

7. Miscellaneous

When operating portable (/P), obtain permission from the owner of the land before using a site. Always leave the site clean and tidy, removing all litter. Observe the Country Code.

Take reasonable precautions to avoid choosing a site which another group is also planning to use. It's wise to have an alternative site available in case this problem does arise.

Make sure your transmitter is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous very strong signals it will have to handle and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input. The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it's best to be able to switch it off when necessary.

8. Adjudication

Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts will carry a heavy points penalty. Failure to supply the complete information required by rule 6 may also lead to deduction of points.

A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.

The 17th Annual *PW* 144MHz QRP Contest 0900-1600UTC, Sunday 20 June 1999

RADIO BASICS

Rob Mannion G3XFD

Rob Mannion G3XFD continues with his description of a variable tuning 7MHz 'front end' converter unit. Complete this project and you're well on the way to building a basic superhet receiver.

In Part 1 of our current project, which began in the May issue, I took time out to describe the various tuning methods available to the inexperienced radio constructor. And although (rather surprisingly) nobody has written to me on the subject - I've no doubt that one or two of the more experienced readers who read the column are wondering why I've not mentioned variable capacitance diodes (varicaps) for tuning.

Well ... in case you've been wondering I should tell you that varicaps have not been forgotten - it's just that I don't think they're suitable for this form of 'learn as you build' approach. I back this statement up with the sure knowledge that many beginners often find themselves puzzled for choice with ordinary variable capacitors - let alone varicap diodes.

To further strengthen my argument I can quote my experiences in answering the queries that have come from readers having problems. But I won't - because that's what I'm here for!

All I will say is that's why I discussed - and illustrated - the various types of variable capacitor that are still available for the 'traditional' home constructor.

Difficult To Find

Unfortunately, we have to face facts in our hobby ... 'traditional' wire ended components such has resistors, capacitors and inductors are being replaced by often anonymous (no component markings) surface mount components. So I advise you to grab the old style miniature components whenever you see them on sale as either new or surplus.

The same advice applies with traditional variable capacitors. Grab them when you can, build up a stock ... you never know when you'll find them useful!

Ready To Build

Now you've (hopefully) got a selection of variable capacitors - or the ceramic coil formers I suggested, we can now progress on to the next stage of the project. However, before I dive into the 'standard' approach (using the variable capacitors) I'll briefly give some guidance to the less experienced constructors are going to use the 'permeability tuning' method.

Using the ceramic coil formers, I suggest you use the coil winding guide in the 'Radio Basics' pages (page 67 of the March *PW* - 3rd paragraph down from the sub-heading 'The Changes'). Using your 'dip meter' (***see note below**) with the coil resonated with a fixed 100pF capacitor place the wound assembly near or almost within the dip meter's tuning coils (using the appropriate range of course - I suggest 6 to 10MHz or whatever range your dipper covers).

***Dip meters:** You have built a dip meter haven't you? If you haven't done so yet (shame on you) - I strongly recommended that you do, as the useful 'dipper' will often be required from now on. If you do build one - you won't regret it. Once built ,you'll find it essential for home brewed projects. If the 'Tinny Dipper' seems too large a project with the full set of coils ... why not just build one and enough coils for the bands from 1MHz or so, up to (let's say) 10MHz? Alternatively, I've noticed that since dip meters have been mentioned fairly often in PW in the last year - they are now often advertised in the PW 'Bargain Basement' for reasonable prices. So, if you don't feel confident enough to build yourself a dipper - why not look in 'Bargain Basement'? But whatever you do - get one for your workshop!*

Get the best dip you can but make sure that the tuneable core is 'centred' when you start (the sliding core at the middle of its travel). Once you've established where the coil, capacitor and core are tuning to, you can then adjust the windings to suit. If the frequency is too low - take some windings off, if too high, take some off. But take heed ... only remove or add one or two turns at a time.

Once you've learned the 'practical way' you'll soon be able to put the simple mathematics required into use. However, for the purposes of this series, I'm avoiding maths. The idea is to get you going and then you'll realise how useful the mathematics are!

The Front End

The idea for the 7MHz 'front end' is to end up with a tuning system which covers from 7 to 7.1MHz for the incoming signal (to be 'mixed') with one permeability tuning unit, with the other (the local oscillator) covering from 8 to 8.1MHz (to provide the 1MHz 'difference' or 'intermediate frequency signal). If you decide to use an r.f. amplifying stage - another permeability tuning unit will have to be wound to cover 7 to 7.1MHz.

While thinking about the use of maths (a wonderfully useful 'tool' in our technical hobby) I'd like to point 'Radio Basics' readers towards 'Electronics In Action' - which starts on page 57. In his column, **Tex Swann G1TEX** who compiles and writes much of the material, is actually discussing the theoretical side of tuned circuits, prepared with the help of maths, I thoroughly recommend that you read Tex's article. Backed up with practical 'hands on' experience I feel sure you're bound to benefit.

More advanced constructors will then have to work out a mechanical coupling system (a 'yoke') to move all three cores in and out of the coil formers. The complexity is outweighed by electrical advantages ... but more about that later!

The Circuits

Now it's time to look at the circuits on offer as part of our on-going training exercise. And don't forget - these projects are only intended to provide practical exercises. I say this to remind you that choosing a 1MHz i.f. frequency might be convenient as a training exercise but it's certainly not a good choice when other technical reasons are taken into account (one of them being that it's in the middle of the medium wave broadcast band!). But, again, I'll explain more about that later. Let's get the project working first!

Anyone who has been following 'Radio Basics' will recognise most of the circuitry in **Fig. 1.** The only real differences between this circuit and the 3.5MHz to medium wave converter featured last year ... is that variable tuning is used to cover the bands of frequency you wish to receive.

Additionally, the crystal oscillator - originally used because it's easy to set up and can be reasonably assumed to be working on the correct frequency, has now been replaced by a variable tuned oscillator. This makes the construction (and setting up) a little more complicated by requiring the use of 'ganged' variable capacitors (the 'ganging' - the term used for capacitors or other controls working together - is indicated by the dashed line linking the three variable capacitors which can, of course be separate units or (more usual nowadays) two or three variable capacitors working together in one 'frame' or chassis' (See the photograph in Fig. 4, May issue, for several examples of this).

However, because the circuit is deigned to produce a 1MHz i.f. output you should not run into the problems of setting up the beat frequency oscillator because as the i.f. stays at a constant 1MHz and the converter front end is tuned (whereas the previous converter was fixed tuned for receiving but variably tuned for receiving on the car radio i.f.) the b.f.o. can be quite

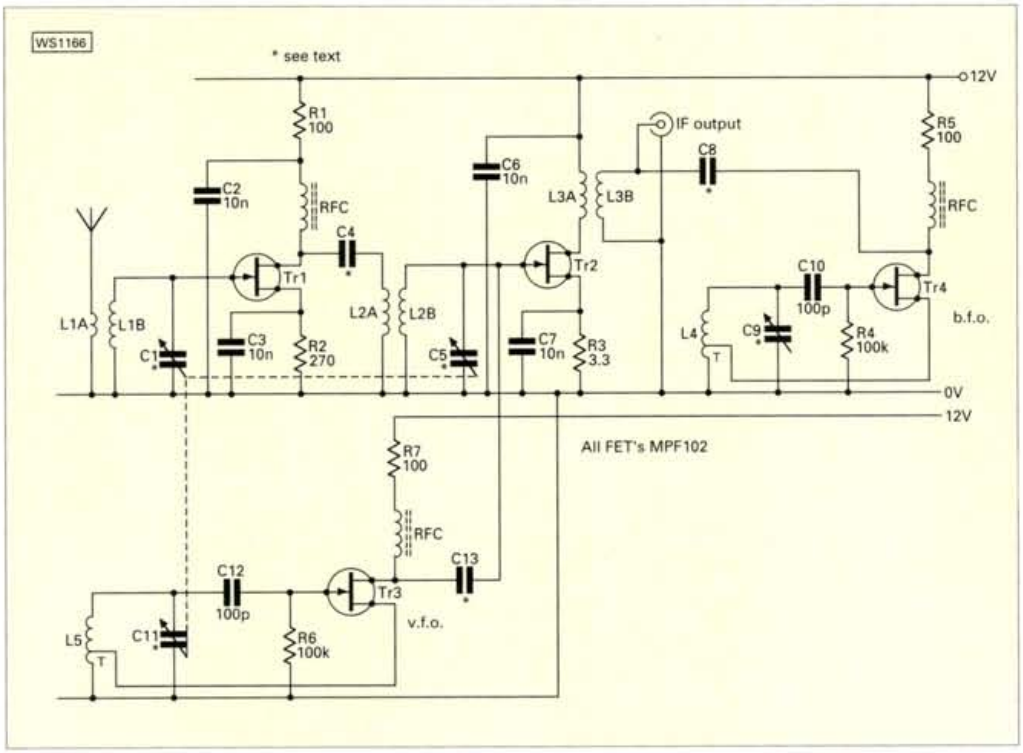

Fig. 1: Circuit of the fully tuneable 'front' end' converter circuit with r.f. amplifier and b.f.o. It can be used for coverage of the 7MHz Amateur Radio band or for 'general coverage' (see text).

easily set to run just above and just below 1MHz to provide the necessary 'beat' note for reception of c.w. (Morse) and s.s.b.

The second circuit, **Fig. 2**, illustrates a simpler version of the 7MHz front end which does not use an r.f. amplifier. This simpler circuit does away with the need for a third (ganged) variable capacitor but will of course not be as sensitive as the circuit with an amplifier.

However, the simpler circuit will be easier to build and those of you who may want to cover a wider range of frequencies (perhaps from 6 to 10MHz let's say, taking in the 49, 41 and 31MHz h.f. broadcast bands and the 7 to 7.1MHz amateur band) may like to try this version first.

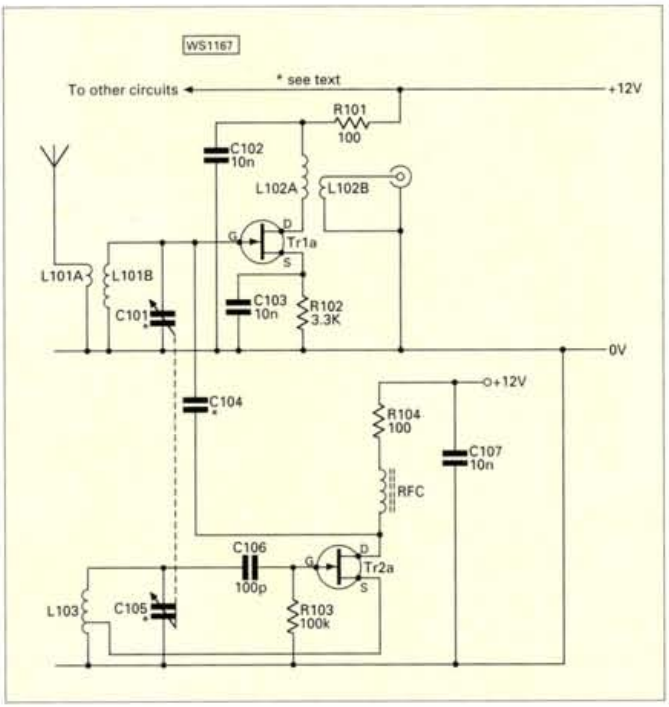

Fig. 2: Circuit of a simpler tuneable front end circuit without r.f. amplifier or b.f.o. (see text).

Note also, that the simpler circuit does not have a b.f.o. But of course, you can add one later if you so wish.

Variable Choices

Now it's time to look at the variable choices - or perhaps the choice of variables? (Capacitors that is). To start, if you've opted to build the simpler circuit dispensing with the r.f. amplifier ... your choice is easy - I suggest you opt for the variable capacitor with the Reference number 2 (May *PW*, page 15). This is ideal for general coverage use and incorporates a simple 'slow motion' tuning drive.

Additionally, variable capacitor No. 2 (I'll refer to it in this way in future) incorporates two separate 'ganged' units of differing capacity. This, in fact, is deliberate because, of course, the two circuits - the incoming signal to be 'mixed' and the local oscillator - are on differing frequencies all the time.

(As you tune the completed tuner up or down in frequency, the input frequency - or incoming frequency - moves up or down in frequency in step with the local oscillator frequency and the 'mixing' process then provides a continuous difference frequency. Easy to talk about theoretically but not so easy to do in practice as you will inevitability find out later!).

The 'difference' frequency (which is termed the 'intermediate frequency or i.f.) is tuned by the drain circuitry of Tr2. It's then fed out to the i.f. amplifier and detector (in our case it's the car radio again) in the same way as the fixed tuned converter was.

So, with the necessary dose of theory, let's now get onto hard facts so that you can prepare your coil and capacitor combinations for the final assembly.

If you're intending to build an amateur band only (7 to 7.1MHz converter, I strongly recommend you use variable capacitor No. 3 or 4 (Page 15, May *PW*). The three gangs on these unit will permit an r.f. amplifier to be incorporated. (My own personal favourite is No. 3).

I suggest that (using No. 3) you wind the coils using the guidelines from the March issue, using a 100pF fixed capacitor in combination with the ganged 20pF variable capacitors aiming to 'set' the coil to just a fraction below 7MHz, (you then increase or decrease the number of turn until you achieve the 'dip' just below 7MHz. Note: make sure of course that you connect to the 20pF variable section connectors and not to the larger values! However, in practice, this should be relatively easy as they are clearly distinguishable,.

Warning: when you are following these instruction please make sure that the variable capacitor vanes are fully meshed - in other words the capacitor is at its maximum capacity, so that when the vanes are moved out of mesh (tuning up in frequency) you will get the maximum benefit of the bandspread.

For anyone building a general coverage (rather than just 7 to 7.1MHz) I suggest you follow the same guidelines but using any of the main 'gangs' of variable capacitors (reference) 1, 2, 3, 7 or 8. (You won't need the 100pF 'set' capacitor.

Next Time

Next time I'll discuss how we can set the coils up to do the job intended. This will also introduce you to the techniques of producing a variably tuned oscillator which 'tracks' to produce the necessary i.f.

In the meantime, get busy winding those coils. And if you've got enough time - why not try experimenting so that you've got one coil (or two if you're incorporating the r.f. amplifier) which tunes 7 to 7.1MHz and another which tunes 8.1 to 8.1MHz? If you do ... you'll be halfway there! See you next time. *PW*

The Not So Good Old Days

John Worthington shares his thoughts and feelings about the way things were and how they have changed since he took the first plunge into Amateur Radio - and argues that they weren't, after all, always the "Good Old Days" that some 'Old Timers' would have us believe.

JOHN WORTHINGTON, PW'S VERY OWN CARTOONIST, GIVES HIS VIEWS OF THE NOT SO GOOD OLD DAYS!

One hears a lot from 'Old Timers' about how good the old days were. Now, I know what you're thinking - "Is he going to betray his own crowd"? My reply would have to be "Yes"! I was glancing through the 1987 edition of the *Callbook* the other day and as my rheumy eyes flitted down the enormously tight lists of names and addresses I wondered idly what 3.5MHz (80m) would sound like if just one page of these callsigns should decide to become active at the same time!

Well, my guess would be that it would sound something like it was in the 1940s when you could get a steady reading on a field strength meter that consisted of a tuned circuit and a diode into a 100mA meter simply from all the r.f. emitted by UK stations.

Rare Event

Getting a decent QSO was a rare event for the average Radio Amateur during daylight hours because of the heavy QRM produced by home-brew amplitude modulated, grid modulated, etc., rigs. Even when there were few stations on, there would seldom be a clear frequency as there would be strong carriers everywhere whilst folk tested their latest construction work. In such a world as it was then, it was the biggest power supply that won.

Getting a contact after nightfall was usually with a local friend only. The signals from the Continent and hugely powerful UK ex-Marconi employees and their like would make the 3.5MHz band a hell of mangled r.f. and audio, as wicks were turned up as far as they would go.

Of course, most Radio Amateurs were only able to practice their hobby in the evenings. So, to break the impasse, many were forced to get their QSOs on the DX bands - but with locals or near locals, as most DX faded rapidly as night fell.

To add to your troubles, there was a big chunk of the 3.5MHz band which wasn't available to amateurs and this was right in the heart of the 'Fone' section - the temptation to go into the forbidden area was overwhelming and several stations had their knuckles rapped by an Authority which was much more stringent and alert than now in the 1990s.

All of this brings me to the seldom realised milder policing which we presently enjoy, which is entirely due to pressure to reduce civil service costs in a world which has greatly increased r.f. activity.

Today's amateurs rail against the multitudinous noises which we get on the bands from unknown sources. They would be shocked to listen to a recording of 3.5MHz at my first QTH in 1947. All vehicles then had no suppression whatsoever, neither had household machines, e.g. vacuum cleaners, shavers, etc., and the resultant racket caused many of today's 'Old-Timers' to become desensitised aurally to the point where their XYLs have to poke them with a stick to indicate forthcoming orders.

Home Of QRP

'Top Band' in those days was the home of QRP, as there was a limit of 10W on everybody and hardly anyone else could operate on the 1.8MHz band except the UK. Although the width of the frequency limits was slightly bigger than now, you couldn't use the top half of it because of a huge navigation beacon transmission which spread its pulsing tentacles over three quarters of the band in some UK areas.

'Top Band' was certainly a good band for the constructionally challenged persons and local net lovers, but little else and if you had a tiny garden with little aptitude for antenna wizardry, then you kept off it. Some might say the latter still applies, but they overlook the prevalence of s.s.b. plus more power which can overcome such difficulties.

The prevalence of a.m. on all amateur bands caused so much mutual QRM that almost only the chaps with the biggest antennas and power amplifiers were readable. Nowadays, there are still those who like to 'throw their weight' about with huge linears, but by and large, the message has sunk in that 100W is adequate for a decent QSO on any band, unless you love exchanging 'rubber stamp' QSOs with similar characters in DX countries - these are the main culprits of excessive power.

Finally, a benevolent nod to probably the best thing about those old days. I am refering to the ability to do your own repairs to commercial rigs. It's about the only thing that I genuinely miss! PW

Antenna Workshop

After a long period of absence, Peter Dodd G3LDO returns to take up his place in the Antenna Workshop authors team, where his first topic is antenna impedance and how to measure it.

Even the most non-technical Radio Amateurs are aware that most coaxial transmission line connecting the rig to the antenna has a characteristic impedance of around 50Ω. They also know that, if the antenna is not 'matched' to the feeder cable then the standing wave ratio (s.w.r.) will be high.

The method of antenna adjustment using an s.w.r. meter is well known. You connect up your antenna system then make a number of adjustments to the antenna, see which one improves the s.w.r. and carry on from there.

The simple approach is fine with antennas such as dipoles. However, things don't always go smoothly. It's not unusual to hear: "I've tried everything but I can't get the s.w.r. down". The setting up of a matching network on a new design of antenna can be quite frustrating if the only indication that you have is an s.w.r. meter.

An Example

For example, if I wanted to make an antenna to cover the 7, 14, 21 and 28MHz bands that could fit into the average garden and didn't need radials, a full wave loop for 7MHz would seem to fit the bill. When tested the only problem was that when the antenna was fed directly with 50Ω coaxial feeder the s.w.r. remained greater than 3:1, no matter how the element length was adjusted.

In reality I could live with this relatively high s.w.r. because the antenna performances would not be adversely affected. However, solid state power amplifier (p.a.) stage protection circuits are not quite so happy about a high s.w.r. So, some method of matching coaxial cable feeder to the antenna must be found.

The problem centres around the antenna feedpoint impedance. But before you can find a cure you have first to identify the problem. The way to do this is to measure this antenna feedpoint impedance. So, let's have a look at this first.

What Is Impedance?

Impedance (the symbol used is Z) is a general term, which can be applied to any electrical circuit that 'impedes' the flow of a.c. current. An antenna is a tuned circuit having inductance, capacitance and resistance and the equivalent circuit shown in **Fig. 1.**

When transmitter power is fed to the antenna, the current in the resistive part is in phase with the applied voltage, while the current in the reactive part (inductive or capacitive) is 90° out of phase with the applied voltage. Thus the phase relationship between current and voltage in a tuned circuit or antenna element can be anything between zero and ±90°, depending on the ratio of resistance and inductive or capacitive reactance.

To cope with the phase relationship of the current and voltage at the load, impedance is often expressed in two parts. These being the resistive and the reactive parts. An impedance of a resistance of 70Ω with an inductive reactance of 30Ω is conventionally written as (70 +j30)Ω, see **Fig. 2.**

The term 'j' can simply be regarded as a convention for reactance. The '**+j**' indicates **inductive** reactance and a '**-j**' indicates **capacitive** reactance. When the antenna is at its resonant frequency the +j and -j parts are equal and opposite so, only the resistive part remains.

An impedance value can be plotted as coordinates on a rectangular chart or map (hence the term rectangular coordinates) in just the same way that a longitude and latitude is plotted on a map. An impedance value of (70 +j30)Ω is shown plotted on an impedance map or chart in **Fig. 3.** On the impedance chart we use ±j like the map's equivalent of East or West. (This method of notation is known as the rectangular co-ordinate system).

The red line is an impedance plot of the loop antenna, described previously, connected directly to the coaxial cable. When a 4:1 transformer is used the curve, shown in blue, shows a much better match.

The circles shown in Fig. 3 are circles of constant s.w.r. for 1.5:1, 2:1 and 3:1. Using our map analogy, like contour lines of equal height, the circles on our impedance 'map' are contours of equal s.w.r..

Measure Impedance

The first real problem in how to measure impedance. In the past, amateur measurement of antenna impedance was not easy, using all sorts of bridge-type instruments. They all suffered from the problem of interpreting the readings from calibrated dials. (The simplest and most common amateur impedance measurement bridge is the Noise Bridge§).

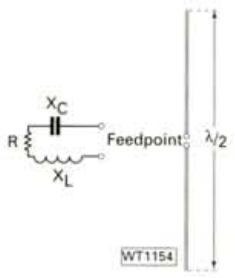

Fig. 1: The equivalent circuit of a centre-fed half wave dipole. At resonance XL and XC are equal and cancel, leaving only the resistance.

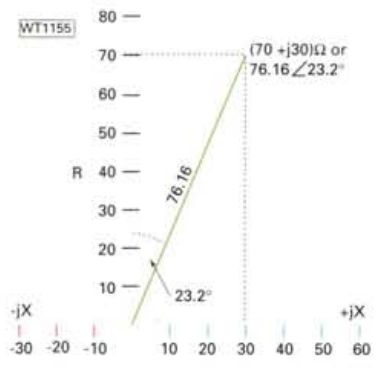

Fig. 2: Impedance map showing the polar and rectangular co-ordinates impedance value of (70 +j30)Ω or 76.16Ω angle 23.2°.

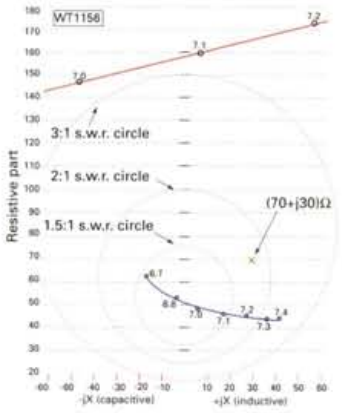

Fig. 3: The curves in blue and in red are impedance signatures of the 7MHz loop antenna with and without a matching circuit respectively. The circles are plots of s.w.r. at 1.5:1, 2:1 and 3:1.

In fact, the method of making impedance measurements could be so convoluted that **Les Moxon**, in his book *HF Antennas for all Locations,* had a complete chapter on 'RF Bridges, their uses and how to manage without them'.

Professional measurements, on the other hand, were made using expensive calibrated bridges such as the General Radio Impedance 1606 RF Impedance Bridge shown in **Fig. 4.** This bridge measures and displays impedance in rectangular co-ordinates. The right hand dial shows resistance and the left, reactance. The indicated reactance value is valid for 1MHz only, and must be divided by the test frequency (in MHz) to get the true reactance.

Impedance can also be defined by the polar co-ordinate system. Using our map analogy again, this is rather like a great circle map, where the location (relative to yourself) of another QTH is given by the length of a line ('Z') and an angle (from 'North').

Some impedance meters display polar co-ordinates, which may be converted to rectangular co-ordinates (and vice versa) using a scientific calculator.

Measured Effect

When you measure s.w.r. to try to find out what is going on at the antenna you are measuring the effect of differing values for antenna feedpoint impedance, feeder impedance and transmitter output. For example, in a (nominal) 50Ω systems an antenna impedance of (100 +j0)Ω will give an s.w.r. of 2:1 (as it's twice the impedance of the characteristics of our 50Ω coaxial cable.

Conversely, an antenna feedpoint impedance of (25 +j0)Ω will also give an s.w.r. of 2:1. But so will a large number of other combinations of impedance values. If you measure an s.w.r. of 2:1 then all you know is that the impedance, when drawn on a Smith Chart, lies somewhere on the 2:1 s.w.r. circle. This explains why an s.w.r. meter is not necessarily the best instrument for deciding what sort of antenna matching network is required.

A transmission line can be used as an impedance transformer. The effect of this transformation is best seen if the impedance is plotted on resistance and reactance lines that are sections of a circle instead of being straight. This style is shown simplified in **Fig. 5** and is known as a Smith Chart.

On the Smith chart, the first thing that you will notice is that s.w.r. circles are concentric. By calibrating the outside of the diagram in fractions of a wavelength we can use the chart to calculate the effect of the impedance transformation over a length of transmission line (the s.w.r. circle crosses the resistance line (vertical) at both the 100 and 25Ω points.

So, you can see a half wavelength (or multiple) of feeder makes a 1:1 transformer. This means that you can use a multiple of (electrical) half a wavelength lengths of feeder to measure the true impedance of the antenna from the ground or the shack.

Measurement Instruments

A new range of moderately priced r.f. measurement instruments are now becoming available to the Radio Amateur. The Autek RX Vector Analyst VA1, shown in **Fig. 6**, is the latest example and it uses a microprocessor to provide a whole range of impedance and s.w.r. information.

The Autek VA1 measures and displays s.w.r. **relative to 50Ω**, although other transmission line impedances can be selected. It can display impedance in rectangular or polar form, as well as inductance(μH) and capacitance(pF). The Autek VA1 will also measure and display impedance as the equivalent parallel load resistance and reactance. But this is beyond the scope of this article.

The real clever bit is the ability of this instrument to display the antenna feedpoint impedance via a length of feeder that's not a full half wavelength at the frequency of measurement. But this can only be done if the (electrical) length of the cable is defined. Although without a numeric keypad to enter the value it might appear difficult - never mind the VA1 will work the cable length out for you.

Fig. 4: A commercial r.f. impedance bridge, from the General Radio Company. This instrument needs a signal source, such as a signal generator and a receiver to detect when the bridge is balanced.

Equipment Accuracy

The General Radio Impedance 1606 RF Impedance Bridge and the Hewlett-Packard HP4084 vector impedance meter are professional precision instruments that can sometimes be obtained at rallies (that's where I got mine from). So how accurate are they and how does the the Autek VA1 compare?

If you use a length of terminated {(100+j0)Ω} coaxial cable and take a number of impedance readings with different lengths of coaxial cable you will get a number of readings lying along the Smith Chart 2:1 circle. Any deviation from this circular line would represent an error.

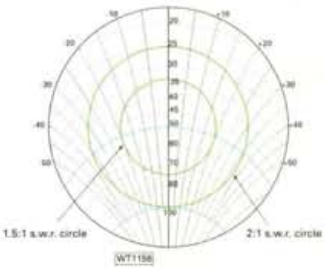

Fig. 5: A simplified Smith Chart. See text for more details.

As changing the length of the cable is rather inconvenient, a easier method, is to change the test frequency, effectively changing the electrical length of the cable. The results of such a test, using a length of mis-terminated coaxial cable were shown, (checking the accuracy of an MFJ-259B) in 'Tex Topics' January 1999 *PW*. Although the data was presented in a different form.

The 'Tex' method of checking impedance is fairly rigorous and the plots may lead you to think that these instruments are not that accurate. But even a precision instrument like the Hewlett-Packard does not produce a perfect circle. The errors are mainly the result of reading and plotting the data.

Data plots made using the Autek VA1 showed that, although not absolutely accurate, they indicated that the instrument can give reasonable results.

So, get measuring. I'll see you when I'm in the Antenna Workshop next!

Fig. 6: The Autek RX Vector Analyst VA1, a tiny instrument that can measure a wide range of r.f. parameters

Fig. 7: The Hewlett-Packard HP4084 vector impedance meter is a stand-alone instrument and does not require any additional equipment to make the measurement.

§ - **References**

'RF Noise Bridge' by **E. A. Rule G3FEW**, p44 *PW* January 1982.

'Feed point Resistance and Component Bridge' by **Denis Payne G3KCR**, p32 *PW* April 1997.

The Antenna Experimenters Guide and *The ARRL Antenna Compendium Vol.3* give more details about measuring impedance. Both these books are available from the *PW* Bookshop.

Oregon Scientific's Weather Clock

We asked our technical 'person', 'Tex' Swann G1TEX to have a look at a different type of shack clock from Oregon Scientific. Here's his forecast!

Rob G3XFD, the editor, called me into the office and said "would you like to review a smart-looking atomic-time locked weather-predicting clock from Oregon Scientific"? Well ever one for a challenge, I of course said yes. The subject of this review turned out to be the main BAR888 Oregon Scientific instrument unit shown in the heading photograph and a smaller white 'outstation' that can communicate the temperature at its location over a 418MHz link to the main instrument. The main unit can deal with up to three outstations, each one on its own discrete 418MHz channel.

Although there may be up to three outstations 'on-line', only one temperature reading at a time may be displayed on the main clock. The temperature measurements may be displayed on either a Fahrenheit or a Centigrade scale, by selection of a small switch under the back panel. But I'm jumping ahead of myself so, let me start from unpacking the units as they arrived.

Fig. 1: The freestanding 'outstation' temperature sensor can also be hung on a wall when fitted with a small rear-mounted clip.

Simple And Easy

Unpacking and setting up the two units that were in the box was simple and easy. The main, smart looking, clock unit of two-tone grey plastic construction 180×130×30mm with a slightly bowed front and back. Each unit came with a set of batteries so, initially at least, nothing else was needed. The main clock display runs from four AA-sized 'penlite' cells, whilst the outstation runs on two AAA sized cells.

An access hatch at the back hides the four-cell battery compartment, the slide out dark grey foot (for free standing) and four small switches. The access hatch also acts as the locking part for the foot. With a built-in catch on each edge of the hatch the well designed foot makes the clock stable when free-standing. If you prefer though, the clock may be hung on a wall, using the shaped cutout moulded into the hatch.

Fig. 2: Removing the back and its sealing gasket, reveals switches for the transmit channel and measurement scale, along with the small helical-wound 418MHz antenna, visible in the 'window'.

The main display (104×49mm) sits above five dark grey 'letterbox' shaped switches that control the mode that the clock operates in, the alarm, temperature display mode and which of the three outstations temperature is currently being displayed. The top third of the display is taken over with a 'weather-prediction' display, with four other digital displayed below.

The outstation temperature display (along with its displayed trend over the last hour) is slightly larger at 18mm high, than the internal temperature display of 12mm height. As the outstation can be up to 30m away I put it outside in the 'shed'. Each morning I could see the outside conditions (and also if it was the XYL's turn to get up and make the breakfast) without getting out of bed.

It's possible to set two independent alarm times ('his' and 'hers'?) on the clock and the alarm chiming tone is one of the most 'civilised' I've come across. For the first 20 seconds of operation a single, somewhat muted' cheep is sounded each second. If you ignore the thing then for a further 20 seconds a double-beep is sounded each second.

If the double beeping fails to alert you, then the clock tries a three per second beep for another 20 seconds. If this sound fails to waken you, the unit finally, gathers itself together and starts a continuous short sharp (five per second) full-throated peeping in an effort to elicit a response. In the calm, quiet of a bedroom it would just be adequate for most people (but it wakes G3XFD up!).

Synchronised With Rugby

The clock unit, in normal operation, synchronises itself with the Rugby atomic-clock transmission each hour (this happens immediately on first operation - or by pressing the reset button). By default, it shows the standard times, of GMT in winter and British summer time in summer (what summer?). But, as a shack clock, you can actually offset the time by any hourly amount to keep GMT throughout the summer.

Each of the outstations, called a 'Thermo Sensor' by Oregon Scientific, is a 90×59×20mm unit that transmits the displayed temperature regularly, on one of three selectable 418MHz channels, to the main clock. The unit also doubles as a 'simple' thermometer with a 9mm high digital display showing either °F or °C. An l.e.d. just under the display flashes in time with the data transmission, which seems to be about every 20 seconds.

Weather Prediction

The weather prediction capability of the clock is based on the method of prediction used by most barometers - that low barometric pressure signifies rain and high pressure a nice sunny day! Hmmm! Over the period I had the unit the weather was so changeable that I was never sure if it was showing a prediction or a 'whilst-you-were-asleep-the-weather-was' style report.

The clock does try hard though. Whatever the actual 'informed' guess of the weather, an arrow symbol, that shows the trend of the barometric pressure over the previous hour, is displayed. And this symbol coupled to the displayed trend of the outstation temperature and its present temperature does give a slightly better overview of the weather than my review might imply.

The Oregon Scientific is a useful clock and weather display although, in reality, little more accurate than close observation of a good barometer. It is though, cheaper than a good barometer and has several other options available.

Greenhouse Owners

The clock and its outstation would be of immense use to greenhouse owners everywhere. The knowledge of the temperature in the greenhouse, and whether it's too cold or too hot in there. But do I think this Weather-Clock is of use, as part of a radio station?

Well, in answer to that question, I've noticed that a 'lift' often occurs on v.h.f. when, after a period of high

Continued on page 58...

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This month the Rev. George Dobbs G3RJV describes a QRP amplifier which will enable you to turn your 'Universal VXO' into a transmitter ... after you've read the usual appropriate quotation!

Carrying on the Practical Way

"Non omnia Possumus omnes"
[all power is not to all]
Virgil

In the March 1999 edition of this column, I introduced readers to a universal VXO circuit. It was a variable frequency oscillator based on 'pulling' a crystal with inductance and capacitance that gave a useful range of frequency excursion without the usual problems associated with a stable variable frequency oscillator. (It's always gratifying to have the goods without the problems!).

In the May 1999 edition I described a direct conversion receiver which could be driven by the VXO and here I offer a little QRP transmitter board suitable for use with the same VXO. A truly 'universal' project!

Useful Results

Low power transmitters are capable of very useful results on the h.f. bands. Readers only have to remember the well-known fact that a four times reduction in r.f. power output is only equivalent to a theoretical one 'S-point' reduction in the received signal. The often-amazing results of QRP operators testify to the viability of using low power on the Amateur Radio bands.

The little transmitter I'm describing this time is capable of an r.f. output in the 3 to 4W range. In this article I'll describe its use on 7MHz, where it could produce a lot of worthwhile QSOs.

The VXO board provides some 2V peak-to-peak of r.f. output which is a very adequate starting point for the transmitter board. The circuit of the r.f. 'power amplifier' section is shown in **Fig. 1.**

The VXO output is coupled to the driver stage via C1. The driver is a 2N2222A bipolar transistor. The stage is well decoupled, r.f. wise, by the use of C3 and C4. In Fig. 1, Tr1 is powered by a keyed 12V supply, which comes from the antenna change-over board which I'll describe later in this article.

An alternative way to key the transmitter is shown in Fig. 1a. Here the emitter of the driver stage and the base load resistor are keyed direct. This method is ideal if the change-over circuit is not being used, for example if a r.f. change-over is to be added.

Note that there are two 0.1µF capacitors in the key circuit. One of these is wired directly across the contacts of the key jack socket. My final version of the transmitter used this configuration because I have a built-in r.f. change-over on the input of the receiver I used for my on-air tests.

The 2N2222A stage drives the power amplifier via C2. The power amplifier is a VN10KM VMOS device. Here, I'm grateful to **Dr. Mike King G3MY**, for a circuit which was published in *Sprat*, the journal of the G-QRP Club.

Mike suggested that the VN10KM could be used for power outputs well above the 1W level commonly associated with these devices. However, as Mike suggests ... this does depend on good heat dissipation for the VN10KM.

The VN10KM does have a heat distribution tab but it's very small and does not include a hole for mounting it to a conventional heatsink. This calls for a little ingenuity from the individual constructor.

Fortunately, in practice, **it is possible** to solder the tab to a larger piece of heat conductive material. I made a heatsink from a piece of brass cut from an unwanted brass hinge. This was soldered - with care - to the small tab on the VN10KM.

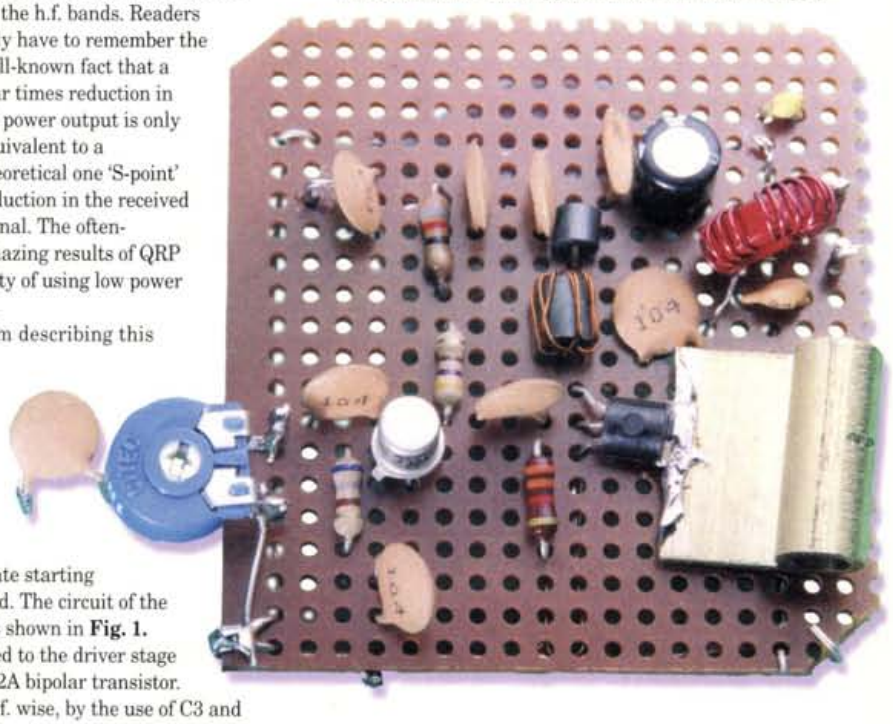
The additional heat dissipation allowed the VN10KM to give around 3W of r.f. output for long periods of operation without curling up its toes. In his original article G3MY used a larger L-shaped heatsink which bolted to a metal case (via a mica insulator).

In the G3MY arrangement the tab of the VN10KM was attached to the heatsink using a 6BA bolt and washer to clamp the tab to the surface. This proved safe with the key down for an hour at a 4W output level. However, I leave the final arrangement to the ingenious skills of the *PW* reader!

Maintaining Stability

Some care must be taken maintaining the stability of the power amplifier stage. To this end, the circuit shows good decoupling of the supply line using C6, C7 and C10.

A ferrite bead is also slipped over the lead for the supply



This month's project. Believe it or not - it's a 'power' amplifier for a 7MHz transmitter!

line to the VN10KM. If the power amplifier is mounted in a case, place C10 close to the point where the supply enters the case.

The layout of the power amplifier should also be contrived to keep the input away from the output. I used a piece of Perf-board to build my amplifier.

If problems still exist, it's worth slipping a ferrite bead over the gate lead of the VN10KM. Adding a small resistor (say 100Ω) in the gate lead could do a real 'belt and braces job'. However, despite these suggestions none of the extra precautions were required on my prototypes for the 7MHz band.

The r.f. load for the drain of the VN10KM is a home-wound r.f. choke. This is made by winding 12 turns of 32s.w.g. enamelled copper wire through a small ferrite bead. (Take care when making this winding because the edges of the bead may be sharp and scrape the enamelling off the wire).

The output of the power amplifier goes via C5 to a simple low-pass filter. I used a three-element filter although the seven element filters I have used elsewhere (see 'Carrying On The Practical Way' March 1997) would provide better harmonic reduction. The values for 7MHz are: C8 - 330pF, C9 - 390pF, L1 - 16 turns 28s.w.g. on a T370-2 core.

The output from the VXO proved to be too much for the r.f. amplifier board and I added the drive control pre-set potentiometer shown on the left of C1. This may be added to the VXO board or the r.f. amplifier board.

Antenna Change-Over

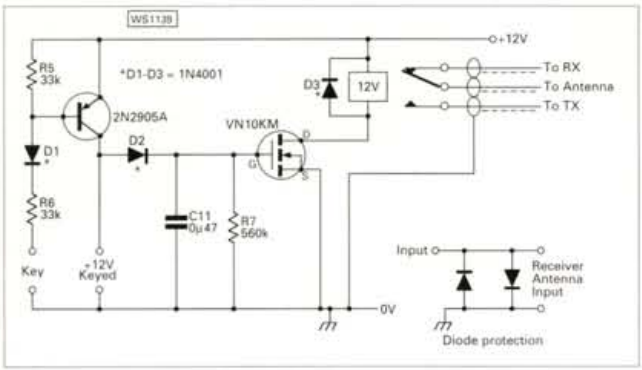
The diagram, **Fig. 2**, shows an antenna change-over circuit that may be used with the transmitter. In use this changes the antenna from receiver to transmitter when the key is pressed and also provides a 12V keyed supply for the transmitter.

In the circuit a 2N2905A *pnp* transistor acts as a d.c. switch controlled by the transmitter key, and when the key is down the transistor switches on. This places a 12V supply to the collector of the 2N2905A following the action of the keying - the 12V keyed line.

The collector of the 2N2905A is connected via a diode to the gate of a VN10KM VMOS device. This is switched on and off by the keyed 12V and operates a relay in the drain circuit. (I think it's best to avoid the antenna changeover relay following the action of the key because this would produce a constant clattering of the relay).

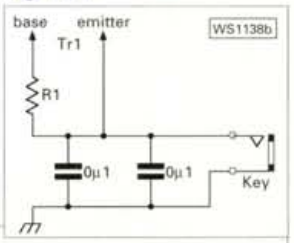
A better method is to allow some 'hang time' on the relay action. This is achieved by adding a capacitor and resistor to the gate circuit of the VN10KM.

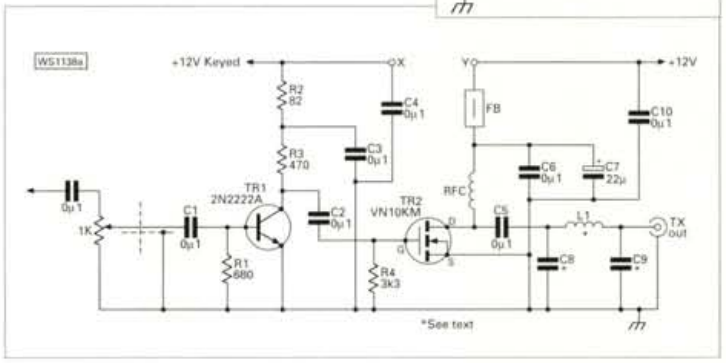
Fig. 2: A suitable antenna change-over circuit. The change-over 'hang time' can be adjusted to suit individual requirements. The diode protection circuit (inset) is a useful addition (see text).



When the key is pressed and 12V appears at the collector of the 2N2905A, the VN10KM switches on and the capacitor (C11) charges up. When the key is released and the 12V disappears from the collector and the capacitor discharges through the resistor (R7). This holds the VN10K on for a short time.

Fig. 1(b)





The 'hang time' can be varied by the values of C11 and R7. (The decaying voltage from the discharge of C11 does not effect the collector of the 2N2905A because it is on the other side of D2).

Fig. 1(a): Circuit of the r.f. amplifier used in the 7MHz transmitter (see text). An alternative keying circuit is also shown (inset) Fig. 1(b).

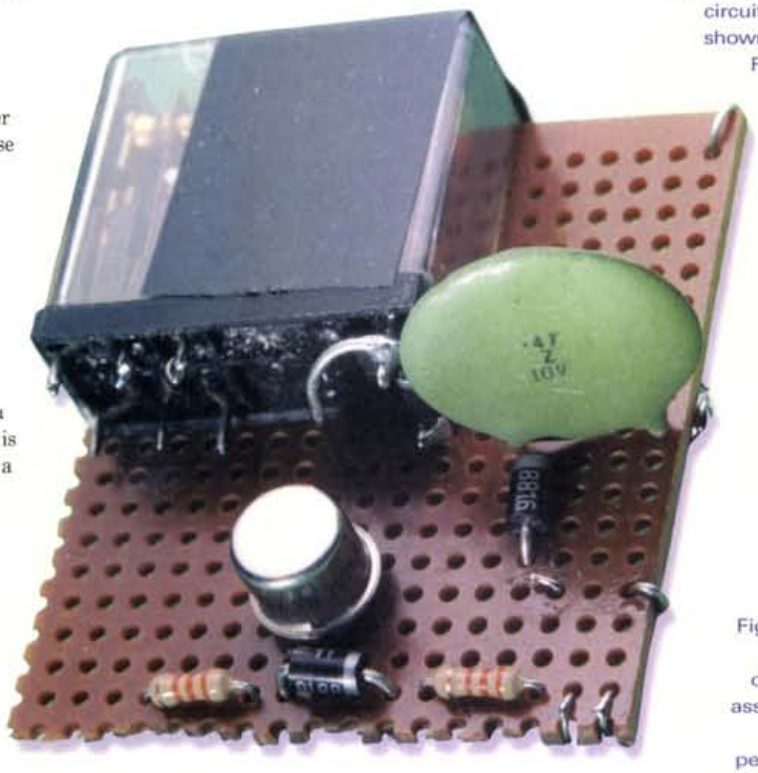


Fig. 3: The change-over unit assembled using perforated matrix board (see text).

Easy To Use

Used in conjunction with the power amplifier board, the change-over board completes an easy to use transmitter to go alongside an existing receiver. Ideally, however, the receiver requires muting during the transmissions.

In practice, I often use little transmitters such as this project by simply turning down the receiver audio gain control to an output level at which the signal can be used to monitor the keying.

Although the antenna is electrically removed from the receiver during transmission, the little circuit (inset in Fig. 2) can be a useful small circuit addition. This is just a couple of diodes placed back to back across the receiver input to reduce the signal level entering the receiver.

I hope you enjoy building the project - it's really amazing what QRP can achieve! PW

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Ideal For The Novice Radio Amateur

The Simple 10-15 Transmitter

Steve Ortmayer G4RAW has been busy up in his 'eyrie' in Halifax and this time he's describing a very simple transmitter suitable for both the 21 and 28MHz bands - ideal for the Novice Radio Amateur or keen QRP enthusiast

A Radio Amateur in Idaho in the United States of America wrote to me recently to ask for details of h.f. frequencies used by the UK Novice Radio Amateur operators. He was keen to have a QSO with a UK Novice station.

I sent the frequency details and suggested that the Novice allocation on 21MHz may offer the best opportunity of a QSO with a UK operator limited to 3W. And as I've noticed that 21MHz is now picking up a bit ... I thought a simple transmitter for the band may interest some of you and perhaps tempt some more activity on the band!

The Circuit

The circuit is a 'bolt together' job using two circuits from the late Doug DeMaw W1FB's internationally famous book *Solid State Design For The Radio Amateur*. The output is approximately 4W. The circuit diagram of the transmitter is shown in **Fig. 1** and the keying circuit in **Fig. 2**.

The variable crystal oscillator (VXO) tuning capacitor allows the crystal to be varied in frequency by ±10kHz or so. This means that with only a few crystals, most of the UK Novice allocation can be adequately covered.

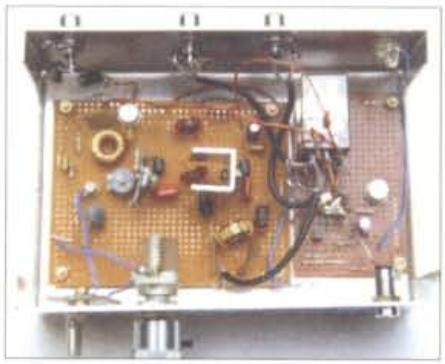
Perforated Board

I built my prototype on plain perforated matrix board, as shown in the photographs. Using this method I run the interconnecting wires underneath the matrix board, so they're not visible in the photograph.

Although I've provided a physical wiring diagram you can of course easily follow the similar layout as I did by placing the components as shown in the photograph. If you decided to design your own printed circuit board layout, a double-sided p.c.b. design would be better.

Alternatively, you can adopt the 'components on the same side as the 'track' p.c.b. method suggested by **Rob Mannion G3XFD** in the 'Radio Basics' series. Rob's system is simple and does not require much p.c.b. drilling and is also quite robust. For a description of the method see *PW* page 16 (July) and page 18 (August 1998). (Page 18 in the August issue shows a QRP VXO transmitter built using the method described.

When it comes to the assembly I suggest you complete the oscillator circuitry up to R5. You can then test to see if the oscillator is working by either listening on a receiver, using an r.f. probe (a small loop with a diode connected to a multimeter) or an oscilloscope if you have one.



The circuit will work on either 21 or 28MHz. Incidentally, I had intended to fit two separate trimmers at C3's position, one set for 21 and the other for 28MHz and switch between them. In practice however, I found that C3 could be set in a position to work on both bands.

Once you've found that all is well with the oscillator circuitry you can then add the driver transistor Tr2 and the components up to C6. Don't forget that a dummy load will be needed to check the power output - and you should measure around the 50mW level.

As you progress through the test keep 'peaking' C3 as each stage is added. In operation, the oscillator is running all the time to reduce 'chirp' but Tr2 is switched by Tr3.

If everything is okay at

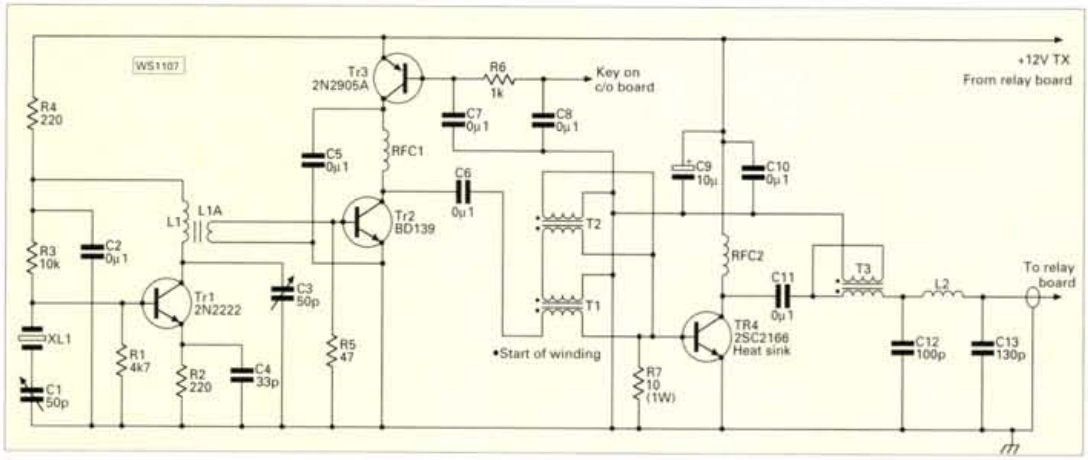


Fig. 1: The main circuit of the Novice 21/28MHz transmitter.

Shopping List

The only parts needing much in the way of explanation are the two RFCs that are each made up of eight turns of 0.27mm (32s.w.g.) enamelled copper wire (e.c.w.) wound on a ferrite bead.

The collector load coil and transformer, L1a/b, is made up by winding 17 turns of 0.56mm(24s.w.g.) e.c.w. wound on a T50-6 toroid for the primary. The secondary consists of three turns of 0.56mm e.c.w. near the '+12V' end of L1a.

The low-pass filter coil, L2, is made by winding nine turns of 0.71mm e.c.w. on a T50-6 type toroidal core.

All three transformers T1, 2 and 3 are made up of seven bifiliar (two wires) winding on FT-37-61 toroidal cores. Take great care to identify the primary and secondary windings of these items. And make sure you get the phasing correct - note the 'blob' shown on each winding in Fig. 1, denoting a notional 'start point'.

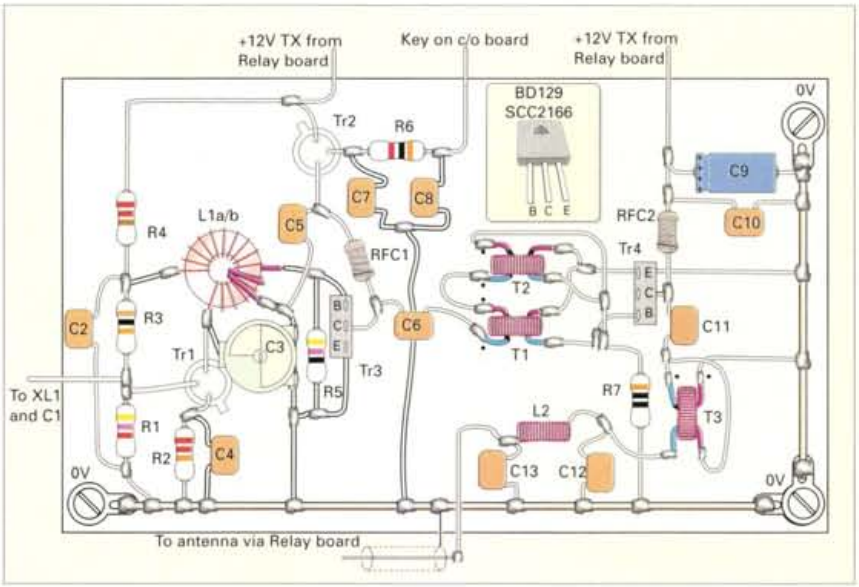


Fig. 3: A suggested layout for the transmitter board.

this stage you can then add the rest of the components.

The Transformers

The transformers, T1, 2 and 3 are each wound with pairs of wires twisted together (bifiliar). To prepare the wires I placed a small hand drill into a vice, and with the two wires carefully clamped in the chuck I slowly turn the handle which produces a nice even twist in the wires.

When you've finished the 'twisting' using the drill, remove the twisted pairs and finish each one off so that they can be connected correctly phased. Then finish assembling the transmitter along the line of **Fig. 3**.

When the transmitter board is finished check the output into a dummy load and you should have between 4 and 5W. (If you're a Novice and really want to look St. Peter straight in the eye when the times comes ... you should of course reduce the voltage to cut the power down to 3W!).

An easy way to reduce power is to use one or two diodes in the 12V d.c. power supply line. I've incorporated a 1N5401 at the 12V input with a 25V electrolytic capacitor. This provides reverse polarity protection and extra r.f. decoupling.

Take care with the wires under the board where they cross. In fact it's best to use insulated wire at these points.

Change Over Board

The transmitter can be fitted into a case with the changeover board (carrying the relay), the circuit is shown in **Fig. 4**. When everything is completed it can be tested on the air.

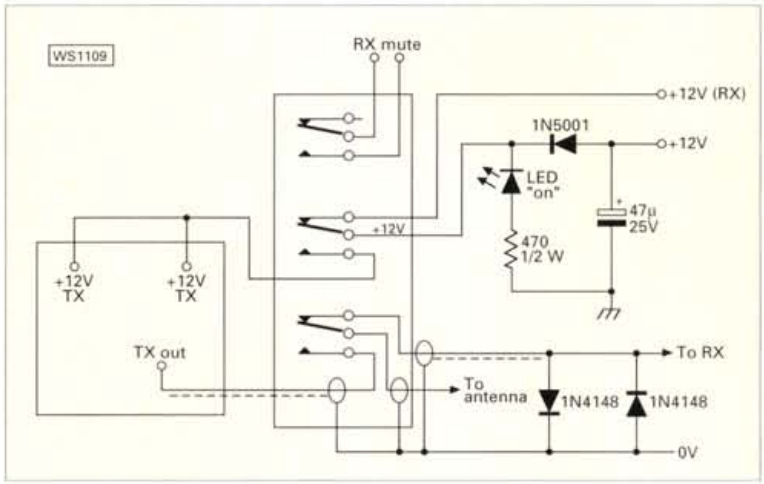


Fig. 4: The overall interconnection diagram. The two reverse connected 1N4148 diodes act to protect the input of the receiver.

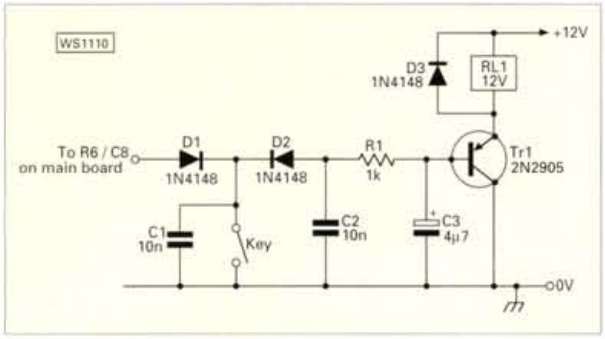


Fig. 2: A simple keying circuit. Note the relay RL1 actually is mounted on the changeover board.

The low pass filter is very simple, so a good antenna tuning unit is a must after the transmitter to minimise any harmonics.

My first QSO with this transmitter was with an RA3 station (Rssui) who gave me a RST 578 report. He explained the signal's overall report of '8' with "Bad chirp old man"! I'm sure that many 'old hands' would smile if they were told they had a poor tone by an RA3. How times have changed!

However, I was using my prototype where I was also keying the oscillator. So, a quick modification to the circuit - leaving the oscillator running all the time (as in the circuit as shown in Fig. 1) cured the problem.

I haven't made it to Idaho with this little transmitter yet, but I have made it across the 'pond' to Boston. Why not build one and try it for yourself! PW

Delving Into The World Of Power Levels And...

Dealing With Decibels

Ray Fautley, G3ASG, delves into the often misunderstood world of power levels, the terms 'decibel' and logarithms. An understanding of these subjects is necessary for radio and really useful when dealing with antennas and feeders.

"...The logarithm of any number can be found by reference to log tables, or very much easier by using a modern pocket calculator..."

I suppose that everyone hears (and probably uses) phrases such as: '... signal-to-noise of 15dB', '... an antenna gain of 18dB', '... filter attenuation is 60dB'. But to be honest, are we always really sure what we mean by these expressions? Another use of the decibel term appears in our Amateur Radio transmitting licence conditions, where the maximum power to be used on any band is quoted in terms of dB relative to 1W. This 'dB relative to 1W' is usually written as 'dBW'.

The way the term is used, the decibel (dB) sounds as though it is a unit of some sort, **but it isn't a unit of any kind - instead it's always a logarithmically expressed ratio of two power levels**. Now, don't just switch off because you think you "never did understand maths", 'cos if you do, I'm wasting my time in writing this and *PW* are wasting valuable editorial space publishing it! This article is just for you, because I think there's no mystique in a little bit of maths in our hobby.

Let us assume we have an audio amplifier that produces 10W output power when a signal of 1mW is applied to its input. The ratio between the output power out and the input power is obviously:

$$\frac{P_{out}}{P_{in}} = \frac{10W}{1mW} = \frac{10}{10^{-3}} = 10^4$$

Meaning that the output power is 10 000 times greater than the input power. Now looking at the above 'maths', why do logarithms have to get involved then?

The reason that logarithms are involved is to simplify the calculation of overall gain of a system comprising several amplifying stages. It would mean multiplying the various stage gains together to get the answer. Using a logarithmic system means that we only have to **add** numbers together rather than multiply them. We simple engineers always take the easy way out!

You may ask where does the decibel come from, anyway? The answer is straightforward as the unit is based on degrees of loudness as assessed by the human ear. In general, the loudness of a sound appears to be **twice** as loud only when the level of the sound is increased by as much as **ten** times. This means that for a sound to appear to be four times as loud, the level of the sound has to be raised by 100 times! In fact, the ear (of our younger readers anyway!) can hear sounds over an intensity range of 1 million million, i.e. a dynamic range of 10^{12}!

Mathematically, the compression of sound levels by the ear indicates that our ears have a **logarithmic** function which is the reason for using the decibel, which is also logarithmic. The equation connecting power levels with decibels is:

$$NdB = 10 \times \log_{10}\left(\frac{P_2}{P_1}\right)$$

where NdB is the number of dB and the term '$\log_{10}$' is the logarithm to the base 10. The term 'P_1' is the **lower** power level and 'P_2' is the **higher** power level.

You may ask "why the initial multiplying factor of 10 in the equation"? Well, that comes from the 'Bel' which is the original name for the ratio which, although fine when used with audio power, is regarded as being rather large for most electrical uses [*a little on the lines of the Farad (F) and the microfarad (μF)* G1TEX]. In the scientific (metric) system 'one tenth' is expressed as 'deci' - hence decibel meaning a tenth of a Bel. The term '$\log_{10}$' means logarithm to the base 10, usually referred to as 'common logs' or even just 'log' and is written as just 'log'. This is how it appears in the following text.

The above method works for power gain, but what about power loss and how do we deal with it? Power loss occurs in items such as an attenuator, so, let's start with our original formula:

$$NdB = 10 \times \log\left(\frac{P_1}{P_2}\right)$$

Again, NdB is the number of dB and 'P_1' is the **lower** (output) power level and 'P_2' is the **higher** (or input) power level.

Suppose the output power is 0.2W and the input power is 12W, what is the power loss (negative gain!) expressed in dB?

$$NdB = 10 \times \log\left(\frac{0.2}{12}\right) = 10 \times \log(0.0167)$$

$$= 10 \times (-1.778) = -17.78dB$$

Other Way Round

Next we have to consider the problem the other way round. How do we find the power ratio when given a dB gain or loss? Let's start with the original formula:

$$NdB = 10 \times \log\left(\frac{P_1}{P_2}\right)$$

Now divide both sides of the equation by 10:

$$\frac{N}{10} = \times \log\left(\frac{P_1}{P_2}\right)$$

$$\text{let } \left(\frac{P_1}{P_2}\right) = P \text{ (power ratio)}$$

take antilog‡ of both sides:
antilog(0.1N) = P

An Example

So, as an illustration to make it clearer let's have a look at an example. If an amplifier is said to have a gain of 45dB, what is the actual power ratio between input and output?
antilog $(0.1 \times 45) = P$
antilog $(4.5) = 31\,622.8$
So, when an amplifier has a power gain of 45dB, the power output of the amplifier is 31,622.8 times the power at its input.

Getting back to the very first example using the input and output power levels of an amplifier (audio or r.f., it makes no difference) we'll put the figures into the decibel formula.

$$NdB = 10 \times \log\left(\frac{10W}{1mW}\right) = 10 \times \log\left(\frac{10}{10^{-3}}\right)$$

$$= 10 \times \log(10^{1+3}) = 10 \times \log(10^4)$$

$$= 10 \times 4 = 40dB$$

Our amplifier has a power gain of 10 000 times, or 40dB.

Consider the effects of increasing the power of four

"...The term decibel means one tenth of a Bel (a term that represents a ratio of 10:1 in terms of power). It should be written as ' dB' - note the lower case 'd' and the capital 'B'... "

different transmitters with power levels of:
a) 0.1W b) 1W
c) 10W d) 100W
by exactly 10W. The change in each case is by exactly the same amount - 10W - but obviously the increase of 10W to a 0.1W transmitter is very different from the increase of 10W to a 100W transmitter.

Much Clearer

Expressed in dB the difference should become much clearer. (Doesn't it?)
Example (a) The 0.1W transmitter increased to 10.1W

$$NdB = 10 \times \log\left(\frac{10.1}{0.1}\right) = 10 \times \log(101)$$

$$= 10 \times 2.004 = 20.04dB$$

And where the 1W transmitter increased to 11W

$$NdB = 10 \times \log\left(\frac{11}{10}\right) = 10 \times \log(1.1)$$

$$= 10 \times 1.04 = 10.4dB$$

Now increasing the 10W transmitter to 20W output

$$NdB = 10 \times \log\left(\frac{2}{1}\right) = 10 \times \log(2)$$

$$= 10 \times 0.301 = 3.01dB$$

And finally, changing the 100W transmitter to 110W.

$$NdB = 10 \times \log\left(\frac{110}{100}\right) = 10 \times \log(1.1)$$

$$= 10 \times 0.041 = 0.41dB$$

Let's now look at the results of these changes. The output changes (in dB) are: a) 20.04dB, b) 10.4dB, 3.01dB and 0.41dB. Hopefully, these examples demonstrate the value of using the dB as an indication of a power change.

Transmitting System

In a transmitting system, the transmitter produces 50W of power that's connected to an antenna tuning unit (a.t.u.) which has a quoted efficiency of 95%, an antenna feeder with a loss of 2% and finally to a beam antenna with a forward gain of 7dBd (Note the additional 'd', which means relative to a dipole). What is the effective radiated power in the direction to which the antenna is pointed?

First find the 'gains' in dB of all the parts of the system and remember the a.t.u. and the feeder both have losses, meaning a negative figure of 'gain'.
For the a.t.u. at 95% efficient, it will have a 'gain' of:
$NdB = 10 \times \log(0.95) = 10 \times (-0.0223) = -0.223dB$
For the feeder (another negative 'gain'):
$NdB = 10 \times \log(0.98) = 10 \times (-0.0087) = -0.087dB$
And finally the antenna has a quoted gain of 7dBd (but we only need the figure not the reference). So, using dB we merely add all the figures together:
(-0.223dB)+(-0.087dB)+7dB
to arrive at a relative power of 6.69dB above 50W (*which will give an improvement of about one 'S' point on* ***both transmit*** *and* ***receive.*** G1TEX).

Without using decibels the overall gain would be:
$0.95 \times 0.98 \times$ antilog (7)
$= 0.95 \times 0.98 \times 5.01$
$=4.66$
The output power is then 4.66 ¥ 50W = 233W and although either method gives the same result, using dB gives a more meaningful answer in 'real world' terms

Voltages and Currents

That's all about power levels, what about voltage and current dBs? There are no such animals! All decibel figures refer only to power levels. This loose reference to voltage and current ratios may only be justified when **both input and output impedances are identical**. In general - **always convert input and output levels to power levels and your decibel calculations will be correct**.

Supposing an amplifier is to be designed for a crystal microphone having an impedance of say, 100kΩ and the amplifier's output impedance is to be 50Ω. For simplification, assume the microphone produces 1V r.m.s. for normal speech. If 1V r.m.s. is also the maximum output voltage of the amplifier the voltage ratio would be one (or 0dB). Is this then really an amplifier when it has the same output voltage as its input voltage? The answer is of course, 'yes' it certainly is!

Let's look at the input power first:

$$P = \frac{V^2}{R} = \frac{1^2}{100\,000} = \frac{1}{10^5} = 10^{-5}W$$

Now the output power:

$$P = \frac{V^2}{R} = \frac{1^2}{50} = \frac{1}{50} = 0.02W$$

Giving a **power gain** of 2000, or when expressed in dB (using Power of course):
$NdB = 10 \times \log(2000) = 10 \times 3.3 = 33dB$

Please note: That in reality we have a power gain of 2000, although the input and output voltages are equal. **So, the moral is: - always use power levels!** *PW*

‡ Antilog:
The term antilog and log have the relationship:
If $a = \log_{10}(b)$ then
$b = \text{antilog}_{10}(a)$ or $b = 10^a$.
(The $\log_{10}(100)$ is 2.0 and of course $10^2 = 100$)

Power Level Problems

Just a few problems to work out with your new skills of the use of power levels and decibels .

(1) An amplifier has as output power of 5W for an input power of 0.1mW. What is its power ratio?
a) 50 b) 500
c) 5000 d) 50,000

(2) If an amplifier has a power gain of 500, what is the input power required to produce an output power of 25W?
a) 4mW b) 50mW
c) 100mW d) 500mW

(3) An amplifier has a power gain of 1,000,000 (or 10⁶). What is its power gain expressed in dB?
a) 6dB b) 30dB
c) 50dB d) 60dB

(4) An amplifier needs a power level at its input of 2mW to produce a power output of 1000W (or 1kW). What is its power gain in dB?
a) 5.7dB b) 50dB
c) 57dB d) 63dB

(5) An antenna is said to have a gain of to 12.8dBd. What is the forward power relative to a dipole?
a) 1.905 b) 19.05
c) 1.342 d) 13.42

(6) A transmitter has a power output of 75W. What value of 'dBW' is marked in the logbook?
a) 18.75dBW b) 7.5dBW
c) 4dBW d) 1.875dBW

Practical Wireless are offering you the opportunity, on these wet and windy spring days, to stock up on some books and perhaps fill a gap on your book shelf. Amateur TV (ATV) and Slow Scan TV (SSTV) are the order of the day, so why not browse through the profiles and, if the weather still hasn't improved, you could even find yourself setting up your very own SSTV operation!
Also, why not take advantage of the FREE P&P (UK only) which is available on all books from our Book Store for this month only. (Offer ends 10th June 1999). Readers wishing to take advantage of this offer must quote PW699.

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 82

Book PROFILES

An Introduction To Amateur Television
Mike Wooding G6IQM & Trevor Brown G8CJS

£5.00

Want an easy-to-read introduction to ATV? Then why not give this book a try? **Highly Recommended.**

The first book that we have for you this month is ***An Introduction To Amateur Television*** and is written by **Mike Wooding G6IQM** and **Trevor Brown G8CJS**. The other important thing that you should know is that it is published by **The British Amateur Television Club (BATC)**.

The book is a very good place to start if you would like to learn more about the 'ins and outs' of Amateur TV (ATV), as the Foreword to the book explains: " This book is intended to provide a practical introduction into the fascinating world of amateur television (ATV)".

The book also states that you don't have to be "fully conversant with every intricate part of the television wave form, before building and operating an ATV station, in particular colour encoding ...", however, it does go on to say that you should understand "... the difference between RGB and an encoded signal such as PAL". Confused already? Then this is the book for you! The very first chapter, 'The Principles of Television', deals with this very thing.

The other chapters include 'Setting up your TV Station'; 'Video Sources'; 'A 70cm Amateur Television Station'; 'A 24cm Amateur Television Station'; 'A Remote Controlled Modular ATV Station'; 'A Spectrum Computer Controlled ATV Repeater' and 'Operating an Amateur Television Station'.

Slow Scan Television Explained
Mike Wooding G6IQM

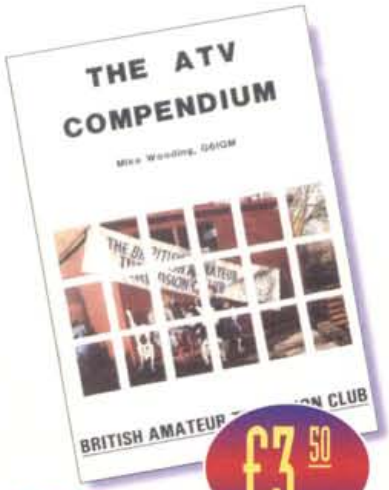
£5.00

Slow Scan Television Explained, like *An Introduction To Amateur Television*, is written by **Mike Wooding G6IQM** and is also published by the **BATC**, and follows very much the same format.

As is explained in the Foreword to the book, some of the material in it is reproduced from *The Slow Scan Companion*, which Mike, the author, states is "... our previous tome ...". Mike says that he hopes that this book on Slow Scan TV (SSTV) is "... a book that will provide newcomers to SSTV with the basic knowledge that they will need to build and operate a station". He also goes on to say that he hopes the book will be an "essential reference source for those already hooked by the mode".

Some examples of the chapters in the book are as follows: 'Introducing Slow Scan Television'; 'Modes and Systems'; 'Slow Scan Television Techniques'; 'The G3WCY Digital Scan Converter' and 'Computers and Slow Scan Television' - amongst others.

The layout of the book is very clear and simple, although some of the circuits could do with being a bit bigger. This book also comes **Highly Recommended**.



£3.50

The ATV Compendium
Mike Wooding G6IQM

As with the above two books, *An Introduction To Amateur Television* and *Slow Scan Television Explained*, ***The ATV Compendium*** is published by the BATC and is also written by **Mike Wooding G6IQM**. However, **unlike** these two books which are aimed more at the beginner, *The ATV Compendium* is aimed at those of you who have already acquired an interest in ATV and especially to those of you involved in home construction - so, readers of *Practical Wireless* will probably find this more interesting.

Mike G6IQM, the author (and, of course, a *PW* author), states in the foreword that he's tried to include "projects that include the use of 'state-of-the-art' techniques and devices, without precluding those who do not own sophisticated test equipment or have degrees in mechanical engineering".

As you may have guessed then, *The ATV Compendium* is a collection

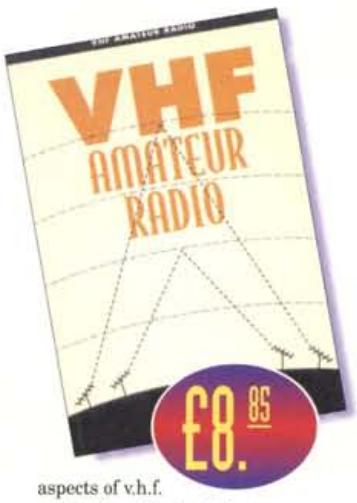
of ATV projects for you to have a go at and the book has various circuits such as: 'Dual-Standard Pattern Generator'; 'Four-Input Vision Switcher'; 'Superimposing Caption Generator'; 'Electronic Amateur Test Card'; 'Video Display Generator'; 'Teletext Pattern Generator'. It also has 'Special Projects' such as: 'A Digital Framestore'; 'A Universal Sync Generator' and a 'Spectrum E-Prom Programmer'. The r.f. projects include: 'A 24cm FM ATV Transmitter' and 'A 3cm ATV Transceiver'.

This book comes **Recommended** to those of you who wish to turn your hands to some ATV projects.

VHF Amateur Radio
William Orr W6SAI

Published by the American **Radio Amateur Callbook Inc.**, ***VHF Amateur Radio*** is written by one of the most well-known authors in Amateur Radio - **William Orr**, of Orr & Cowan fame. In his Foreword, William exclaims "Welcome to the exciting world of v.h.f. amateur radio"! He then goes on to say that this book, as well as covering the 100-300MHz range, has also "... been expanded to include the six meter (50MHz), 70cm (420MHz), the American band - 33cm (902MHz) and 23cm (1250MHz) bands".

The author, William Orr, claims that this book is written in "non-technical language" and that it "... provides valuable information covering important



£8.85

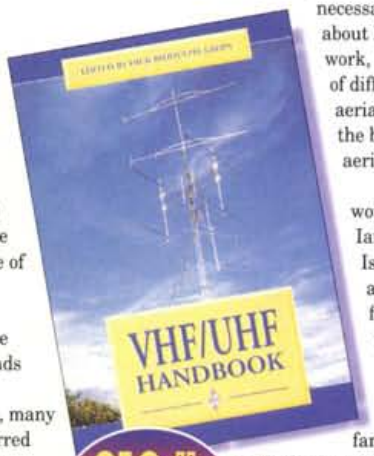
aspects of v.h.f. radio". Described as being a "companion volume to *All About HF Amateur Radio*", *VHF Amateur Radio* is quite an adequate information source for those of you whose main interest lies in v.h.f. operation.

It covers various subjects closely related to v.h.f. operation such as antennas, propagation, equipment, DX operation, causes and cures of stereo and TV interference and more.

VHF Amateur Radio is clearly illustrated and plainly set out and comes **Recommended**.

VHF/UHF Handbook
Edited by Dick Biddulph G8DPS

This **RSGB** published book is a new version of the ***VHF/UHF Handbook*** which was originally published back in 1983 and claims to be a "... guide to the theory and practice of amateur radio reception and transmission on the v.h.f. and u.h.f. bands ...". As you will appreciate, though, many changes have occurred since 1983 and this newer version reflects these changes.



£18.75

In the Preface of the book, **Dick Biddulph G8DPS** says that "One of the aims of this book is to promote that facet of amateur radio [home construction] by including tried and tested circuits for receivers and transverters as well as for building blocks for receivers, transceivers and transmitters".

This practical book comes complete with plenty of circuits, diagrams and pictures to illustrate the chapters which include: 'Getting Started'; 'Propagation'; 'Antennas And Transmission Lines'; 'EMC'; 'Data Modes'; 'Amateur Television'; 'Satellite Communications'; 'Repeaters' and 'Test Equipment, Methods And Accessories'.

The *PW* team think that this would be a very handy book to have in your shack if you are a dedicated v.h.f./u.h.f. radio operator and comes **Recommended**.

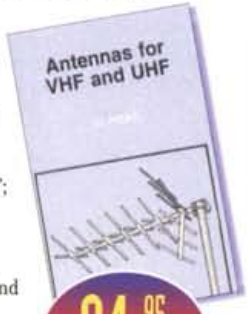
Antennas For VHF And UHF
Ian D. Poole

You may recognise the name of this author as also being the author of our bi-monthly series 'What Is A ...?' **Ian Poole** has also written many interesting books on various subjects of which this is one. ***Antennas For VHF And UHF*** "describes in easy to understand terms the necessary information about how aerials work, the advantages of different types of aerial and how to get the best out of an aerial".

Most of you would have read Ian Poole's 'What Is A ..?' articles and will be familiar with the way that he explains things so you should be in fairly familiar territory with this book. It contains clear diagrams which illustrate the various chapters.

Ian claims that this book was written "... to give a general background to the operation of antennas. It also describes a number of aerials which are suitable for operation in the v.h.f. and u.h.f. portions of the spectrum". Its various sections range from 'Basic Concepts'; 'Feeders'; 'The Dipole'; 'The Yagi'; 'The Cubical Quad'; 'Vertical Aerials'; 'Wide band Aerials'; 'Aerial Measurements'; 'Practical Aspects' and finally 'Frequencies And Channels'.

This book comes **Recommended**.



£4.95

As you may, or may not have noticed, there are two articles on SSTV in this month's Practical Wireless and because of this we have a number of books for you this month on that very same subject. Of course, PW are aware that ATV and SSTV are probably new subjects to most of you so we hope that the books mentioned here will help to fill in any gaps in your Amateur Radio hobby.

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WHAT IS A ... Junction FET?

In the next of the 'What Is A ...?' series, Ian Poole G3WYX explains the answer to the question 'What Is A ... Junction FET'?

The idea of the f.e.t (field effect transistor) has been in existence for many years and can be traced back to a proposal made by **Lilienfield** in **1926** and also to another paper by **Heil** in **1935**. Then, during the 1940s, **Bell Laboratories** set-up a semiconductor research group.

The Bell Laboratories investigated a number of areas pertaining to semiconductors, one of which was a device that would modulate the current flowing in a semiconductor channel by placing an electric field close to it. Unfortunately, the idea didn't work during these early experiments and the group turned their sights in other directions and ultimately invented the bipolar transistor in 1948.

After this much of the semiconductor research was focused on improving the bipolar transistor, the idea was not fully investigated for a while. Nowadays, however, f.e.t.s are very widely used and provide the main active element in many integrated circuits. Without them electronics technology would be very different to what it is today.

Electric Field

Basically, an f.e.t. consists of a section of silicon whose conductance is controlled by an electric field. The section of silicon through which the current flows is called the channel and it consists of one type of silicon, either **n-type** or **p-type**. The connections at either end of the device are known as the source and drain.

The electric field to control the current is applied to a third electrode known as a gate. As it's only the electric field that controls the current flowing in the channel, the device is said to be **voltage operated** and has a high input impedance, usually many megohms. This can be a distinct advantage over the bipolar transistor that is current operated and has a much lower input impedance.

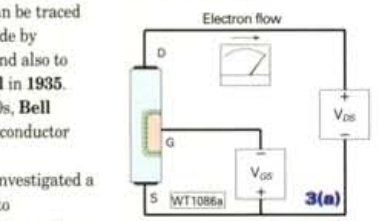

Fig. 1: Construction of an n-type channel junction f.e.t. (For a p-type f.e.t., the n and p type regions are swapped and the arrow on the schematic symbol is reversed).

The n-type junction f.e.t. is shown because it's more common than the alternative p-type f.e.t. However, the same principles apply, the only changes that need to be made are that n-type material is replaced by p-type and so forth - and holes are used as the majority carriers instead of electrons.

In the n-channel f.e.t., the channel itself is formed within a p-type substrate as shown and a further p-type area acts as the gate. The junction between the channel and p-type gate has a depletion layer.

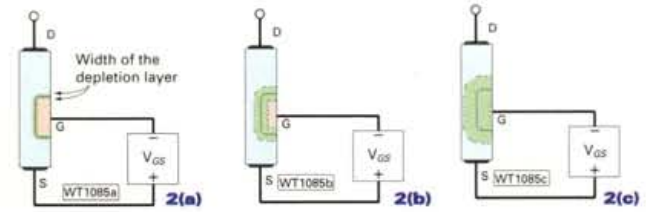

Fig. 2 (a, b & c): Effect of gate voltage on the depletion layer.

The thickness of the depletion layer varies in accordance with the magnitude of the reverse bias on the junction. In other words, when there's a small reverse bias, the depletion layer only extends a small way into the channel and there's a large area to conduct current.

When a large negative bias is placed on the gate, the depletion layer increases, extending further into the channel, reducing the area over which current can be conducted as shown in **Fig. 2 (a, b &c)**. With increasing bias, the depletion layer will eventually increase to the degree that it extends right across the channel, and the channel is said to be 'cut off'.

When a current flows in the channel, the situation becomes slightly different.

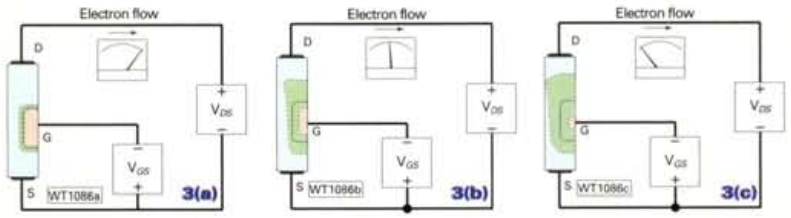

Fig. 3 (a, b & c): Effect of drain source voltage on the depletion layer.

How It Works

In order to understand how an f.e.t. works, it's helpful to look at its construction which is shown in **Fig. 1**. Here you can see an n-type junction f.e.t.

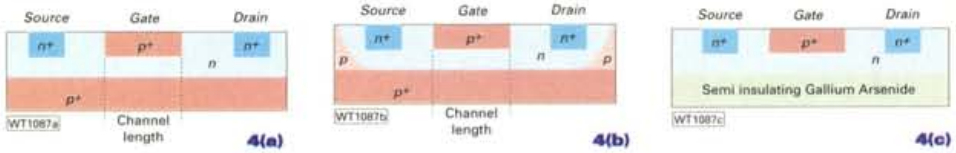

Fig. 4 (a): Channel grown epitaxially (see text). (b): Channel created by diffusion.(c): A gallium arsenide structure where the device is built on a semi-insulating substrate.

With no gate voltage, electrons in the channel (assuming an n-type channel) will be attracted by the positive potential on the drain and will flow towards it, enabling a current to flow within the device - and hence, within the external circuit.

The magnitude of the current is dependent upon a number of factors and included is the cross sectional area of the channel, its length and conductivity (i.e. the number of free electrons in the material) and the voltage applied.

From this, it can be seen that the channel acts as a resistor and there will be a voltage drop along its length. As a result of this, it means that the p-n junction becomes progressively more reverse biased as the drain is approached as shown in **Fig. 3 (a, b & c)**. Consequently, the depletion layer becomes thicker nearer the drain, as shown.

As the reverse bias on the gate is increased, a point is reached where the channel is almost closed off by the depletion layer. However, the channel never completely closes. The reason for this is that the electrostatic forces between the electrons cause them to spread out, giving a counter effect to the increase in thickness of the depletion layer.

After a certain point the field around the electrons flowing in the channel successfully opposes any further increase in the depletion layer. The voltage at which the depletion layer reaches its maximum is called the 'pinch off voltage'.

Heavily Doped

There are a number of ways in which f.e.t.s can be fabricated, as shown in **Fig. 4 (a, b & c)**. For silicon devices, a heavily doped substrate normally acts as a second gate. The active n-type region may then be grown epitaxially (a method of growing thin layers of semiconducting material onto an existing substrate, whilst ensuring that the crystalline orientation of the deposited layer is the same as that of the substrate. This is achieved by condensing silicon atoms onto a silicon substrate at 1200°C). The active n-type region may also be formed by diffusing the impurities into the substrate or by ion implantation.

Where gallium arsenide is used, the substrate is formed from a semi-insulating intrinsic layer. This reduces the levels of any stray capacitances and enables good high frequency performance to be obtained.

Whatever the material used for the f.e.t., the distance between the drain and source is important and should be kept to a minimum. This reduces the transit times where high frequency performance is required and gives a low on resistance that is vital when the device is to be used for power or switching applications.

Next time I'll be looking at another area of the f.e.t. family, namely those devices with insulated gates. Details of terms relating to semiconductor fabrication techniques can be found on my Web site at **http://website.lineone.net/~ian_poole**

ELECTRONICS IN ACTION

Welcome to Electronics-in-Action the bi-monthly round-up of ideas, letters, projects and books about this fascinating hobby. In this issue we also have a few requests for help from readers. And I'll bring you up to date with the latest in my attempts to make a valved radio - and on that subject, I review a simple Novice radio kit from Lake Electronics. It's simple but works well!

I'll start with the requests for help from readers this month. From **Jim Coad G6IZQ** comes a request for any more information about one-valved radios such as the ones that were popular in the 1950s and '60s. In particular Jim is looking for any information about the series of datasheets that were available from **L. Ormond Sparks**, a firm, based then in Swanage, Dorset, that advertised in the 1950s.

The datasheets available, in an advert taken from the November 1953 issue of *PW* (*a copy of that advert is shown in* ***Fig. 1***. Ed.) are, for the 'Pocket Pak', the 'Chummy', the 'Middy', the 'Cruiser', the 'Skipper' and the 'Corvette'. I wonder if the proprietor had been a signaller in the naval side of things before opening up the shop?

Fig. 1: The L. Ormond Sparkes advert as it appeared in the November 1953 issue of PW.

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THE "CORVETTE." 4-valve all-wave superhet. Great range and very selective. Ideal for a portable. Very compact.

Data Sheets of above, 3/2½ each, post free.
Many other designs available. Send 2½d. stamp for my latest list.

L. ORMOND SPARKS (P), 48A, HIGH STREET, SWANAGE, DORSET.

Jim goes on to say that the sets he'd really like some information about were one and two valve radios that used the miniature Eddystone coils and the 'DK' series of 1.4V heater battery valves. He says that although he "knows the circuits off by heart", he would like to create one as near as possible to the original designs. Can you help Jim with more details please?

In another part of his letter, Jim mentions having managed at long last to find time to visit the **Royal Signals Museum** at Blandford Forum here in Dorset. He wrote "I had a very interesting afternoon at the museum, as I knew most of the sets well, having grown up at the time of Government surplus, Lisle Street, etc. and later worked in the laboratories where the Clansman series of military sets were developed".

Thanks for reminding me about the Royal Signals Museum, Jim, I can also thoroughly recommend it as a day visit whenever readers are in this area. Situated atop a hill above Blandford itself, the museum is not only a history of the Royal Signals themselves, but a history of the art of signalling itself. In the new building the displays are very cunningly laid out (perhaps Baldrick worked on this part of it?) to make you feel that the building is huge.

I originally visited the museum many years ago, to take photographs of Morse keys for an article that appeared in *PW*. This was before the move into the new building, but even then the 'couple of hours job' actually took all day, when I had to be 'thrown out'. Recently, I had an opportunity to revisit the museum with our radio club and I think they have made it even better. Highly recommended as a day out and I think even the family would enjoy it too!

Camera connection

Another reader looking for previous circuits (or a clever inventor who can help) is looking for the circuit and construction details for an infra-red triggered camera release. **Michael Troy EI6HA**, says "I am one of many amateurs who are interested in photography and I am trying to get a circuit diagram, or plans, for an infra-red beam breaking device that will trigger the camera when a bird or animal passes through the beam".

Michael went on to say "there seems to be many similar circuits used in intruder alarms, but I need one fitted with a programmable delay, so as to cater for fast flying birds or slow moving animals like foxes or badgers". He needs fairly complete details mainly about the camera release end. By this I must assume that Michael has the type of camera that has a mechanical shutter release, rather than an electronic release like many new cameras.

It was possible, at one time, to buy commercially made animal-activated camera triggers, but Michael seems unable to find any reference to them in photographic magazines and I seem to have drawn a blank in my searches too. I have, though, found a project that was published back in June 1980's *PW* called 'An Acoustic Flash Trigger' by **J. S. B. Dick GM8OWX**.

The circuit for the Flash Trigger is very simple utilising a '741 operational amplifier (opamp), in full open circuit gain mode to trigger a BC169 transistor. This transistor, in turn, triggers a variable time delay '555' i.c. whose output (delayed) goes into another BC169 transistor which finally 'fires' a thyristor that drives the flash. (The descriptions seems to be more complex than the circuit actually is).

The *PW* article would seem to encompass most of the possibilities required by Michael, other than the operating of the camera shutter release. And the circuit is so adaptable that it would take little little modifications to make a 'broken beam' the trigger for the circuit required. It would also make the basis of a simple courtesy (or burglar deterring) light for an area.

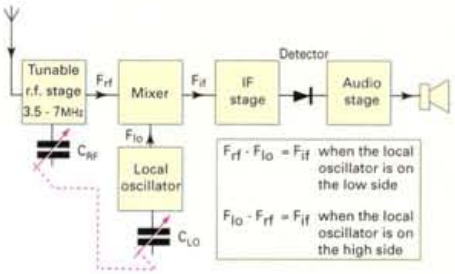

Fig. 2: The simplified block diagram of a superheterodyne ('superhet') receiver

Flash Advantages

The advantage of triggering the flash unit is that the response can be almost instantaneous capturing of a picture.

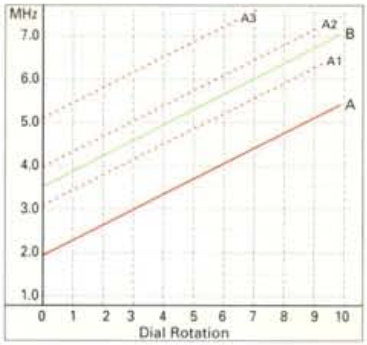

Fig. 3: Idealised tuning scales for the r.f. and l.o. tuned circuits discussed in text.

Whereas if you have to drive a solenoid, that pushes the shutter release on a mechanical camera and then wait until the shutter blind travels out of the way, a fox could be several yards away (and a fast moving bird nearly in its winter holiday resort).

If money were not important, perhaps an electrically triggered camera and a high voltage driven strobe flash that doesn't use a supersonic frequency d.c. to d.c. inverter would be the better solution, There is one problem with this method of triggering the flash, and that is that the shutter on the camera must be open at the time the flash is

Continued on page 56...

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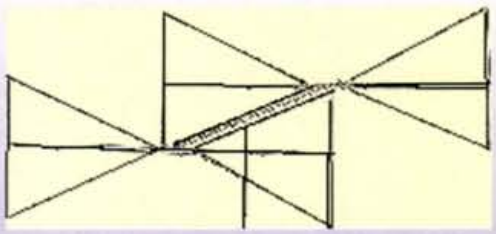

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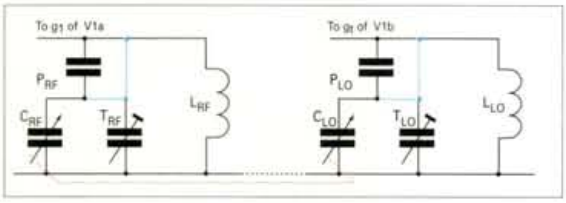


Fig. 4: Two alternative positions for combinations of series parallel capacitors to allow two tuned circuits to 'track' one another. See text for more detail.

triggered. So, any photography must be done in the hours of darkness and would mean a trip to the camera position every time the flash fired to wind on the film and open the shutter again. Not ideal! But I'm sure that readers can help Michael.

Valves & Receivers

Back in the April E-i-A, I left you with the thought that I'd be bringing you a valved receiver soon. Well I still intend to do that, but I've come across a few snags that you may like to read about,

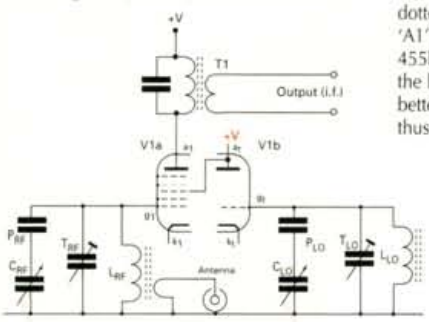


Fig. 5: The simplified layout of a receiver mixer front-end. See text for more detail.

as I think they are, as a schools inspector might say, 'of educative relationship'. I wanted to create a superhet receiver tuning over about 3.5-7.5MHz that would be capable of receiving both a.m. and c.w./s.s.b transmissions.

Of course, I could have used several valves for the project and made it 'easy', but I wanted to do the job with just two valves, an oscillator/frequency changer and a simple r.f. pentode for the i.f. stage. The i.f. stage is designed with a centre frequency of 1.6MHz and to be tunable over about ±25kHz for bandspread purposes.

The i.f. stage was reasonably easy to design and, in fact, I've tested a very early prototype on its own that works well. As it is, in reality, only a modified medium-wave regenerative set with a very limited tuning ability. The problem however, has turned out to be getting good tracking between the local oscillator (l.o.) and the tuned r.f. circuits.

Have a look back at the basic block diagram of a simple superhet receiver as shown in **Fig. 2**, I'm sure that you remember this from your RAE course. To get a constant mixed output frequency that is the i.f., the two tuned circuit **have to stay exactly the same frequency apart** throughout the tuning range. This process is called 'tracking' and this is where the problems can begin.

I'm sure you can remember, from the RAE, that the i.f. is the difference between the l.o. and the incoming signal (it doesn't matter which is the higher in frequency). I've shown the ideal case in **Fig. 3**, where you can see the incoming signal tuning is the green line marked 'B', as there are three other lines shown.

Perfect Tracking

In Fig. 3, the solid red line ('A') is the 'perfect' tracking l.o. frequency which I designed to be 1.6MHz below the wanted incoming signal ('B'). I could have designed the l.o. to tune along the dotted line marked 'A3' (or lines 'A2' or 'A1' if I had chosen to use an i.f. of 455kHz). I chose the 1.6MHz i.f. and the l.o. on the low side to give a slightly better frequency stability to the l.o. (and thus to the c.w./s.s.b. reception capability).

The formula for calculating the frequency of a tuned circuit is, as I'm sure you know:

$$F = \frac{1}{2\pi\sqrt{LC}}$$

that implies that if a variable capacitor has a maximum to minimum capacity range of 4:1 then the tuned frequency varies over a 2:1 range. So, taking the tuning range of the l.o. (line 'A' in Fig. 3), the tuning range is a little over 3:1 (1.9 to 5.9MHz). This would imply that a variable capacitor of a min-max range of 10:1 would cover that range easily.

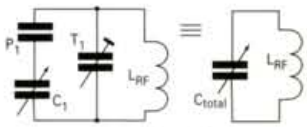
But look now at the tuning range of the incoming signal. This has only a 2.14:1 range, implying that the capacitor should have a 4.5:1 min-max range. Obviously we cannot use a variable capacitor with the similar value sections. It would be possible to have a custom made variable capacitor unit made, but what an expensive set it would tune out to be!

The answer to the tracking problem turns out to be very much cheaper and easier to implement, and that is to use a series/parallel combination of capacitors as shown in **Fig. 4**. There are two places you can connect the trimmer capacitors, either to the junction of the fixed and variable capacitor, or directly across the coil itself. I have chosen to use the format shown in the skeleton layout of my proposed l.o./mixer valve shown in **Fig. 5** (the maths are easier for a start).

Not wishing to do an enormous amount of maths I used a spreadsheet to work all the variables out, and this makes life so much easier (copies of the spreadsheet, in Microsoft *Excel* v5 format, are available via E-mail or via the editorial offices with a formatted disk [720kb] minimum).

Fig. 6: After playing with values on a spreadsheet, this is the 'best' tracking I could get under the circumstances.

Anyhow, after a lot of testing and trying (there's really no easy way to get to this point) I ended up with a tracking curve



$$C_{total} = \left(\frac{P_1 \times C_1}{P_1 + C_1}\right) + T_1$$

Fig. 7: How to calculate the total equivalent capacitance of a series parallel combination.

as shown in **Fig. 6**.

The curve of Fig. 6 needs little explanation. To get within ±20kHz I had actually to accept a 1.585MHz i.f. but, this is close enough to 1.6MHz to make practically no difference at all. And as I intend having a tunable i.f. it's ideal. The values I ended up with are as shown in **Table 1**, and although capable of being 'played with' a little more - I was happy with the result.

If you've forgotten how to calculate the combination capacitance, it's shown in **Fig 7**. Now to find the coils I need that may be used in valved circuits.

Easier Calculations

If you don't have a computer just yet, then a pocket calculator must suffice for most work then! And to that end, I've worked out an easier frequency calculation method for L&C values in tuned circuits. The full formula for a tuned L & C circuit is shown above, **but** the L and C values must be given in Farads (for capacitance) and Henries for the inductance. But in most r.f. circuits the values are in picofarads and microhenries.

Item	value
T_{RF}	12pF (20pF)
P_{RF}	110pF
L_{RF}	22µH
Tuning range 1.879 - 6.031MHz	
T_{LO}	7pF (10pF)
P_{LO}	270pF
L_{LO}	45µH
Tuning range 3.469 - 7.568MHz	

Table 1

By using picofarads and microhenries then the formula may be rewritten:

$$F = \frac{1}{2\pi\sqrt{LC} \times \sqrt{10^{-12} \times 10^{-6}}}$$

and if we carry this on a little more and follow it through to simplify the method even further, then:

Programming PIC

I've had a computer CDROM from **matrix multimedia** that is to help you learn to program PICs, the **p**rogrammable **i.c.**s that are to be found in a growing number of hobby and household items. If

you're interested in finding out more, but haven't got a clue about them, then this CDROM called ***PICtutor*** (one in a series of electronic teaching aids‡) is an ideal starting point.

Although the *PICtutor* is designed to be worked through from start to

finish for beginners, it's so laid out that once you have done this, you can jump quickly from topic to topic throughout the 'course'. I found this ideal, having worked with small microprocessors many years ago when I was working on an HND

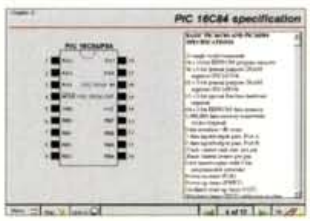


Fig. 8: The built-up Novice Receiver from Lake Electronics. See text for more details.

$$F = \frac{1}{2\pi\sqrt{LC} \times \sqrt{10^{-18}}}$$

$$F = \frac{1}{2\pi\sqrt{LC} \times 10^{-9}}$$

$$F = \frac{10^{9}}{2\pi\sqrt{LC}}$$

We can simplify this even further by working out all the fixed values to give the very much simplified:

$$F = \left(\frac{159.155}{\sqrt{LC}}\right) \text{MHz}$$

Now this can be worked out with a very simple calculator. **But bear in mind for this formula to work the capacitance must be in picofarads and the inductance in microhenries.**

Fig. 9: The open layout of the Novice Radio Kit makes it easy to assemble for all ages and skills.

A Lake Splash

I've had a chance to look at another little radio, the **Lake Electronics Novice Receiver kit**, which I mentioned in E-i-A back in the April issue of *PW*. This kit is designed to complement the Novice amplifier that I looked at in that issue. And in spite of its simplicity the receiver functions very well indeed. It surprised me I have to admit.

Mounted on a small p.c.b. similar in size to Alan's Novice Amplifier, the 16 components form a nine volt battery powered receiver that has a stated frequency coverage of 6-18MHz see **Fig. 8** and **9**. On completing the kit I found that the range covered was 6.5-23MHz, just missing out on the high signal level '49m' broadcast band.

The instructions for the kit suggest winding 16 turns of wire onto a toroidal core, which I modified afterwards to 20 turns on the supplied core. This simple modification changed the tunable range to 5.5-18.5MHz on the kit I tried. I suggested this modification to Alan who said he would add the changes into the instructions for the next batch of kits.

Like the Novice Amplifier kit, the Novice Receiver is well laid out and would make an ideal introduction kit for anyone - even those not contemplating taking the Novice course. On its own and using just two single one metre lengths of wire connected to the 'antenna' and 'earth' connections fairly strong signals were heard in the supplied crystal earpiece. Changing over to my 20m long outside dipole with the earpiece still in my ear was a mistake though.

On the longer wire antenna the audio signal level was almost deafening, causing me to hastily remove the earpiece. On coupling the Novice Receiver to the Novice Amplifier the audio signals became much more manageable with the volume control. Although the reception is not up to the same quality as a top-of-the-range communication rig, the Novice Receiver from Lake electronic Kits is considerably cheaper at only **£8 inclusive of VAT**. or **£16** if you order the receiver and amplifier pair from Lake Electronics at **7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: 0115-938 2509**. Or by E-mail: **radkit@compuserve.com**

Conundrum Winner

And now the bit you have all been waiting so patiently for. In spite of a complete computer crash interfering with the timing of the draw, the winner is .... But first let me tell you the answer to the 'Christmas Conundrum' that came courtesy of **Frank Whitehead G4MLL** and was posed on page 69 of the December 1998 issue.

It was without a doubt the best answered conundrum that I've featured in E-i-A and its answer is 325Ω. I've had one answer at 324.999Ω from a reader whose calculator obviously ran out of numbers and many answers included sketches of other ways of drawing the cube of resistor.

After throwing them into the editorial hat, the answer from **Brian Smith G4EQC** rose to the top as winner. My thanks go to all of you and your patience waiting for a winner to be announced. I can only offer my commiserations to all other entrants who didn't win the *PW* bookstore Voucher.

Book Offer

Every time I write this column I go into the *PW* Bookstore and try to arrange a book offer for readers. This time I've arranged with Michael in our Bookstore that until the end of June 1999, anyone ordering a copy of ***Understanding Basic Electronics*** will pay **only £15.50 inclusive of P&P**. Rob Mannion G3XFD is also a great fan of *Understanding Basic Electronics*,which he says "is a superb beginner's book and ideal for those following the Radio - The Basics Column". The book makes light work of learning the concepts of basic electronics with ideas in short, well illustrated sections and suitable for almost any age group.

Well that's all I have space for this month. I'll see you again in the August issue of 'Electronics-in-Action'.

TEX

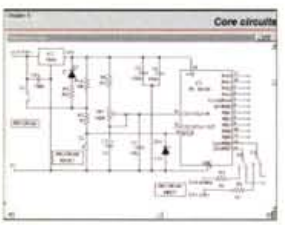
‡ Other CDROMS in the series I looked at in E-i-A in December 1998 in a review at the bottom of pages 68 and 69. The CDROMs from Matrix Multimedia are available from the *PW* Bookstore. The list includes *Digital Electronics* at £45 and *Parts gallery and Electronics circuits & components* at £35. They're all good value teaching and learning aids. for individuals or groups.

course.
The many 'lessons' to be taken, cover topics such as memory use, files, binary tools and hexadecimal, the command set mnemonics (textual commands used in lieu of the actual binary codes), the operation of the commands

themselves, the action of the various 'flags' used by and for the commands, how the internal registers (short term memory locations) can be dealt with ...., etc.

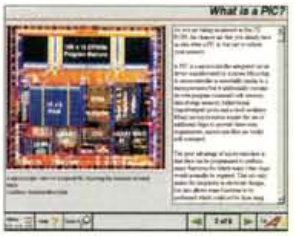
One nice touch is the use of a 'virtual PIC' for you to try your newly learned programming skills out on. And although this can be a little 'sterile' compared to being let loose on a real PIC, it does have the advantage that its cost is included in the CDROM and needs no other hardware other that your own computer screen and keyboard.

There are however, two additional kits available as 'add-ons' to the *PICtutor*. As you might expect, they are complimentary to the CDROM course and are, in effect, the 'next stage' of development of your skills at programming the PIC style of controllers. If you choose to stay with the virtual PIC, you can accept 'challenges' to program controlled devices, such as an electronic 'engaged loo light', various traffic control lights for pedestrian, road and rail traffic, clocks and a simulated dice display.



Although, at first glance the price might seem to be rather steep at £45 for the *PICtutor*, it does represent a very cheap way of learning about a fascinating aspect of the electronics hobby. You may think that you cannot think of a use for a digital controller chip in the radio side of the hobby, but a PIC could be used as the 'intelligent' controller for an automatic a.t.u. Or it could be the controller for a 'home-brewed' synthesised receiver, or whatever you can think up to use this versatile chip. As Apple say in their computer adverts 'Think Different'!

G1TEX



Oregon Scientific's Weather Clock

...continued from page 36

pressure, the barometric pressure starts to fall as the high pressure area moves away. There seems to be enhanced propagation in the direction that the 'high' is moving towards. Not a very scientific means perhaps but at least an indicator that a 'lift' might be in the offing.

Having taken it into the office I was greeted with "Have a look at the time - and tell me about the weather" said Rob the editor! Ah well I suppose I'd better humour him - "12:30 and wet, as you can see by looking out of the window"*. ***PW***

** **And it was.....and the display agreed!** **G3XFD***

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Layout of 2 trap sloper — Coax Feed

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SA10 operates on all bands 160m - 10m. It can be installed as a flat top, sloper, or inverted 'V'. The top is 135ft/41.15m of heavy duty stranded copper wire, with low loss end insulators. A centre insulator is fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. It will work well from the balanced line output of your antenna tuner. **£67.45**

All Band (Limited Space) SAS-2 450Ω FEED

SAS-2 will operate from 160m - 10m. It can be a flat top, sloper, or inverted 'V'. The top is of heavy duty stranded copper wire, and provides *135ft/41.15m electrical length*, with a physical length of only 70ft/21.34m through the use of antenna shorteners. It is centre fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. This antenna will work well from the balanced line output of your antenna tuner. **£97.45**

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The pile of 1950s PWs on his desk tells us that it's Phil Cadman G4JCP who is leafing through post Second World War radio articles this month while he's looking after the vintage 'wireless shop'. So, let's see what's 'in store' for us this time....

I trust all you (UK-based) vintage computer enthusiasts caught the final part of *Station X: The Codebreakers of Bletchley Park*, on the UK's Channel 4 TV service. Pity the programme didn't go into more detail about 'Colossus', the machine used to help crack the German Lorenz cipher.

Apparently, the 'Colussus' had over 1500 valves. Pure 'Valve & Vintage' Heaven!

Magic Oscillators

My brief mention of magic-eye tube, grid dip oscillators (g.d.o.s) a while back, actually produced a few letters! In particular, **David Pratt G3KEP/G4DMP** wrote to me about the g.d.o. he and **G3MAW** had published in the July 1960 issue of *SWM*. I'd not come across this design before so David kindly sent me a copy of the original article.

The G3KEP/G3MAW project is actually quite a neat and simple unit so I thought it might be a good idea to re-publish the circuit and coil details here; see **Fig. 1**. The g.d.o. was originally designed to cover 1.8 to 4.9MHz and 4.8 to 13MHz, using two plug-in coils. But I've no doubt it would operate at both lower and higher frequencies if desired.

The circuit, Fig. 1, isn't particularly critical as regards layout **but do keep all r.f. wiring as short and robust as possible**.

Here are the original coil details:

Coil 1: (1.8 to 4.9MHz, approximately)
160 turns 39s.w.g. enamelled wire close-spaced on a 0.5 inch diameter former (Denco 0.5in. yellow).

Coil 2: (4.8 to 13MHz, approximately)
55 turns 29s.w.g. enamelled wire close-spaced on a 0.5 inch diameter former (original project used Denco 0.5in. white).

Wire Gauge

If you can't get the exact wire gauge, use the closest available and be prepared to adjust the number of turns to get the coverage you want. Unfortunately, I've no idea about the specification of the Denco formers*(*see information panel at end of article*) so use whatever half-inch (12mm) formers you can find. Bear in mind **plug-in** coils are needed, so try to find formers that can be easily attached to a plug.

The EM84 valve is readily available from advertisers in *PW*. However, the tuning capacitor - a 100pF + 100pF unit - might be a problem, in terms of cost if nothing else* (*see note below*, **Editor**). The g.d.o. as built by G3KEP/G3MAW actually used a normal, albeit physically small, 500pF + 500pF broadcast tuning capacitor stripped to one fifth the number of plates. I wouldn't suggest you do this with a brand-new capacitor, but it is an excellent way of utilising an otherwise scrap capacitor salvaged from an old radio.

****Note:** Readers interested in this project may like to refer to the source of 150+150pF variable capacitors mentioned in 'Radio Basics' in the April PW (page 15), reference number 8 which are available for reasonable prices. Although 50pF higher in capacity on each 'gang' they would still be suitable for use in the g.d.o., but frequency coverage would of course be slightly different. **Editor**.*

Providing the necessary power ought not to be much of a problem either, as long as you don't mind staying within reach of a mains supply. A 6V, 3VA transformer will satisfy the EM84's heater requirements, while a low voltage transformer and voltage multiplier can provide the h.t.

For example, a 20V-0-20V, 3VA transformer feeding a voltage quadrupler should produce around 220V. You could even run it from a modern d.c. to d.c. inverter, such as those used for the once popular Pye v.h.f. valved p.a. stage transceivers (from a 12V battery source) to make it truly portable.

Low Voltage Valves

If you thought the 45V h.t. supply of some small battery sets was low then prepare to be amazed. Despite the fact that this is **not the April issue** of *PW*, I shall now tell you about a series of valves that were designed to work with an h.t. supply of 12.6V! Yes - that's the h.t. supply I'm talking about, not the heater supply. Or rather, it's both.

Way back in the 1950s, car radio designers had a problem. Valve car radios (there were no other kind in those days) needed a bulky and often troublesome d.c. to d.c. converter to generate the h.t. required for the valves. Indeed, the circuitry of early car radios was often very similar to their domestic counterparts. And, unfortunately, they were large, consumed lots of power and got hot.

The transistor was the answer to the designers' prayers. Well, it would have been except that those early transistors didn't amplify very well at radio frequencies. However, there were power transistors available which could produce a few watts of audio quite efficiently.

So, having got the audio output stage sorted out all that was needed was the rest of the set! Realising the problem with ordinary valves was the high voltages they needed, valve manufacturers came up with a series of valves that could operate with an h.t. of just a few volts.

Most of the impetus for the design work came from the USA where car radios were far more common than here in Britain. This might have had something to do with the fact that, once upon a time in the UK, you had to have a separate broadcast receiving licence for any radio that was permanently installed in a vehicle!

Valve Types

In all, I've found over 45 valve types which were designed for low voltage operation. Most are very rare so I'll only mention those types likely to be found in car radios here in the UK.

The common line-up found in sets associated with American companies or American designs is:

12AD6: Heptode frequency changer;
12AC6/12BL6: pentode r.f./i.f. amplifier;
12AE6: double diode triode, detector and a.f. amplifier;
12K5: space charge tetrode audio driver.

In the UK, **Brimar** made all the types listed above and described them as "preferred types for new

equipment" in the years around 1960. Interestingly, the December 1958 issue of *Practical Wireless* featured a car radio construction project with just this valve line-up.

The 12K5 space charge tetrode is worthy of special mention. In normal operation, grid 1 (the space charge grid) is connected to h.t. and the signal is fed into grid 2 (the control grid). If this seems backwards, you'd be right!

The idea is that the electric field created by the positive voltage on grid 1 effectively neutralises the space charge that surrounds the cathode. With very little space charge to repel the electrons that leave the cathode, a (relatively) large anode current can flow even at very low anode potentials. Despite all this, the 12K5 is only rated at 35mW output with an h.t. of 12V.

Unbelievably, the 12K5's heater current is 0.45A at 12.6V - nearly **six watts**! Somewhat excessive when the other valves in this series consume a 'mere' 0.15A each.

Home-grown designs often used the European line-up of:

ECH83: triode heptode frequency changer;

EBF83: double-diode pentode, i.f. amplifier and detector;

EF98: pentode a.f. amplifier (tetrode/triode connected).

In practice, a second ECH83 was very often used. The heptode section providing r.f. amplification and the triode section amplifying the audio from the detector stage.

Power Transistors

Whatever the valve line-up, the audio output stage usually employed one or two low-frequency germanium power transistors. The OC16 was a particular favourite here.

If the output stage needed more drive power than a valve stage could produce - as in the case of push-pull OC16s - a transistor driver was interposed. The OC82(D) being a common choice.

Not to be outdone by its practical rival, in September 1962 *Short Wave Magazine* published a design by **G3KWG** for a communications receiver covering the 1.8 and 3.5MHz amateur bands. This set used the European series together with an OC72 audio driver and an OC16 audio output stage.

First Hybrid Radios

The first hybrid car radios appeared in the late 1950s. That gold mine of circuits, the *Radio and Television Servicing* series, includes two designs in the 1958/59 edition. The first is the **Masteradio CR800**. This uses the American series of valves. The second, the **Pyeway TCR1000** (made by **Pye**, surprise!), uses the European series.

Car radios were not the only receivers to successfully mix valves and transistors. For example, in the same edition there's an **HMV** battery portable. In this set, the conventional line-up of DK96, DF96 and DAF96 battery valves is followed by a push-pull pair of OC72s in the audio output stage. Several other manufacturers produced similar designs.

Hybrid designs incorporating low voltage valves were produced until about the end of 1962. By that time transistors were quite capable of replacing valves in every stage of a car radio.

Indeed, even as the very first hybrid car radios were being designed, some manufacturers were already selling all-transistor sets. However, these were strictly for home and portable use. Transistors were, at that time, not deemed robust enough for operation in the harsh environment (electrically and heatwise) of a motor vehicle.

The last hybrid design that I've come across is one made by a company called **Newmatic**. Covered in the 1963/64 edition of *Radio and Television Servicing*, it's a curious design which uses an ECH83 mixer/oscillator and an EBF83 as a reflex i.f./a.f. amplifier. The only other active devices are in the audio stages - an OC82D driving a push-pull pair of OC82s.

Oh, and the name of this set - the **Ten-Four**! Maybe its designer was an early CBer. Does anyone know anything about this set or its manufacturer? Better still, has anyone actually got one?

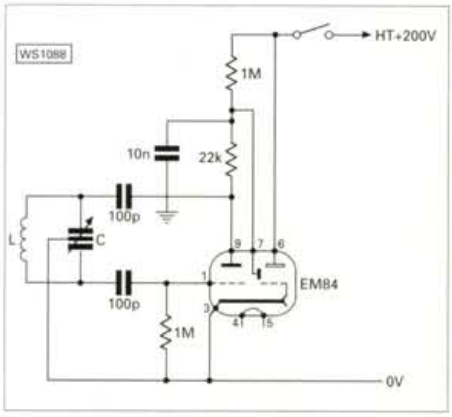

Fig. 1: Circuit of the valved grid dip oscillator using the EM85 'magic eye' indicator (see text for further information on coils, etc.).

Short Reign

It seems a terrible shame that these low voltage valves had such a short reign - little more than five years. Today, they'd be absolutely ideal for use in portable valve equipment but for their excessive heater power.

You see, the valve designers assumed a nice big car battery was available. In addition, the heater currents of 0.15A (American series) and 0.3A (European series) were already accepted standards. There simply was no need to economise.

One type I haven't mentioned so far is the ECC86. Although intended as an r.f. amplifier and self-oscillating mixer - for v.h.f. I presume - this double triode might work well as a regenerative detector and audio amplifier.

There are some modern valve types which, although never intended for **very low voltage operation**, might work acceptably at 12V. I'm thinking of the types which were designed for use in television sets in the late 1960s. Some of these valves can draw large anode currents at modest anode voltages.

It might be worth experimenting with the ECC88/PCC88 and similar types. But even the venerable 6J5 could work acceptably.

Whilst I'd suggest keeping any unused (and used) examples of these valves for use in the car radios they were designed for, I can't help wondering how they'd perform in a simple t.r.f. set. Or even how they performed in the designs that were published in *PW* and *SWM*. Maybe someone will write and tell me. (Hint.)

Interesting Letter

Actually, just before sending these esteemed words to our (even more esteemed) Editor, an interesting letter arrived from **John B. Dickinson** of Tamworth. He tells of an interesting and very unusual hybrid receiver conceived by **Sir Douglas Hall**.

John very kindly included a photocopy of Sir Douglas's article in with his letter. I was surprised to find that it was published relatively recently, in the August and September 1978 issues of the *Radio and Electronics Constructor*. The design is certainly unique; at least I've never seen anything like it before although the Editor, Rob Mannion G3XFD, tells me that Sir Douglas was well known for the designs, particularly in *The Radio Constructor* magazine in the 1960s and early 1970s.

I see the street lights have just come on so I guess it's time to put the shutters up and say cheerio until it's my turn 'in the shop' again. Please send your comments and letters to me either via the *PW* offices or direct to: **21, Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.** No E-mail address this time, I'm thinking of changing to one of the 'free' Internet service providers ...! So, I'll be up-dating you on the change next time I'm on duty in the 'shop'. *PW*

Denco Coils

Although the full range of Denco products are no longer manufactured and coil formers of the size quoted in the original g.d.o. article are no longer available, **Ronnie Allwright** (son of the late founder of Denco) is able to provide a limited made-to-order selection of products. The dual purpose (valve or f.e.t.) coil range are available at £7.90 each plus VAT, and the transistor range at £8.90 each plus VAT.

Red or yellow formers (only) are available at £2.50 each plus VAT. There's a charge of £1 P&P per order. Further details are available from **Ronnie Allwright at Denco (Clacton) Ltd., 259/265 Old Road, Clacton-on-Sea, Essex, Tel: (01255) 422213.**

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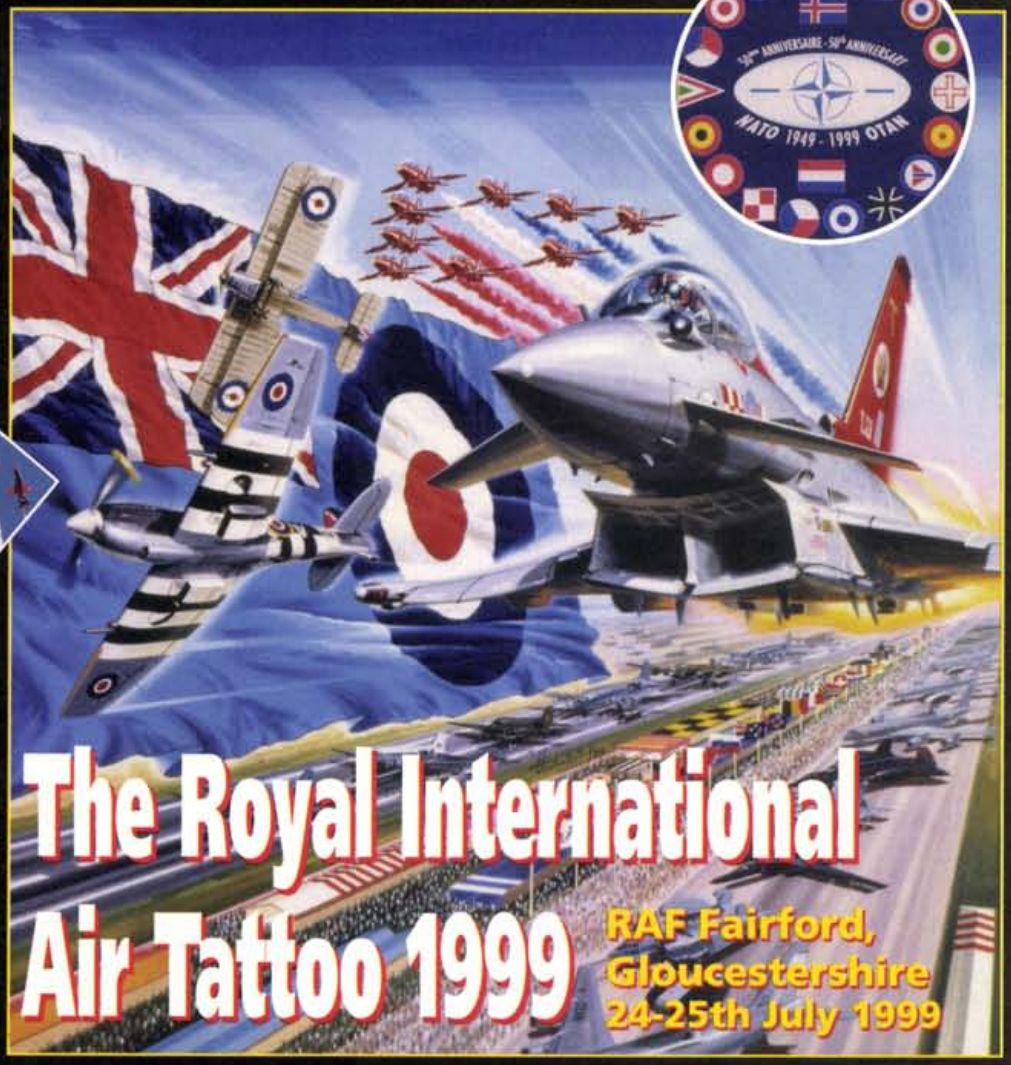

The **Royal International Air Tattoo (RIAT) 1999**, in partnership with **British Aerospace**, has much to celebrate! The Tattoo, this year, sees the **50th Anniversary of NATO**, **75 years of the Royal Auxiliary Air Force** and says a big **"Happy 35th Birthday"** to the **RAF Red Arrows!**

The RIAT takes place over the weekend of **24th & 25th July 1999** at **RAF Fairford, Gloucestershire** and is staged in order to raise much needed money for the RAF Benevolent Fund which, you will agree, is a very worthy cause.

You will be able to see the "... airborne might of NATO" in an overhead drama which will highlight aircraft from both sides of the Iron Curtain and will cover the decades of the Cold War, the fall of the Berlin Wall and operations in Sarajevo.

"East will meet West" in a finale opened by the **RAF's** very own **Parachute Team - The Falcons** - and over 50 aircraft will be lined up on the taxi-way for all to see, as "hovering helicopters fly the national flags of NATO countries", whilst overhead, Allied and former Eastern Bloc aircraft will fly past, led by the Red Arrows.

As well as all this, in celebration of the 75 years of the Royal Auxiliary Air Force, Air Force reserves from around the world will join in an hour-long flying pageant along with a Battle of Britain Memorial Flight Spitfire.

Gates open at 6.30am both days and the flying display starts at 10.00am with the rest of the day easily filled with the many other events and attractions. So, if you fancy your chances at winning a pair of adult tickets to the RIAT then why not have a go at our free-to-enter competition?

How To Enter

To be in with a chance of winning one of 15 pairs of adult tickets to this spectacular flying event, all you have to do is find the words hidden in the word search and complete the gap in the sentence underneath with the remaining letters.

Send your entry to ***Practical Wireless***, **RIAT Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** by **25 June 1999.** Please remember **do not** include other correspondence with your entry form (photocopies are acceptable). The Editor's decision on the winner is final and no correspondence will be entered into.

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E	R	T	R	E	C	N	O	C	I	N
B	A	L	L	I	A	N	C	E	T	U
R	O	S	F	O	R	C	E	P	I	S
A	N	N	I	V	E	R	S	A	R	Y
T	R	A	F	R	O	Y	A	L	B	D
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ECC82	3.50	PL81	2.00	6BR8	4.00	12DW7	15.00
ECC83	3.00	PL504	3.00	6BW6	4.00	12E1	10.00
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EM81/4/7	5.00	5R4GY	7.50	6SC7	3.00	7360	25.00
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THIS MONTH DAVID BUTLER G4ASR LOOKS FORWARD TO DX ON THE 50MHZ BAND AND EXPLAINS HOW THIS CAN BE MADE POSSIBLE BY SOLAR RADIATION.

Very little in the way of enhanced propagation was reported on the v.h.f. bands during March. There was a small auroral back-scatter opening during the evening of March 1 with a few Swedish stations being reported on the 144MHz band but other than that, nothing else was reported on this band or higher.

Jim Martin MM0BQI (IO85) concentrated on the 50MHz band and made s.s.b. contacts via the auroral curtain with GI6ATZ (IO74), GM0EFT (IO86), GM0HBF (IO67), GM1RQD (IO88) and GW0GEI (IO73). Jim uses an Icom IC-746 transceiver running 50W into a 5-element Yagi. He signs his letter off by mentioning that he's looking forward to some DX activity happening on the 50MHz band soon.

Well Jim, I can tell you that enhanced propagation was temptingly close on the 50MHz band during March, with stations in southern Europe (Spain, Portugal and Italy) reporting almost daily openings into southern Africa and South America via trans-equatorial propagation (t.e.p.).

On March 2 one such t.e.p. opening just crept into southern England with the stations of G4IGO and G4HBA (both in IO80) working PY5CC in Brazil but the event was very brief.

Ken Osborne G4IGO reported that conditions on March 14 were quite interesting. Between 1200 and 1225UTC, he heard Norwegian video signals, the OZ7IGY beacon and the stations of OH1XT and SM3EQY. At this time he was measuring the maximum usable frequency (m.u.f.) to be around 55MHz.

From 1259UTC, Ken started to hear TV signals on 48/49MHz from other parts of Europe on a beam-heading of 170° and a possible sighting of ATV station in Kenya (5Z) although this was unconfirmed. A few minutes later, from 1308UTC, the beacon station ZS6TWB (50.043MHz) was heard peaking 549 from South Africa.

Keeping the beam in a southerly direction, Ken was then pleased to hear, at 1416UTC, the station of 9G1BJ (Ghana) working a number of Italian stations. He was very weak, peaking S2 at best, but an hour later between 1437-1537UTC the conditions had improved considerably with 9G1BJ being heard at 58 on s.s.b.

Later in the afternoon, between 1444 and 1629UTC, Ken reported hearing TV from Equatorial Guinea (3C). In the evening between 1910 and 2005UTC, the 7Q7SIX beacon was heard from Malawi with signals up to 599 at times.

The DX reception was followed by hearing EA7/EA9 stations, the CN8LI beacon in Morocco and the ZD8SIX beacon on Ascension Island. As Ken mentions, not much worked but an interesting day nevertheless.

Norman Vincent G3NVO (IO91) reported a good opening to South Africa on March 19. He mentions that ZS6WB peaked 57 at 1159UTC and that he also worked the station of ZS6AXT on c.w. and s.s.b.

Conditions were also good on the following day, March 20, with **Jim Smith G0OFE** (IO90) and other stations in southern England working into the ZS6 call area.

50.000		
	50.020 - 50.080	Beacons
	50.090	Centre of (c.w.) activity
50.100		
	50.100 - 50.130	Intercontinental DX window
	50.110	Intercontinental DX calling
	50.150	Centre of (s.s.b.) activity
	50.185	Centre of (Crossband) activity
	50.200	Centre of (m.s) activity
50.500		
	50.510	SSTV (a.f.s.k.)
	50.550	FAX
	50.600	RTTY (f.s.k.)
	50.620 - 50.750	Digital communications (#1)
	51.210 - 51.390	Repeater (f.m.) inputs (#2)
	51.410 - 51.590	Telephony (f.m.)
	51.510	Calling channel (f.m)
	51.810 - 51.990	Repeater (f.m.) outputs (#2)
52.000		

#1 In the UK the sub-band 50.50 - 50.70MHz has been allocated for digital communications.

#2 In the UK the f.m. repeater inputs are between 51.210 - 51.410MHz and the corresponding outputs are 500kHz lower, between 50.710 - 50.910MHz

WT1198

Fig. 1: This Table shows the current IARU Region 1 50MHz band plan.

SMALL TASTER!

These reports give you just a very small taster of what conditions will be like on the 50MHz band later this year. When conditions are favourable the maximum usable frequency will extend to 50MHz and beyond.

Under these favourable conditions, the 50MHz band will resemble a wide-open 28MHz band and world-wide DX will be possible. This is because of the increasing likelihood of ionospheric F2-layer propagation which is the mode most often used by short wave operators to contact other stations around the world.

The 'F' region is actually subdivided into the F1 and F2 regions. The F2 region is the most dense and peaks at altitudes between 200 and 600km. The F1 region is a smaller peak in electron density, which forms at lower altitudes in the daytime.

Sometimes the signals will be exceptionally strong because the ionospheric absorption is lower at these higher frequencies. A number of factors determine the level of F2-layer ionisation. The most significant of these are the state of the sun (what point of the solar cycle we are at), the season of the year (spring, summer or winter) and the time of day (not only at your station but along the path and at the other station's site).

The state of the sun follows an 11-year cycle. High energy radiation from the sun (gamma rays, X-rays and ultra-violet radiation) are absorbed in the outermost region of the atmosphere to create the 'F' region of ionisation. F-layer propagation depends on the intensity of this activity and this average intensity is determined by the average sunspot number.

The sunspot number is a very cyclical phenomenon and the pattern is reasonably well defined. Since 1749, records of the sunspot numbers have been kept and it's possible to look back and review these cycles.

A better measure of solar activity is the solar flux unit (s.f.u.). This is a simple measurement (at a wavelength of 10.7cm-2800MHz) which is immediately available unlike the sunspot number that requires some processing.

Current solar flux and magnetic disturbance data can be obtained from a variety of sources but I find the Internet (**http://dxlc.com/solar**) or the DX Packet-Cluster network to be invaluable.

MAXIMUM DENSITY

Although the ionisation in the F2-layer is caused by solar radiation, the maximum density is not found at latitudes where the sun is directly overhead. Instead its the regions 10-15° north and south of the magnetic equator.

These regions of maximum m.u.f. don't follow the seasonal movement of the sun north and south of the geographic equator, but merely change in relative intensity. The F2-layer m.u.f. peaks around the equinoxes (March 22 and September 23) when the two regions are equally illuminated rather than at mid-summer in either hemisphere.

It's interesting to note that the openings I reported earlier to PY and ZS on the 50MHz band took place within a week or so of the spring equinox. Last time around I mentioned that when we're approaching the solar maximum, the autumn equinox gives a higher m.u.f.

On the other hand, if we

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were on the decline towards the solar minimum then the spring equinox will give a higher usable frequency. Therefore, all things being equal, the conditions during this coming autumn period should be very good indeed.

Not only is there a seasonal variation but a shorter monthly cycle is also evident and this results from the 27-day rotation of the Sun. The Sun turns the same side towards the Earth every 27 to 28 days and band conditions follow this cycle.

Users of the h.f. short wave bands and the 50MHz band can therefore expect a recurrence of similar conditions as the Sun returns to the same relative position in just under a month. You should note that the day-to-day m.u.f. does not sympathetically follow the solar flux. In fact, the ionosphere acts like a giant capacitor taking time to charge up and time to decay.

Sudden increases in solar activity (which ultimately drives up the solar flux) also gives rise to sudden ionospheric disturbances (s.i.d.) and fade-outs. This activity can, at a stroke, trigger auroral openings and lower the m.u.f. but within a day or so this will dissipate and the m.u.f. will rise again.

So, at first you might start with a dead band with no apparent openings, then there will be an outburst from the Sun possibly giving rise to auroral back scatter openings for a few days. There then follows a period of good F2 or t.e.p. openings. This eventually dies out, perhaps after two weeks or so, leaving a dead band before the next rotation of the sun when the whole process start again.

What this all means, in practice, is that there are auroras, followed by F-layer propagation, followed by a few days peace and quiet in which you can catch up on the household chores!

When the 50MHz band is open via F2-layer propagation, you'll notice that certain countries can only be worked at certain times of the day. The paths with the highest m.u.f. are normally those at which local noon occurs at the mid-point. Basically, it follows the Sun. In other words, you work stations in Australia and the Far East between 0900-1000, Africa from 1100, South America and the Caribbean around 1200-1300UTC and North America from 1500UTC onwards. So, if you want to work VK you'll either have to be in late for work one morning or hope the opening occurs at a weekend.

PREDICTION & PROPAGATION

After examining a variety of methodologies used for predicting solar and geomagnetic activity in Cycle 23, a panel of propagation experts finds that a reasonable consensus is for a large solar cycle with a smoothed sunspot maximum of 160. This is comparable to the last two cycles but is not expected to exceed Cycle 19 which was the largest cycle on record.

Solar Cycle 23 is expected to peak sometime between June 1999 to January 2001, probably around March 2000. Likewise, geomagnetic activity during the cycle is expected to be comparable to that experienced in recent cycles, resulting in high levels. The probability for severe geomagnetic storms will be the greatest during an extended period lasting from 1999 through to 2005.

The extreme geomagnetic storms can have the force to disrupt, degrade and at times block the effectiveness of radio and satellite communications. Space environmental effects caused by enhanced electromagnetic radiation, charged particle streams and other emissions from the Sun can also have a debilitating effect on spacecraft electronics.

The effects at solar maximum may also increase the drag on low-earth orbiting (l.e.o.) satellites and possibly cause Amateur Radio satellites to re-enter the atmosphere much earlier than planned.

CALLING FREQUENCY

With the possibility of world-wide DX on the 50MHz band in a few months time, it's worthwhile paying some attention to the 50MHz band plan and the international calling frequency in particular. The table (**Fig. 1**) shows the current IARU Region 1 50MHz band plan.

In simplistic terms, the area from 50.000 to 50.500MHz is used for DX working on c.w. and s.s.b. and the area from 50.500MHz and up is for local communications using modes such as f.m. telephony, Packet radio, FAX, SSTV and RTTY.

Between 50.000-50.100MHz the band is allocated to c.w. stations only. However, 60kHz of this sub-band is allocated to beacon stations effectively making the exclusive c.w. band only 20kHz wide with the centre of c.w. activity based on 50.090MHz.

Around 150 beacons are operational world-wide at present and more are planned. Incidentally, although the bottom 20kHz from 50.000-50.020MHz can be used for c.w., I've never heard anyone operating in this area in over 15 years of using the band. Most of the c.w. activity takes place between 50.080-50.110MHz although, in common with other bands, c.w. can be used in the s.s.b. portion as well.

Upwards from 50.100MHz, the band is allocated to both c.w. and s.s.b. operation. The so-called DX window is a 30kHz wide-band allocated between 50.100-50.130MHz with the intercontinental calling frequency on 50.110MHz. This is probably the most monitored frequency in the entire amateur bands allocation and is where the first signals during an opening are likely to be heard.

Weak DX signals will generally make their first calls on 50.110MHz and it's for this reason that general operation on, or near, this frequency is positively discouraged unless you're sure that an opening is imminent or in progress, or that your call will initiate activity.

The footnotes associated with the band plan mention that no contacts should be made on 50.110MHz, it's simply a calling frequency and stations should move away from here when contact is first established. Note also that the DX window should only be used for contacts between stations in different continents.

Personally, I think it's best just to listen on 50.110MHz to confirm the band is open. Then find a clear frequency much further up the band (maybe 50.135MHz or higher) where you can call CQ. After all, if stations can find weak beacon stations on frequencies other than 50.110MHz then they're quite capable of finding you wherever you decide to operate.

The local s.s.b. centre of activity is 50.150MHz. Again, if someone answers your CQ call it's best to move to a clear frequency further up the band once contact is established.

CROSSBAND ACTIVITY

Crossband activity is centred on 50.185MHz. Short wave (h.f.) crossband operators should call "CQ crossband" and indicate this frequency or one close to it on which they will listen for calls. Please avoid the use of 50.110 or 50.150MHz. (If you're looking for 70MHz contacts, then the frequency to use is 70.185MHz).

Often, especially during Sporadic-E openings, you may hear European operators calling on 50.185MHz for crossband contacts to 70MHz or 144MHz. Once again, it's good practice to move away from the frequency once contact is established.

Crossband activity to 28MHz still takes place but to a much lesser extent than in previous years. The h.f. centre of activity for both crossband and talkback is 28.885MHz. This frequency is also the focal point for all 50MHz DX liaison activity. By monitoring this frequency during an opening you will receive the most up to date information available about who is working what, where and when.

Those of you thinking about operating on 50MHz might like to monitor the 28MHz frequency as it will give you some idea of what to expect. This applies mainly during the sunspot maxima years but it's also often used during Sporadic-E openings. The activity on 28.885MHz, particularly throughout Europe, is such that operators are requested to spread out either side of this nominal frequency.

During the last sun-spot cycle, very few European countries had access to the 50MHz band but that situation has changed significantly since then. Almost every European country now has an allocation in the band and most have many keen operators. The competition for the rare DX stations is going to be tremendous and it really will help everyone if you maintain the gentleman's agreement and operate according to the recommended band plan.

ECHOES FROM MOON

Stewart Nelson KK7KA has recently reported receiving echoes from the surface of the moon whilst carrying out 'moonbounce' tests on the 144MHz band. What makes this report interesting is that Stewart has only been using a solid-state amplifier and a single 10-element Yagi to hear his own echoes.

The results have only been made possible by using audio frequency shift keying (a.f.s.k.) and the use of custom digital signal processing (d.s.p.) software to extract the very weak signals out of the noise. To

compound his difficulties, Stewart cannot operate from his home QTH because of severe power-line noise and therefore all tests have been carried out from a portable location using battery power.

The a.f.s.k. samples were created with a simple PC script and written to disk on a PC. This file was then played and the analogue audio tones recorded onto a Walkman cassette player. At the portable location, the audio from the cassette player fed the data input of a Yaesu FT-847 transceiver and also drove a simple home-brew circuit which keyed the radio when audio was present.

The FT-847 is set in single sideband mode (s.s.b.) and drives a TE Systems 1452G solid-state amplifier into the 10-element Yagi. Both the amplifier (producing about 240W output) and the radio are powered by a 12V battery.

The antenna is mounted on a three metre pole lashed to the back of a van, manually aimed by visually sighting on the Moon. A pre-amplifier (built in the TE Systems amplifier) is used on receive, producing an overall noise figure of around 2dB. No optional filters have been fitted in the receiver. This is by no means state-of-the-art for e.m.e. communications.

The audio of the received echoes were then recorded onto a DAT 'Walkman'. Back at the home QTH, the tape is played into a PC with a sound card. The subsequent (.wav) file is then analysed with a program which uses the transmit sidetone to track analogue tape speed variations and locate the echoes. The program then produces a series of plots, corresponding to steps in the expected echo position.

For the technically minded, a binary f.s.k. data pattern is transmitted at a speed of 15 baud, with a frequency shift of 30Hz. The baud rate is a compromise between the integration time and any corruption caused by libration effects.

The libration effect is the random fading of signals reflected off the Moon. It's caused by the rocking motion of the Moon and the signal wavefront bouncing off its jumbled surface, taking on the irregular shape itself. The distorted wavefront is now full of peaks and troughs which occasionally add up in phase. Stewart sends a burst of 33 bits, lasting 2.2 seconds, every 4.76 seconds. One block of 25 bursts is then sent taking almost two minutes to complete.

After every five blocks, a c.w. station identification is inserted. Turning to receive, each bit is demodulated using a separate 'receiver' for the mark and space frequencies. The difference between the outputs is added to or subtracted from a variable, according to whether a one or a zero is expected in that position.

The first bit of each burst is lost by the keying delay and is ignored, the remaining 800 bits of each block are summed and the result plotted. This type of averaging is much less efficient than long receiver integration times (not possible because of libration), but still yields a processing gain of 14.5dB.

The received signal to noise ratio (s/n) from the correlation receiver (15Hz noise bandwidth) was calculated to be about -7.5dB. Stewart mentions that he has little interest in 'conventional' e.m.e. contacts because he has no experience of copying c.w. signals, let alone the very weak ones heard under moonbounce conditions. He is, however, very interested in making low power digital contacts via the moon and reckons it would be "real cool" if the first digital e.m.e. QSO was made between two low-power single-Yagi stations.

DEADLINES

That's it again for another month. Propagation is slowly taking a turn for the better and I want to hear what you've been up to. Forward any news, views, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR

HF FAR & WIDE

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THIS MONTH LEIGHTON SMART GW0LBI SAYS THAT CONDITIONS LOOK AS THOUGH THEY MAY BE ON THE UP OVER THE NEXT FEW MONTHS. SO, NOW IS THE PERFECT TIME TO GET DXING ON THE HF BANDS!

At least one of my reporters this month has said that conditions have been heading "In an upward motion", although he does add "... but there have been days when the bands have been as flat as a pancake"! I think that just about sums this month up!

I've certainly noticed some phenomenal signals on the bands this month, particularly during the **ARRL DX CW Contest**. Isn't it strange how conditions seem to 'peak' whenever there's a contest? A band bursts into life all of a sudden, with S9+20dB signals storming in, yet there was very little to be heard just one day before!

In my opinion, this 'peak' in conditions which seems to surround contests proves just one thing - that there are literally thousands upon thousands of stations out there who don't get on the air often enough. The conditions are there, but the transmitting stations aren't!

SIGNALS FROM 'DOWN UNDER'

I received a telephone call this month from **Paul Williams M0BCL** of Wellington in Somerset, who was as 'pleased as punch' after working **9A3GF** in Croatia on 21MHz whilst using just 4W of c.w. from a Marconi 'T', insulated wire antenna lying flat on the lawn.

At the time I thought that this was quite an achievement, however, there was more to come and the following evening I received another call from him, although this time he was very excited indeed. The news was that earlier that day he had worked **US8IR** in Ukraine and **LZ2RS** in Bulgaria on the 28MHz band using just 5W of c.w. and a 30m, end fed, insulated wire buried 5cm **under** the lawn!

Both these contacts took place over distances of around 2092km or thereabouts, a considerable feat when you consider the circumstances - both low power and a buried antenna! So, no wonder Paul is proud of the results of his experiment so far!

"This must be the ultimate 'low profile' antenna" says Paul, adding that he's able to mow the lawn over his antenna! "Maybe I'll try a buried vertical next"! he says jokingly (I think!), "but I'll have to find a way of getting it down there!"

The rest of Paul's low-power station (apart from the subterranean antenna!) consists of an SGC 2020 QRP transceiver and an MFJ antenna matching unit. This just goes to show what can be done in this marvellous hobby of ours, eh!

YOUR REPORTS

I'll delve into your reports now (as space is limited this month) starting with the 14MHz band. First up comes **Ted Trowell G2HKU** on the Isle of Sheppey in Kent who, using a G5RV antenna and 70W of c.w., lists contacts with S79XB (Seychelles), and HH3RK (Haiti), while **Carl Mason GW0VSW** of Skewen in West Glamorgan, using QRP c.w. at 4W and another G5RV antenna hooked up with VK5FE/P (Australia) at 0700UTC, as well as EA8/SM5CBC (Canary Islands) and LY2FY (Lithuania) at around 1730UTC.

"I had some good contacts this month" is the word from **Sean Gilbert G4UCJ** of Milton Keynes and his log shows just how good conditions were at times. Using 30W and an indoor dipole, his 14MHz log shows c.w. contacts with LU7DIR (Argentina), VP2V/K1DW (British Virgin Islands) and TG9/IK2NCJ (Guatemala) at around 2230UTC, while VK4DJ (Australia) was worked at 0800, and T30R (West Kiribati) and E44/HA1AG (Palestine) came in at around 1800UTC.

THE 18 & 21MHz BANDS

Retirement means that new reporter **Robin Trebilcock GW3ZCF** of Bishopston, Swansea, has more time to get on the bands during the day. Using a vertical antenna at a little over two metres above ground and 100W, his 21MHz contacts include 6W1RB (Senegal) at 1142UTC, FM5NA (Martinique Island) at 2037, ZL4WA (New Zealand) at 1013, as well as ZF1UK (Cayman Islands) at 1248, HS1NGR (Thailand) at 1441, E44/HA1AG (Palestine) at 1232 and finally PT2GTI (Brazil) at 1004UTC. A warm 'HF Far & Wide' welcome to Robin.

Using 100W s.s.b. on the 18MHz band this month was **Eric Masters G0KRT** of Worcester Park in Surrey, who lists contacts with ZL4DJ (New Zealand) at 0828UTC, as well as RA3XY (European Russia) at 1026, while a switch to the 21MHz band brought in N3RS (USA) and VO1MP (Newfoundland) at around 1530, EC8AUZ (Canary Islands) at 1956 and 4N7MK (Yugoslavia) at 1109UTC.

Low power was the order of the day for Carl GW0VSW on the 18MHz band, with VU3VLH (India) being a nice contact for him. Other c.w. hook-ups included VP2/K1DW (British

LEIGHTON GW0LBI HAS SOME GOOD NEWS - IT LOOKS LIKE CONDITIONS ON THE HF BANDS ARE ON THE UP!

ROGER COOKE G3LDI BRINGS UPDATES ON MOVIESTAR, PSK31 AND MUCH MORE

RadioScene

Virgin Islands) at 1822 and EA6BB (Balearic Islands) at 0838UTC, while Ted G2HKU lists just two contacts on 18MHz in the form of C56SW (The Gambia) and KL7HF (Alaska).

THE 24 & 28MHz BANDS

The 24 & 28MHz bands are where Ted G2HKU spent most of his time this month, according to his logs. With his G5RV antenna on 24MHz, he lists c.w. contacts with ZS5RON (South Africa), VQ9QM (Chagos Islands), C56SW (Gambia) and S79XB (Republic of Seychelles), while on 28MHz using a HF6 vertical antenna he hooked up with HP1AC (Panama), K3TEJ/C6A (Bahamas), plus 8P6GO (Barbados) with an MFJ Magnetic Loop antenna.

According to Sean G4UCJ the narrow 24MHz band has been proving quite reliable for long-distance contacts of late. His log includes c.w. contacts with JT1BH (Mongolia), and VU3VLH (India) at 1000UTC, while 28MHz provided him with TL5A (Central African Republic) at 1300, 5N3CPR (Nigeria) at 0800UTC, BA7JK (China) and EL2WW (Liberia).

Down in Surrey, Eric G0KRT has been having a go at the 24MHz band in a big way, using s.s.b. to contact TL5A (Central African Rep.) at 0900UTC for a new country, along with P49M (Aruba Island) at 1600, and NH1JL/M (USA) at 1500, while a switch to 'the key' brought in CU2AA (Azores Islands) at 1200 and EW6WR (Belarus) at 1020UTC.

Finally, to tie up the ribbons this month, Robin GW3ZCF reports working CX6FP (Uruguay) using an indoor G5RV antenna on the 24MHz band, while his vertical on the 28MHz band brought in A41KJ (Oman) at 1300 and LU1ICI (Argentina) at 1700UTC.

SIGNING OFF

Well that just about wraps it up for this month. I think it's safe to assume that conditions will generally continue to improve over the next couple of years, even if there may be some 'flat' periods to come.

No doubt our readers and reporters will waste no time at all in hooking that juicy DX, so I look forward to hearing more about your exploits on the h.f. bands!

THANKS TO ALL REPORTERS FOR THEIR TIME AND EFFORT IN MAKING THE COLUMN A SUCCESS. AS USUAL, REPORTS, INFORMATION AND PHOTOGRAPHS BY THE 15th OF THE MONTH, DETAILS AT THE TOP OF THE COLUMN. CHEERIO FOR NOW AND GOOD DX!

Leighton

DATA SCAPE

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THIS MONTH, ROGER COOKE G3LDI UPDATES YOU ON THE MOVIESTAR SECURITY PACKAGE AND THE GROWING POPULARITY OF PSK31. HE ALSO DISCUSSES HOW E-MAILS AND PACKET MESSAGES CAN BE MISCONSTRUED IF YOU'RE NOT CAREFUL - SO BE WARNED!

In my last column I reported on ***MovieStar***, the latest offering from Applied Technologies Manufacturing (ATM), giving particular attention to the security aspect - the **Security Patch Panel and software**. Additionally, ATM now have a stand at the main Amateur Radio shows and considerable interest has been shown in this new product.

The new board has all the hardware and software necessary to connect four video cameras and four security sensors to the PC and, when triggered, the *LookC* security software records the event directly onto the hard drive or server with time and date stamp.

The software can also jump from whatever application you are running to provide instant video of an event or record it in the background. Versatility allows the data to be copied, moved around IT networks, remotely accessed and printed with excellent video quality.

Fig. 1: The Security Patch Panel and MovieStar boards.

Fig. 2: The front page of Palestine E44DX's Web site which can be found at: www.n4gn.com/e44dx

A new professional version of the software is now available which has some important new features, including four channel audio multiplexing and recording, replay and printing from within the *LookC* application and automatic sending of video events via networks and modems. This allows remote site monitoring with visual confirmation and that will put some of the Sociologically Challenged Unwanted Morons (Scum) out of action!

The professional version is more expensive at **£399.00 plus VAT**, but the normal Security Pack should be adequate for most amateurs. The Security Patch Panel and MovieStar boards are shown in **Fig. 1.** ATM now have a Web site, find it at: www.atmltd.co.uk

PSK31 ACTIVITY

Last month, I also reported on the increase in PSK31 activity. It's gaining in popularity to such an extent that interference is being caused to the Pactor operators. With an ever-increasing amount of data modes, this is bound to happen. Each mode ideally requires its own segment and it's very difficult to fit them all in on our crowded h.f. bands.

At one stage I thought that Packet, with its error-correction techniques, would supercede RTTY on the h.f. bands. This has proved not to be the case and, if anything, RTTY is gaining in popularity. We badly need a new 'gentleman's agreement' for h.f. data operation to avoid any conflicts. I await any comments you might have!

HI-TECH DX

Recent DXpeditions have organised themselves a Web site, the expedition to Heard Island being one of the most well organised. They even had amateur satellite links to pass their logs. These were then uploaded to the Internet Web site, where you could check to see whether your call was in the log.

The most recent 'entity' to come on the air was the **DXpedition to Gaza City in Palestine** with the call **E44DX**. Their Web site can be found at: **www.n4gn.com/e44dx** The front page is shown in **Fig. 2.** They have the same logging facility so you need have no more sleepless nights wondering if your call is in the log!

There are all sorts of DX sites to visit, with information on just about anything to do with DX. Some are easier to use than others, but lots of them are linked anyway. I found a very useful one for pure information and it's very easy to navigate.

You could also add the following to your bookmarks as well, the **DX-Central** Web site will come in useful one day. Find it at: **www.dx-central.com** (Its front page is shown in **Fig. 3**).

Fig. 3: Front page of the DX-Central Web site www.dx-central.com

Fig. 5: Front page of Alan Pickup's SatEvo Web site: www.wingar.demon.co.uk/satevo

Fig. 4: Front page of the Visual Satellite Observers Web site: www.satellite.eu.org/sat/vsohp/satintro.html

Fig. 6: Interested in looking for software on the Internet? Take a look at the Tucows Web site at: www.ou.edu/tucows

WATCHING MIR

Watching ***MIR*** or the **International Space Station (ISS)** pass across the sky is addictive to some people. There is one local amateur here in Norwich, **Sid Kerrison G3MFQ**, who has followed *MIR* since its launch. He's a plotted history of it and has kept immaculate and meticulous records since then. He even gets up at 0500UTC - if there is a visual pass!

Another local, **Paul M1CCZ**, produces predictions for *MIR* and the ISS showing the visual passes available. Another series of communications satellites, the ***Iridiums***, have generated some interest too. They provide a ten-second burst of sun reflection at certain times.

There are about 87 *Iridium* satellites and predictions can only be done for a certain locality. Paul produces these too and if you have witnessed a minus 9 flare, it can be quite illuminating (or should I have said fascinating!). However, these predictions are made taking Latitude and Longitude into consideration, so you can see they have to be made individually.

Accurate Keplerian elements are necessary and I download these on a regular basis. However, I did a search using *AMSAT, SATELLITE* and a few other words. It really is quite interesting what sites are available. Try these two for example, both have lots of useful data and are handy to add to the bookmarks. The first is the **Visual Satellite Observers** Web site which can be found at: **www.satellite.eu.org/sat/vsohp/satintro.html** It's front page is shown in **Fig. 4.** The second one is **Alan Pickup's SatEvo** Web site and it can be found at: **www.wingar.demon.co.uk/satevo** The front page for this one is shown in **Fig. 5.**

SOFTWARE ON THE INTERNET

Looking for software on the Internet can be a time-consuming business, so another site that has stacks of it can be very useful to add to the list. Such a site is called **Tucows**. I'm indebted to **Fred VE7PL** who told me about this one and, at first I got the name wrong, spelling it in the conventional way: "twocows". However, once I had the correct URL, it proved to be a useful site. It has all types of programs and it really is worth a look. **www.ou.edu/tucows** (Again, the front page is in **Fig. 6**).

FREE ISPs

As I suggested a few months ago, the competition for free ISPs (Internet Service Provider) is warming up. **Freeserve** is now the largest free ISP with well over a million subscribers. This has been a nice little earner for **Dixons**. They have seen sales of computers and modems increase well over 10% and their share price has increased very nicely!

When **Tesco** announced they were offering Internet connection at £9 per month, I didn't think it would catch on! Sure enough, they've also had the same thought and now provide a free service.

Asda is due on soon and **Barclays Bank** is toying with the idea. I assume **Sainsburys** won't be all that far behind, with others all trying to carve the cake baked originally by **Freenet**.

I've had five free CDROMs from **AOL**, trying (in vain) to tempt me into a £15 per month subscription. I wonder how much longer they will hold out? I can't see anybody paying that sort of money any more. With 15mB of available Web space and unlimited E-mail addresses, who could want more?

Oh yes, of course there are the FREE local telephone calls. Now that WOULD be nice! Just like the USA. Who will be first? Then the free ISP suppliers would have difficulties. They share the telephone charges with BT at present. All they would have left would be the potential customer base.

E-MAIL EXPLOSION

The E-mail explosion is obvious to anybody with an ear on the media, whether it be TV, Radio or Newspapers. In a few years time there will be no business without Internet, Web site and E-mail facilities. A large percentage of the population in general will at least have E-mail.

However, the written word is different from the spoken word and the same applies to Packet Radio. It's all too easy to sit at a keyboard and charge off an E-mail or Packet message without much thought. As a result, those who have done just this, willingly or otherwise, may not fully appreciate the nuances this method of interacting brings with it. These stem largely from the subtle intermingling of aspects from two previously distinct means of communication, speaking and writing.

In a sense, E-mail and Packet combines the immediacy of speech with the convenience of the written word, like letters. But, unlike telephone calls, E-mail and Packets always (almost always) arrive. There are no on-line engaged tones, no typing tag. But, as with telephone calls, there is a tendency in this written work to react immediately, to write - as you would speak - without thinking too much about the words or form.

The immediacy leads to one of the biggest problems with E-mail and Packets, the fact that while it reads as a transcript of speech, with all the benefits of spontaneity and informality that implies, it lacks the vital ancillary clues usually accompanying conversations. In particular, the tone of voice and non-verbal signals sent by facial expressions or body language are all missing. All too often this generates misunderstandings, rash responses and the escalation of mail until it gets personal, insulting, and unnecessary. It becomes raw outpourings of emotion rather than reasoned response.

To avoid problems, it's important to pay particular attention to the clarity of your writing, re-reading it several times. If there's a faint possibility that your words will be misunderstood by someone, they almost certainly will be. Moreover, the fact that your words do not disappear into thin air as they would do with speech, but are stored in somebody's mailbox, means that a perceived slight can last a long time.

To achieve clarity in your writing, you need to do two things. Read what you have written from the standpoint of your harshest critic and wait for several hours before actually sending the mail. The latter is doubly advisable, because it gives you the chance to re-read what you have written and catch any ambiguity you may have missed the first time.

GRAHAM HANKINS G8EMX BRINGS NEWS OF THE NEW GB3EN ATV REPEATER AND NEWS FROM PICKETTS LOCH

RadioScene

A second read also enables you to distance yourself from the emotion that provoked the message. Leaving it for some time may even lead you to change your mind about the content you were going to send. It's often the case that what seems at the time of writing to be a particularly witty or crushing response, looks pretty foolish when viewed objectively later on, when the emotions have calmed down.

Clarity by itself will help enormously to compensate for the lack of non-verbal information. If you wish, you can go even further by adding explicit hints about your written intent. These might take the form of parenthetical comments on your own words ("only joking", "just kidding" or "only my opinion") or similar. 'Smileys' can be used to effect in a similar way, just as a nod or wink or grimace, face to face, would do. Used in this way, effects like these can set the tone of a comment that otherwise might have given offence or be taken the wrong way.

On the Packet network, I've seen quite a lot of badly written messages, obviously designed to give offence (which is often taken) and the resulting plethora of unnecessary mail has been sufficient to cause amateurs to give up Packet radio altogether. This shouldn't happen - we are supposed to be intelligent beings in control of our communications.

Usually it's the system operator or administrator (Sysop) that sees all the mail, but remote sysops can also see them too and some Bulletin Board Systems (BBSs) have several remote sysops. If you feel you have to pick a bone with somebody and it could turn out to be acrimonious, please use the telephone. Nobody else wants to know about it and it's damaging the network.

E-mails at least are one-to-one, but you should also be careful in your writing on this medium too, it's not pleasant to upset or be upset.

WELL, THAT'S ABOUT IT FOR THIS MONTH. I HOPE THAT I HAVEN'T LEFT ON TOO SERIOUS A NOTE? KEEP CONTACTING ME WITH ANY THOUGHTS OR FEELINGS THAT YOU MAY HAVE ON ANY SUBJECTS MENTIONED IN THE COLUMN. DETAILS AT THE TOP OF THE COLUMN.

73 Roger

FOCAL POINT

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THIS MONTH GRAHAM HANKINS G8EMX REPORTS ON THE UNVEILING OF THE NEW ATV REPEATER, GB3EN AND ALSO BRINGS YOU NEWS FROM THE LONDON AMATEUR RADIO AND COMPUTER SHOW AT PICKETTS LOCK. AND HE SAYS TO KEEP PEN AND PAPER READY FOR AN ATV EVENT COURTESY OF THE BATC FOR YOUR DIARY!

The world might be preparing to celebrate the next millennium, but in the Amateur Radio and Amateur Television calendar it was the weekend of March 13/14 that was of more immediate significance.

During the Saturday of the **London Amateur Radio and Computer Show** at Picketts Lock Exhibition and Leisure Centre, only a few kilometres away the latest 1.3GHz Amateur TV Repeater, **GB3EN** (located in Enfield), was being switched on into service.

The ATV repeater project in Enfield was started by the **Cheshunt and District Amateur Radio Club**, but the **North London Television Group (NLTG)** was formed so that the task could be progressed to completion and ultimate licensing.

The GB3EN Repeater uses an Alford-Slot antenna to give an all-round (omni-directional) receive pattern at 1249MHz, but

Fig. 1 and 2: Pioneering ATV experiments on 10GHz. BATC member, Bob Platts G8OZP, prepares to send pictures to Holland using 'over the water ducting' effect. (Photos courtesy R Platts G8OZP).

'EN is transmitting on 1312MHz with a pair of directional 'Bow Tie' antennas to concentrate the outgoing radiation pattern towards the north and south of the repeater site at the Enfield Civic Centre.

The coverage map of GB3EN shows an expected transmission area into central London then south to Streatham and Bexley and a northern limit from Potters Bar to Epping, although a lobe may extend close to Hertford.

In a pamphlet issued at the rally, **John Douglas G4DVG**, Secretary of NLTG, adds: "The radiation pattern map of GB3EN is based on computer predictions and, as always, real life may be somewhat different. Now that the box is transmitting, I shall be collecting reports and going out to verify the coverage. All users should remember that the important thing was to get a reliable ATV repeater on the air so additional features - 'Bells and whistles' - will probably be added later". As with most ATV repeaters, frequency modulation is used throughout, so the repeater can be accessed with incoming composite video, frequency modulating a 1249MHz carrier.

John G4DVG was also the speaker for the talk on ATV scheduled for the Sunday's lecture stream at the Picketts Lock exhibition. Using a novel mix of video tape, overhead projector and photographs enlarged onto a video monitor via a small camera, he covered the history of ATV from the early years of self-wound scan coils, home-built cameras and flying-spot scanners for test cards, up to the present-day repeaters. John 'rounded off' his talk with a detailed look at GB3EN and the meeting congratulated the NLTG. team for achieving a working repeater.

The **British Amateur Television Club (BATC)** was also at the Picketts Lock rally, with an exhibition stand in one of the smaller halls. The main feature of the club's display was a large map of the UK with all the ATV repeaters marked, with photos of some of their test cards. This seemed to attract substantial interest, pulling visitors' attention into the stand to spot the 24cm ATV transmitter and receiver that had been assembled from kits.

Obviously, ATV is very

much a 'home construction' hobby and many enquirers were eager to assemble each of the modules and access their newly-discovered local repeater!

LITTLE MENTION OF SSTV

Other visitors to the BATC show stand were active with Slow Scan TV (SSTV) and made the comment that there was very little mention of this by the BATC or elsewhere. So, I will mention it here, but briefly because it is a big subject. (Don't miss our special SSTV article on pages 24 & 25 - **Ed**).

Slow Scan TV only handles still images. A photograph, drawing or computer graphic is scanned in the normal way, but slowly, e.g. around seven seconds for the complete image. This creates a vision signal at audio frequencies, which can be sent over any amateur band instead of voice from a microphone.

Images can be sent and received over great distances, depending on the band. There are many computer programmes available for SSTV, the images can be in colour and stored on hard discs or manipulated in assorted ways.

So, it depends on what the operator wants from his visual communication - almost any distance but only fixed images, or lesser ranges but 'real-time' natural full-motion pictures. Or why not be active in both! 'Focal Point' welcomes reports from Amateur TV (ATV), whatever the mode.

Several new members joined the BATC at the Picketts Lock show and all were given a copy of ***An Introduction To Amateur Television* (*IATV*)** written by **Mike Wooding G6IQM** and **Trevor Brown G8CJS**. But the title of this book doesn't really do full justice to the contents.

The *IATV* book begins with a comprehensive chapter explaining the vision wave form from basic scanning to PAL colour encoding, then there are more than 100 pages in which Mike and Trevor cover vision sources including popular home computers, ATV on the 430 and 1270MHz amateur bands and a computer-controlled ATV repeater. It concludes with guidelines on operating an ATV station for normal contacts and during contests.

Although *IATV* was first published in 1992, most of the book remains relevant, usable and certainly an absorbing read today. *Introduction to Amateur Television* can be ordered from the *PW* Book Store pages, or by joining the BATC as a member! Find the Club on the Web at **http://www.batc.org.uk**

BATC'S 50TH ANNIVERSARY

The next major event in the ATV calendar will be the **BATC's 50th Anniversary show** at **Shuttleworth College**, part of **Cranfield University** near Bedford, on **Sunday August 8**. Substantial demonstrations of broadcast and Amateur TV are being planned and the ATV repeater groups are being invited too. The day will include the club's Biennial General Meeting (BGM), which will feature the presentation of awards to members who have made significant contributions to Amateur TV.

The BGM is also the place to put forward suggestions for the club's future and elect the BATC committee for the next two years. Final details will be in the August 'Focal Point', so I hope everyone doesn't go to Cornwall for the eclipse!

CHEERIO FOR NOW, KEEP THOSE REPEATERS BUSY BUT DON'T FORGET SOME SIMPLEX ATV ON SLOW SCAN AND 430MHz!

73 Graham

BROADCAST

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THIS MONTH, AS WELL AS BRINGING YOU THE USUAL UP-TO-DATE BROADCAST BAND NEWS, PETER SHORE ALSO HIGHLIGHTS SOME OF THE AFFECTS THAT THE RECENT CONFLICT BETWEEN SERBIA AND THE NATO COUNTRIES IS HAVING ON THE BROADCAST BANDS.

As this edition of *PW* goes to press, NATO jets are bombing Serbian military installations. As a result, the propaganda war between NATO countries and Serbia has intensified.

If you log on to the **Radio Yugoslavia** Web site, you'll find a whole series of stories about what is described as "NATO aggression". You can listen via RealAudio to the station's programmes in addition to the usual short wave transmissions.

English from Belgrade is on the air: 0100-0130UTC on 9.58MHz (not Sunday); 0530-0600UTC on 9.58MHz (daily); 1830-1900UTC on 6.10 and 9.72MHz (daily); 1900-1930UTC on 7.23MHz (daily); 2100-2130UTC on 6.10 and 6.185MHz (daily). The 2100UTC transmission is well received in south east England, with 6.185MHz offering a slightly higher signal strength.

Fig. 1: Radio B92's Web site which can be found at: http://www.b92.net

Fig. 2: The rare Thai QSL card from Radio Thailand which came courtesy of Mr W. J. Parry of Tipton in the West Midlands.

ORDERED OFF THE AIR

The main independent radio station in Serbia, **Radio B92**, was ordered off the air on 25 March and the director, Veran Matic, was arrested by Serb police. The station, which broadcast news about the situation in the Balkans, was seen as a threat to the Milosevic regime.

Radio B92's programmes were aired on f.m. in Belgrade and on the Internet. The BBC and the European Broadcasting Union arranged for B92's programmes to be fed to satellite and relayed across Europe.

As the NATO air strikes got underway, B92 staff maintained a news service of sorts, but clearly feared for their own lives and a majority of the stories were considerably watered down versions of events reported world-wide by the foreign media operating near the Serbian borders. You can find Radio B92 on the Internet at **http://www.b92.net**

Radio Free Europe, the US-funded radio service operating from Prague, added programmes in Kosovian-Albanian on 1 March. The transmissions are on the air at 2000UTC for 30 minutes on 7.18, 9.60 and 9.69MHz.

OTHER VOLATILE AREAS

Another volatile area is Indonesia and **Radio Australia** has increased its programme output in Indonesian. There is an extra weekday-only programme between 0800 and 0830UTC on 15.415 and 17.75MHz.

Trans World Radio has added a new 100kW transmitter at its facility on Guam in the Pacific to help expand the religious station's coverage of the Asia-Pacific region. Trans World Radio celebrates the 45th anniversary of its first transmissions from Tangier in Morocco this year.

In the Falkland Islands, there's a new medium wave service due to go on the air from a 132m antenna tower hooked to

THIS MONTH PETER SHORE TAKES A LOOK AT HOW THE CONFLICT IN SERBIA IS AFFECTING THE BROADCAST BANDS

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

RadioScene

a 15kW transmitter. A report on the **Voice of America**'s 'Communications World' suggests that a calculation of the frequency using the antenna tower height results in an operating frequency of around 1420kHz.

South American countries use the 10kHz channel spacing that's also used throughout the USA and Canada and I presume that to avoid nasty interference, the station on the Falklands will adhere to the rule. Let me know if you catch this station when it goes operational later this year.

RARE QSL CARD

In April's column I asked if anyone had received a QSL card from **Radio Thailand**. Mr **W. J. Parry** of Tipton in the West Midlands sent me the card he received after complaining that English-language programmes are cut off before they end!

Mr Parry puts the problem down to the transmitting station switching away, although it could be that the presenters don't watch the clocks in the studios carefully enough. Thanks for the letter and for letting *PW*'s readers see the rare Thai QSL card.

OTHER FREQUENCY NEWS

Closer to home, I now have some programme and frequency information from European radio broadcasters. **Radio Vlaanderen International (RVI)** has dropped the title 'Brussels Calling' from its half-hour English programmes and on Saturday has replaced current affairs and arts coverage with a Flemish music programme. The popular 'Radio World' programme continues to be aired in all transmissions on Sunday.

The RVI service is on the air in English at: 0400-0430UTC on 15.565MHz for North America via Bonaire; 0700-0730UTC on 9.925 and 15.195MHz for Europe; 1130-1200UTC on 5.985MHz for Europe; 1730-1800UTC on 5.91 and 9.925MHz for Europe, 11.84MHz for Africa and 13.685MHz for south-east Europe and the Middle East; 1930-2000UTC on 5.96MHz and 1512kHz medium wave for Europe; 2230-2300UTC on 15.565MHz for North America via Bonaire.

Radio Netherlands summer schedule has English at: 0930-1125UTC on 9.82, 13.71 and 12.065MHz for Asia and the Pacific; 1030-1225UTC on 6.045 and 9.86MHz for Europe; 1430-1625UTC on 9.89, 12.075 and 15.59MHz for South Asia; 1730-1830UTC on 6.02, 7.12 and 11.655MHz for Africa; 1830-2025UTC on 6.02, 7.12, 9.895, 11.655 and 13.70MHz for Africa; 2030-2225UTC on 1512kHz medium wave for Europe; 2330-0130UTC and 0430-0525UTC on 6.165 and 9.59MHz for North America.

Feature programmes in June from **Hilversum** include 'Mounting Everest'. Crampons and spikes feature in this heady documentary from James McDonald looking at the history of the challenge to climb the world's highest mountain.

Also on the air, are two programmes in a food series looking at the three aspects of starch. Jane Murphy looks into noodles while Michele Ernsting reports on the West's staple diet of potatoes.

Radio Sweden now has just three English programmes to Europe. Tune in to programmes from Stockholm at: 1730-1800UTC on 6.065MHz Monday to Saturday or 9.59MHz on Sunday; 1930-2000UTC on 6.065MHz and 1179kHz medium wave; 2130-2200UTC on 6.065 and 9.43MHz plus 1179kHz medium wave.

Radio Austria International has English to Europe: 0430-0500 and 0730-0800UTC on 6.155 and 13.73MHz; 1330-1400UTC on 13.73MHz; 1230-1300 and 1630-1700UTC on 6.155 and 13.73MHz; 2130-2200UTC on 6.155MHz and 1476kHz medium wave; 2130-2200UTC except Friday on 5.945MHz.

With those listening tips, I'll sign off for another month. Keep your ears close to your wireless in the next four weeks and report any interesting finds to fellow broadcast listeners through this column in *PW*.

UNTIL NEXT MONTH - HAPPY (AND EVENTFUL) LISTENING!

73 Peter

AUSSIE ORACLE

LETTERS AND REQUESTS FOR TOPICS YOU'D LIKE COVERED TO ME PLEASE.

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THIS MONTH, CHRIS EDMONDSON VK3CE TALKS ABOUT YOUR E-MAILS, MORE NEWS ABOUT HOW THE YEAR 2000 OLYMPIC GAMES WILL BE EFFECTING THEIR 70CM BAND AND EXPLAINS JUST HOW GENEROUS THE AUSTRALIAN GOVERNMENT IS WHERE RADIO HOBBYISTS ARE CONCERNED...

Well, it's "G'Day" from Downunder once again! We're well into our Autumn and staring a chilly winter fair and square in the eye, so I guess it's your turn to 'skite' about the weather.

I'm about as far south as you can go on mainland Australia - without wading out into Bass Strait - but even so, we're still looking at daily top temperatures around 15-20°C. We'll survive ...

Once again I've received quite a remarkable amount of E-mails from your side of the globe. (Isn't it funny how we so quickly grasp the new technologies that are offered to us. I simply cannot imagine how I could put my magazine *Radio and Communications* together each month without the Internet).

Your mail is, as always, encouraged and welcomed. I always try to respond quickly to E-mailed letters, but actually **writing** by hand is something I've almost forgotten to do, so please be patient if you post mail to me - and if you write in the middle of my night, don't expect the reply to make much sense!

LOCAL NEWS

Well, top of the local news here is the 70cm (430MHz) ... a band you're not likely to hear too many VKs on where you are, I expect! In this country, the 70cm amateur band occupies 420 to 450MHz, with most activity falling in the 430 to 440MHz range.

Although it's a secondary allocation - the defence forces 'own' the band in this country and we have uninhibited access to it - it's as good as a primary allocation to us and completely protected from commercial take-over bids! So, of course, we've been sitting on our hands, laughing at the frustration of the commercial services clamouring to get just a tiny, little part of such juicy real estate. Two recent events have left us gasping ...

All amateurs around the country have now been formally advised, in writing, that a portion of the 70cm band will be used for **ALL** communications for the **Year 2000 Olympic Games**, to be held in Sydney, the capital city of New South Wales. The Games will occupy the bottom several Megahertz of the band and for the next 21 months or so, amateur activity on the affected spectrum is banned within about 160km of Sydney.

All Games communications will use heavily-encrypted digital signals in a switched trunking system ... a bit of a hard nut for the locals to crack, if that sort of thing takes their fancy (and why not? As you'll shortly read, we're allowed to listen to anything we like over here!)

TEMPORARY LOSS

While people were still mumbling and muttering about their temporary loss of privileges on a small part of that very large allocation, another, far more potentially destructive force reared its ugly head and did it on the very same band. In fact, it seems we have to blame you good folk in Europe for spoiling a really nice band.

You see, hot on the heels of this announcement about the Olympics from our spectrum regulator - the **Australian Communications Agency (ACA)** - came the almost unbelievable news that the ACA had decided to allow what they, rather euphemistically, call **LIPDs - Low Interference Potential Devices** - to occupy the 433MHz section of the band.

Now, we have **lots** of 70cm repeaters in this country, all on a 5MHz negative offset and many of them use the very same channels these rotten LIPD things are on for their input frequency. The specific frequencies arose because importers started getting their hands on all sorts of interesting European remote-control gadgets. Things like garage door openers, remote central locking systems for cars ... you know, those little pocket devices which most of us carry around these days.

In the past, these things either worked on infra-red light (very short range, but no potential for interference) or by r.f., at just over 300MHz, a band prone to r.f. interference (r.f.i.) from strong signals. In fact, to wander off frequency for a moment, we had a

rather hilarious example of this in Hobart, Tasmania, a couple of weeks ago:

A US aircraft carrier named *Carl Vinson* lobbed into town on its way from the Gulf back to the USA. As soon as the huge ship came into range, most of the garage doors and half the car alarms in Hobart started playing silly buggers - they were point blank refusing to work. It seems that the ship's main radar transmitter is on 303MHz - right on top of all those remote controls!

Anyway, back in 1996 a group of importers started lobbying the government to let them sell these European gadgets, which use 433MHz or so. The ACA looked at it and decided there should be no problem with that, and by and large they were right. Except ... **some** of the gadgets it allowed aren't the push-button type of devices which are there for only a fleeting moment and at minuscule power levels.

Some of these devices, we now know, are things like wireless stereo headphone sets and industrial control machinery. These machines power up their 25mW or so and leave it there, often for hours on end ... and guess what? We've had lots of them wiping out the most-used Melbourne, Victoria, repeater for weeks now. But there's worse. And this is so stupid that many of us are quite simply speechless.

"ALL TRANSMITTERS"

The ACA saw no point in specifying just what kind of data transmitters should have access to the new LIPD allocation - so it simply wrote "all transmitters" in the regulation. A quick-thinking electronics outlet jumped on the opportunity to make a very sneaky dollar.

A couple of months ago this company launched a new "personal communicator" - a very snazzy-looking channelised 20mW simplex transceiver which works in the 70cm band. So, now we have the utterly ludicrous situation of having licensed amateurs working voice **on the same frequency** as unlicensed citizens doing exactly the same thing!

Also - how about this? Our local Melbourne 28MHz f.m. repeater - which regularly works the world - also has a 70cm linked channel ... and yes, the input frequency to the link, which will possibly broadcast you around the world, is one of the channels used by the LIPDs. The LIPD user can't hear the output frequency, only the input and probably not all that well.

We had the absurd situation a couple of days ago where a VK3 was working a ZL and an LIPD user at the same time!! The two harried amateurs gave up in disgust and vacated the channel. The ACA responded in writing to a lot of mail from infuriated amateurs. It basically told us where to get off. So that's that ... Or is it?

NEW RADIO EQUIPMENT

As the editor of a radio magazine, I suppose it makes sense that I get to see a lot of new radio equipment. Most of the gear from the larger manufacturers also appears in the stores in this part of the world, but not all of it. One reason for seeing minor differences in the available gear, of course, is to cope with different regulatory requirements, while another is more fundamental, like different frequency coverage needs thanks to variations in band plans.

Our h.f. gear is almost the same as yours, but when you get into the higher frequency ranges, you start to see some significant differences. Let's make a few quick observations about those differences in our radios.

There's rarely any tone needed to access repeater stations here. A small proportion of repeaters use CTCSS to avoid unintentional tripping by intermodulating signals, but other than that, tone signals are not needed, so the 1750Hz facility is generally not fitted to VK-spec v.h.f. and u.h.f. radios. (Mind you, our market is so small in overall global terms that, if the US and Japan also had tone access for repeaters, our radios would get the feature anyway!)

These days, just about every commercially-made Amateur Radio product (I loathe the term 'ham'), offers some extra receive-only tuning range outside the bands it was designed to transmit on. But the radios sold here often seem to offer even more than the specifications panels would suggest.

Quite a few years ago, I examined a new Icom model for which the specifications panel boasted receive coverage from 136 to 174MHz on the two metre band and 430-450MHz on the 70cm side. Imagine my surprise - and pleasure - to discover that it actually started receiving at about 60MHz and kept right on going in four undocumented 'bands' to about 930MHz! The Japanese 'techs' beamed as they watched my bewildered face while I tuned the newcomer around at Icom's office.

AUSTRALIA'S GENEROUS ALLOWANCES

The radios had been modified, I was told, to suit Australia's remarkably generous allowances for radio hobbyists. According to our **Radiocommunications Act** (spell that when you've had a few!) we can listen to anything we like - anything at all - on any frequency whatsoever, provided we do not improperly divulge anything heard during the course of so-called 'recreational' listening. The national telephone carrier has a restriction of its own that prevents one from listening to signals which are being carried by the telephone network, but otherwise, go for it!

The amateurs clearly wanted to get the most from their radios and the importers saw to it that each new model would get additional spectrum coverage. Going back, say, eight or ten years, the additional coverage was generally of limited use, as the receivers would become somewhat deaf (remarkably so in some cases) as one tuned away from the amateur bands.

That situation no longer applies and many radios for world consumption now have a very extended receive range. In fact, it puts the editor of a magazine like mine into a fairly ticklish situation. You see, the radio marketplace in Australia is somewhat limited in size, so *Radio and Communications* is aimed at readers in many areas - amateur radio of course, but also CB, scanning and short wave listening.

It can take some judicious use of the editorial 'red pencil' to keep things in perspective. I don't know about you, but I think I tend to be pretty wary about telling the readers that there is now an amateur hand-held transceiver which has more memories than some mid-range scanners, that it scans its hundreds of memories and searches the bands faster than the scanner, that it has a virtually flat response curve over its tuning range, is built like a brick outhouse with a die-cast chassis rather than the scanner's flimsy plastic, is supplied with a rechargeable battery pack and is half the size of the scanner, transmits on three or four different bands - and all for **less** than the cost of the scanner!

Well, I might be wary about saying it, but two of the jolly things **do** exist! Do I want to encourage people who don't hold amateur licences to buy amateur radio equipment? Well, no, of course not. The market boasts a number of very good scanner receivers these days, but the truth of the matter is that most scanner devotees would be at least as well off with an amateur transceiver. Exactly what we don't want!

AMATEUR VERSUS SCANNER

Perhaps the most obvious example of the amateur versus scanner situation occurs in the mobile market. Not all that many scanners designed specifically for in-car use are on the market these days, but you and I can go out and buy a radio like Yaesu's amazing FT-8100, which not only allows you to tune over the most interesting commercial spectrum there is, but listen to two bands at the same time! Almost unbroken coverage from the a.m. aircraft band to beyond 1300MHz, again with hundreds of memory channels and hot receiver performance, is hard to beat.

But most parts of the world limit the spectrum these amateur receivers and scanners are allowed to cover, or legislate to prevent their use, even if they can be openly sold. We recently researched the situation in the USA and discovered that most states actually restrict the use of wide-coverage receivers. Only bona fide Amateur Radio operators appear free to possess them, but they still face restrictions in their use.

The Police forces around Australia know that at any point in time there will be a lot of scanners tuned into their channels. This doesn't worry them at all! If there's anything sensitive to transmit, it's done over digitally-encrypted channels.

If you listen long enough, you'll hear instances where members of the public have assisted police simply by listening to their scanners. Even I was recently able to help! Late one night, a local police unit had left the lights flashing a little too long at a local school break-in. The car battery had just enough herbs for the frustrated officer to call in for a local car with jumper leads aboard. The nearest police unit with leads was about an hour away, the officer was told. Five minutes later, I was on the scene with a fresh battery and the area was once again being patrolled.

The same coverage and performance situation also appears to apply to the short wave receiver market. Some of them offer very similar receiver stages to the h.f. amateur transceivers - but not many of them also tune up into the lower v.h.f. ranges, as we see with so many h.f. + 50MHz radios these days.

Australia appears to be alone in first world countries in allowing people to listen to virtually anything they please, yet we don't seem to have widespread social unrest as a result!

ANYWAY, THAT'S ALL I HAVE TIME (AND SPACE) FOR THIS MONTH! KEEP THE E-MAILS AND LETTERS COMING!

73 Chris

Trader's Table

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01705 662145

TRANSCEIVERS HF

ALINCO DX-70T 100W HF + 10W 6M TRANSCEIVER £475
ICOM IC725 HF 100W TX £499
ICOM IC706 HF/VHF TRANSCEIVER £525
ICOM IC765 HF 100W TRANSCEIVER £999
KENWOOD TS-50S HF MOBILE £499
KENWOOD TS-140S 100W HF TRANSCEIVER £399
KENWOOD TS-680S 100W HF + 10W 6M + CTCSS £599
KENWOOD TS-440SAT 100W HF TRANSCEIVER £499
KENWOOD TS-930S 100W HF TRANSCEIVER £699
KENWOOD TS-870DGE 100W HF DSP TRANSCEIVER £799
YAESU FT-757GX HF 10W TX/RX £395
YAESU FT-707 100W HF £325

TRANSCEIVERS VHF/UHF

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ICOM IC-207H 2M FM MOBILE TRANSCEIVER £225
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ICOM IC-228H 2M 45W MOBILE £185
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STANDARD C-5200 TWINBAND 50W MOBILE £299
STANDARD C-8900 2M MOBILE £185
TRIO TR-2200 2MTR MOBILE TX £75
TRIO TR-2200 GX 2MTR MOBILE TX £75
YAESU FT-227R 2M 10W FM MOBILE £99
YAESU FT-290 R11 2MTR M/MODE £275
YAESU FT-290 R11 + FL2025 AMP 2MTR M/MODE £375
YAESU FT-726R HF/2M/70CMS BASE TX £599
YAESU FT-5100 DUAL BAND MOBILE £269
YAESU FT-8000R 2M/70CM MOBILE TRANSCEIVER £299
YAESU FT-8100R 2M/70CM MOBILE TRANSCEIVER £325

RECEIVERS

DRAKE - R8A HF RECEIVER £799
ICOM R-72 HF RX + ACC £499
LOWE HF 225 HF RECEIVER £399
SANGEAN ATS-803A S/WAVE RX £99
SONY ICFSW55 SHORTWAVE RECEIVER £145
SONY ICF-7600D SHORTWAVE RECEIVER £69
YAESU FRG100 HF RECEIVER + PSU +FM £349

HANDHELDS

ALINCO ALM-203E 2M H/HELD TX £129
ALINCO DJ-180EB 2M HANDIE - EX DEMO £129
ALINCO DJ-180 2MTR H/HELD + EDC46 FAST CHARGER £129
ALINCO C5 DUAL BAND MICRO - EX DEMO £149
ICOM IC-4IE 70CMS - EX DEMO £155
KENPRO 202 2MTR H/HELD TX £39
KENPRO KT-44 70CMS H/HELD TX £85
KENWOOD TH-215E 2MTR H/HELD TX £89
KENWOOD TH-28E 2MTR H/H TX+70CM RX £149
KENWOOD TH-45E 70CMS H/HELD TX £139
REXON RL-102 2MTR H/HELD TX £69
YAESU FT-23R 2M HANDIE £99
YAESU FT-50R 2M/70CMS HANDIE £199
YAESU FT-708 70CM HANDIE £89

MISCELLANEOUS EQUIPMENT

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KENWOOD AT230 ANTENNA TUNER £169
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KENWOOD DFC-230 FREQ CONTROLLER £49
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KENWOOD TL-120 100W HF AMP £185
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YAESU FTS17 CTCSS & FT 411/811 ETC £39

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HF TRANSCEIVERS

Alinco DX-70E HF,6m All Mode Mobile/Base with Gen. Cov. £425
Alinco DX-77E Base Transceiver with Gen.Cov. 12V £459
MFJ MFJ-9020 x2 20m CW QRP Transceiver £125
SGC SG-2020 QRP Transceiver SSB,CW 20W 12V £485
Trio TS-530S Base Transceiver Mains £325
Trio TS-930S Base Transceiver Mains £525
Yaesu FT-847 HF,6m,2m,70cm All Mode with Gen. Cov. 12V £1349
Yaesu FT-890AT Base Transceiver with Gen.Cov. and ATU 12V £695

VHF/UHF BASE/MOBILE TRANSCEIVER

AKD 2001 2m FM Mobile Channelised 25W £145
Icom IC-229H 2M FM Mobile 50W with 20Ch £225
Icom IC-275E 2m All Mode Base 25W Mains £549
Kenwood TM-451E 70cm FM Mobile 35W 2m RX, Full Duplex £299
Yaesu FT-790R II 70cm All Mode Portable 2.5W £259
Yaesu FT-5100 2m,70cm FM Mobile 50W,35W Full Duplex £299

VHF/UHF HAND HELD TRANSCEIVER

ADI AT-200 2m FM H/Held with Nicad , sp.mic £99
ADI AT-600 2m,70cm FM H/Held,Wide RX,Full Duplex £175
Alinco DJ-560 2m/70cm FM H/Held £169
Alinco DJ-580 x2 2m/70cm FM H/Held £175
Alinco DJ-C5 2m,70cm FM Micro with 118-174, 420-450MHz RX £139
Alinco DJ-F1E x3 2m FM Mini H/Held £99
Alinco DJ-S11 2m FM Palm Transceiver with 136-174MHz RX £69
Icom IC-2E 2m FM H/Held £95
Icom IC-2iE 2m FM Mini H/Held £125
Icom IC-2SE 2m FM Mini H/Held with Battery box , Case £109
Icom IC-24ET 2m/70cm FM H/Held £179
Icom IC-P4E 70cm FM H/Held £169
Kenwood TH-22E 2m FM H/Held £125
Kenwood TH-28E 2m FM H/Held £199
Kenwood TH-42E 70cm FM H/Held £189
Kenwood TH-46E 70cm FM H/Held £199
Standard C-520 2m,70cm FM with Full Duplex , Batt. box £185
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Shortwave Receivers

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Icom IC-R70 100kHz-30MHz AM,SSB,CW Mains £425
Icom IC-R71 100kHz-30MHz All Mode Receiver Mains £425
Icom IC-R72 x2 Base Station Receiver £449
JRC NRD-525 90kHz-34MHz All Mode Receiver 200Ch. Mains £529
Lowe HF-225 x2 30kHz-30MHz All Mode Receiver 12V £299
Roberts R-827 Portable 0-30MHz with BFO £115
Trio R-600 150kHz-30MHz AM,SSB,CW Receiver Mains £195
Yaesu FRG-100 x2 50kHz-30MHz AM,CW,SSB 12V with PSU £345

Scanners Mobile/Base

Icom IC-R8500 100kHz-2GHz All Mode Base 12V with PSU £1100
Realistic Pro-2014 68-512MHz (with gaps) FM Receiver 50Ch. 12V £85
Realistic Pro-2026 x2 66-956MHz (with gaps) AM,FM 100Ch. 12V £149

SCANNERS HAND HELD

Alinco DJ-X10 100kHz-2000MHz All Mode 1200Ch. £225
Icom IC-R1 x3 0.1 - 1300MHz AM/FM/WFM 100Ch. £199
Opto R-10 x2 30MHz-2GHz FM Interceptor £129
Realistic Pro-25 66-956MHz (with gaps) AM,FM 100Ch. £65
Realistic Pro-26 25-1300MHz AM,FM,WFM 200Ch. £149
Yupiteru VT-225 108-142,150-160,220-391MHz AM, FM 100Ch. £169

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STATION ACCESSORIES

Mirage B-34-G amp for handhelds £79
Garmin GPS 45XL handheld GPS £149
Ameritron 811 600watt linear £499
Yaesu MD-1 Desk mic boxed mint £69
MFJ 949E A.T.U. inl. 300watt dummy load £79
Diamond SX100 SWR/PWR meter 3kw £75
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VHF/UHF TRANSCEIVERS

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Kenwood TM25IE 2 meter 50watt mobile £249
Hora C150 2 meter handheld £89

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Kenwood TS850satauto ATU etc £749
Alinco DX70 HF+6m mobile £475
Kenwood TS570D Auto A.T.U. DSP £675
Alinco DX77 HF base station £499
Yaesu FT1000MP/AC demo £1899
Icom IC746 HF+6+2 100watts A.T.U £1099
Icom IC737 mint, auto A.T.U £649
Kenwood TS50S HF 0-30mhz £499
Kenwood TS680 HF+6M £499

SHORTWAVE RECEIVERS

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AOR 7030 with remote control £449
Kenwood R2000 0-30mhz all mode £299
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Sony SW77 boxed mint with PSU £229
Yaesu FRG100 boxed mint with PSU £349
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AOR 3000 0-2036mhz all mode £399

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Bearcat 3000XLT 25-1300mhz AM, FM, NFM £179
AOR 8000 0-1900mhz 1000 memories £239
Icom PCR100 0-1300mhz AM, FM, NFM £199
Icom IC7100HF 0-2000mhz all mode 1000mem £699
Yupiteru MVT7100 0-1650mhz charger nicads etc £179
Realistic Pro2042 1000 memories base £179
Realistic Pro 2025 60 memories 66-512mhz £79
Realistic Patrolman 66-956mhz £149
Realistic PRO 25 66-956mhz £99

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Icom IC-745 Gen cov RX 100W 12V DC £395
IC-735 Gen cov Rx 100W 12V DC £495
IC-730 100W 12V DC £295
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Yaesu FT-101Z 240V 100W £250
FT-757GX 100W plus FP757 psu £495
Ten Tec ARGOSY plus PSU £250*
227 ATU £60*
Heathkit HW9 inc WARC £225*

RECEIVERS & SCANNERS

Icom IC-R71E HF Receiver £549*
IC-R72E HF Receiver £495
Kenwood R5000 HF Receiver £599
Uniden UBC50XL Handheld scanner £50
Ten Tec RX325 HF Receiver £195*
Realistic PRO-2006 Base scanner £125
Yupiteru MVT-7100 Handheld scanner £150
Yaesu FRG-9600 HF-950MHz £225
Drake R8E HF Receiver £495

4m

AKD 4001 Mobile 10W £125*

2m

Icom IC-260E M/mode mobile 10W £175
IC-2SE Handheld £125
CTE CTE-1600 Handheld £50
Yaesu FT-208R Handheld plus fast charger ... £95*
FT-480R M/mode mobile 10W £195*
FT-290 M/mode Mutek rx £249
AKD 2001 Packet ready £125*
2001 FM mobile £125*

70cm

Icom IC-471E M/mode base 12V DC 25W ... £495
ADI AT-48 Handheld k/pad £99
AKD ..... 7003 Packet ready £125*
Yaesu FT-790R M/mode portable 1W £199

Dualband 2/70

Icom IC-W2E Handheld £150
IC-32AT Handheld £125*
Alinco DJ-C5 Handheld £125*
ADI AT-600 Handheld £149*
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STATION ACCESSORIES

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Alinco DJ-580 2m/70cm (144/430MHz) dual-band hand-held with Alinco speaker/microphone, d.c. lead, boxed, little used, includes 6A p.s.u. and mobile dual-band magnetic mount antenna, £220. Tel: S Clifton GW4WBT (01492) 878107.

Alinco DJ-S11 2m (144MHz) hand-held, new, £50. Hora C-408 70cm (430MHz) hand-held, £50. MFJ-921 2m a.t.u., power/s.w.r. 300W, £35. MFJ-411 Morse tutor, £40. Datong D70 Morse tutor, £35. FT-911 23cm (1296MHz), offers. Tel: Stockport 0161-427 6094.

Alinco DX-701 commercial h.f. 100W receiver/transceiver plus matching a.t.u. EDX1, both boxed, little used, excellent condition, 30A p.s.u. and vertical tuneable h.f. antenna available. Total cost £908.95, will accept £600. Tel: St Osyth (01255) 820116.

AOR 3030 h.f. receiver with extra filters and v.h.f. converter, handbook, mint condition, £365. NRD-525 h.f. receiver, v.g.c. with handbook, £450. Icom IC-R70 h.f. receiver with handbook, v.g.c., £295. AOR 2002 base scanner, 25-1300MHz, mint with handbook and SE?? 1300 discone antenna, £175. Tel: (01606) 862175.

AOR AR3030 receiver, a.m./s.a.m./n.f.m./s.s.b./c.w./FAX, two v.f.o.s, Collins filters, 100 memories, v.h.f. 108-172MHz, converters fitted, mint condition, cost £950 new, will accept £375. Tel: (01608) 662488.

AOR AR3030 receiver, all modes plus FAX, 100 memories, two v.f.o.s, Collins filters, showroom condition, cost £950 when new, will accept £395. ATU R1000, £40 includes Securicor delivery. Tel: Frank (01608) 662488.

Bush DAC 10, Dac 90, Dac 90A, Exco U241, Ekco AW70 (1939) Premier radio kit, ultra twin, all working and in good condition, plus Tesla Talisman, good condition but not working. Best offer secures. Tel: Wayne (01942) 896123.

Clearout: IC-255E, £60. SEM v.h.f. linear and power supply, £50. Elevator rotator, £95. Supa keyer, £20. Sigma 80m (3.5MHz) short dipole and balun, £60. Open to offers on all. Tel: Mike on Epsom (01372) 810612.

Colour video test card generator, suitable for ATV, 12V operation supplied with 16 customised test patterns, £45 plus carriage. Tel: Bob G8VOI on Portsmouth (01705) 250830, after 6pm.

Commtel 400 channel scanner, v.h.f./u.h.f., £150. AKD 7003, £90. Alinco DJ-C1 v.h.f. (new), £120. AKD 6m (50MHz) transceiver, £120. MFJ 209, £60. AKD Target receiver, £95. Tel: Stockport 0161-427 6094.

Dentron MT-3000A a.t.u., 3kW, good and large with a handbook, £200. MFJ-949C a.t.u. with handbook, £65. Tel: Geoff G4DED QTHR, Banbury (01295) 259766.

Drake R4C receiver, good condition with four optional crystal filters and handbook, £300 p.n.o. Kenwood R5000, immaculate with narrow s.s.b. filter, handbook and box, £575. JRC bandwidth control unit for NRD-535, £65. Tel: (01245) 381961.

Drake R8A, £450. Q-Tek magnetic long wire balun adapter, £12. Joy match a.t.u., £15. Might exchange for Drake against Racal 1792 with each cash adjustment. Tel: (01772) 704009, after 6pm.

Eddystone 770R receiver, 27-165MHz, £135. Racal RA17L, cabinet, manual and plugs, £145. Racal RA137 l.f. adapter, manual, £95. Scarce ex-RAF WWII NAAFI receiver, manufactured by Magneta, £100. KW103 combined 100W and 1kW s.w.r. meter, £50. Tel: (01482) 887938.

Eddystone 840A, excellent condition, fully working, also Phillips lamps communication receiver, type PCR, repairs or spares, along with a selection of 40 valves, £150 o.n.o. Tel: (01323) 894226.

EIMAC SK-610A valve base for 4CX250 series, new and unused, £35. Epson LX850 PC compatible, 9-pin Dot Matrix printer, g.w.o., £25 plus carriage. Tel: Bob G8VOI on Portsmouth (01705) 250830, after 6pm.

***Elektor Electronics* Magazines**: 1979-1998, two missing, £25, buyer to collect. Tel: Bob G8VOI on Portsmouth (01705) 250830, after 6pm.

Fidelity CB transceiver, model CB1000FM, excellent condition, in original box with microphone, £25. Tel: John Noble (01634) 233058.

Global a.t.u. 1000, £40. Antenna, new, in packing, stick type, outside, up to 1500MHz receive, £30. Books: *Shortwave Listeners* RSGB 1998, *Pooleys Flight Guide*, etc., the lot for £20, including P&P. Tel: (01608) 662488.

Heathkit IP2715 battery eliminator p.s.u., 13.8V 25A with auto cut-out, £50, must be collected. Tel: G4HFL on Bucks (01844) 346274.

Icom FL-100 500Hz c.w. filter for IC-746/IC-706, new, £35. Kent twin paddle Morse key, unused present, new, £40. Tel: (01356) 624039, anytime.

Icom IC-71E receiver, like new, bargain, £400. National Panasonic DR49 digital, f.m./m.w./l.w., 1-6 to 30MHz, s.s.b., excellent short wave radio E160 Hummerlund SP-600, first class radio, excellent condition, £250. Eddystone 1837/2 digital g.c., five filters, v.g.c., £350. Sony 220 World Zone repair or spare, £50. Tel: West London 0181-813 9193.

Icom IC-725 h.f. transceiver with f.m. board, boxed, as new condition, £400. Tel: 0141-885 2022.

Icom IC-740 h.f. internal p.s.u., f.m. board fitted, GDCNDX with manual, 12V or 240V, FT-290 MkII with mobile mount and manual, £300 and £180. Tel: G C Chatfield on South East London 0181-670 7397.

Icom IC-740 not used much, good condition, £350. Tel: Dave on Herts (01582) 766410.

Icom IC-761 h.f. transceiver in as new condition, £575. Two v.h.f. plus u.h.f. colinear antennas, half price, buyers to collect. Tel: South West London 0181-785 7314.

Icom IC-775 d.s.p. transceiver, 1.8MHz-30MHz, top of range 200W output, s.s.b. filter, manual, boxed, genuine reason for sale, mint condition, £1800. Tel: Roger M0ADQ (01977) 649418.

Icom IC-8500 communications receiver, full multi-mode coverage 10kHz-2GHz, still under warranty, all boxed plus manuals, cost £1649 new, will sell for £1085. AOR 50043 communications receiver, 10kHz-2.6GHz, two months old, all boxed, with manuals, cost £1544, will sell for £1225. Tel: (01592) 203279, anytime.

Icom SP20 speaker, £90. Black Star signal generator, 0.1Hz-500kHz, £95. MFJ-401C keyer, £32. Lake 13.8V, 1.5A p.s.u., £32. BK Electronics 300W amplifier, £60, all excellent condition. Tel: Phil on West Midlands (01902) 843447.

J-beam 70cm (430MHz) 8/8 slot, £10. G3HSC beginners Morse record, £5. Tel: Les G8AHE 0121-458 2406.

Kenwood 78E parts, TSU7, CTCSS, ME1 memory, PB13 battery, BT8 battery case, EMC-1 microphone, SC35 case, antenna. Tel: G4TDF QTHR 0121-742 3832.

Kenwood TM-V7E for sale, £400. Icom IC-TBE hand-held for sale, £270. Power pack, three weeks old, £70. Tel: Paul Talbot 2E1GHW (07971) 327333.

Kenwood TR-751E 2m (144MHz) multi-mode, Manson EP-815 15A p.s.u., both boxed, excellent condition, £380 o.n.o. Tel: Colin M0AFW on Sheffield 0114-251 1098, evenings.

Kenwood TS-520SE transceiver plus matching AT-200 a.t.u., v.g.c., manuals, ideal starter rig, £200 plus carriage. Tel: Mike G3TMB QTHR (01704) 214012.

Kenwood TS-950SD digital with d.s.p. and all filters, TCXO twin receivers, handbook, box, brand new condition, £1395. May swap for other h.f. gear plus cash. Tel: (01606) 862175.

Lowe HF-250, 0-30MHz receiver, comes with optional f.m. board fitted, lead and software for easy PC connection, power supply, all boxed with manual, cost £830 new, will accept £295. Tel: Dave on Matlock (01629) 822286.

Marconi Marine 'Oceanic' main ships receiver, solid state modular construction, 15-30MHz??, a.m./s.s.b./c.w./RTTY, digital display, keypad, preset 500kHz/2182kHz, cased, rack handles, manual, full specification, immaculate, £1000 o.n.o. Tel: (01483) 861293.

Military/Marine: Marconi marine sentinel (like an Eddystone), £75. CR300, £65. RCA AR88 with speaker, handbook, spares, £65. All work well. Also CR100 and R107, offers. Tel: Chris Moreton (01291) 673849/650499.

Mirage B-108 2m (144MHz), s.s.b. f.m. linear amp with a pre-amplifier, 10W in, 80W out, mint, £75 o.n.o. Yaesu FL2-1007 linear amp, 1kW out, mint, £400 o.n.o. Tel: G3YRB QTHR 0181-684 3974.

Panasonic compact multi-band radio, model RF-B65D, 1.615-29.999MHz, l.w./m.w./f.m., broadcast/s.s.b./c.w./a.m., size 198¥118¥33mm, UM3 batteries, Panasonic p.s.u., instructions, service manual, good condition, £65. Tel: Edwards G3MBL, QTHR Nr Bury St Edmunds, (01284) 827379.

Plessey ex-army manpack h.f. transceiver/receiver, model A13, g.w.o., full service manual/circuit diagram with long wire and rod antennas, bargain at £50, carriage extra. Tel: (01255) 820116, anytime.

Practical Wireless, full 12 month issues from 1976 up to and including 1987 (no 1985). *The Radio Gram*, issues 1-26 and 28, valve radio by Charles E Miller. *Monitoring Times*, full 12 month issues from 1989 up to and including 1993. *Everyday Electronics*, full 12 month issues from 1988 up to and including 1991. *Electronics Today*, full 12 month issues from 1978 up to and including 1980. Tel: Dennis Knee 0191-252 0361.

Private collection: 50 domestic and schools radios for sale separately (1930s-1960s), offers invited. Please send large s.a.e. for lists - plus £1 for illustrated catalogue if required. Tel: Chris Moreton (01291) 673849/650499. 10 Castle Parade, Usk, Gwent NP5 1AA.

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Racal RA1772 receiver, all filters fitted, excellent condition, £400, prefer buyer to inspect and collect. Tel: Peter on Fife (01383) 881081.

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Some accessories and/or options are standard in certainareas. Check with your local Yaesu dealer for specific details.