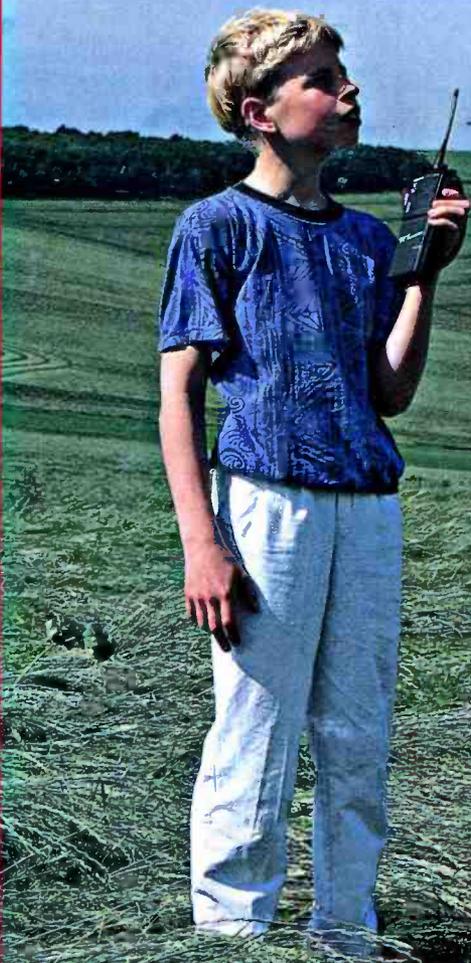


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Any Operator



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Monopole

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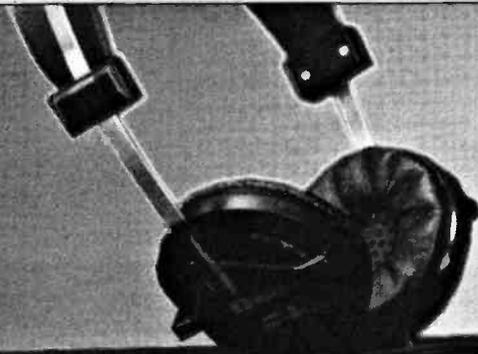
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Acknowledgements: Our thanks go to budding Novice Amateur David Owen, son of Mike G4YTA, for his help with this month's front cover.

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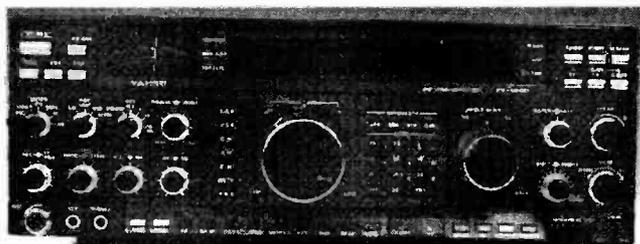
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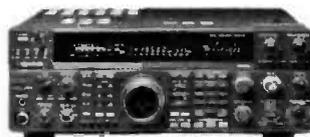
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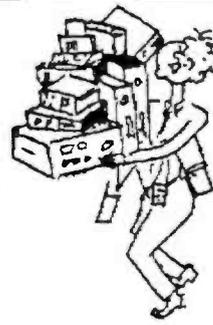
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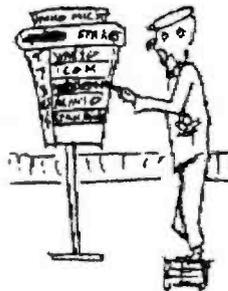
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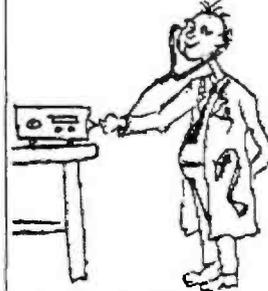
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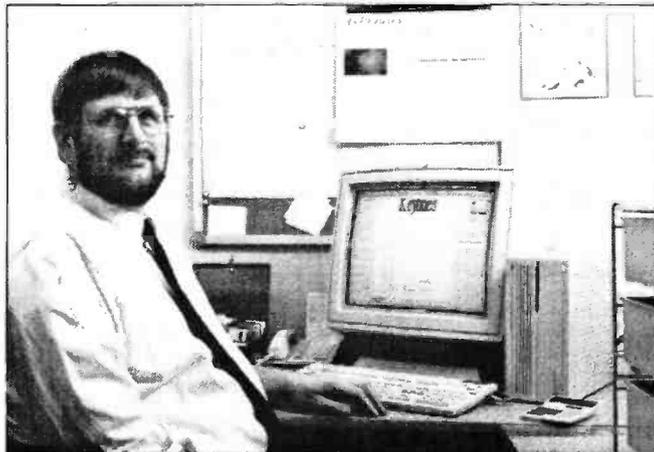
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Keylines



Rob Mannion G3XFD

I've always enjoyed mobile operating. My first mobile receiving rig was a super-regenerative receiver working on 144MHz - or thereabouts. The little 'swoosh-box' worked well and was very sensitive. The receiver provided me with a great deal of pleasure, especially when I was able to park on relatively high ground.

Unfortunately, 25 years ago, 144MHz was virtually dead during the day. The only activity was usually in the evenings and at weekends. However, during the evenings I soon learned to keep the receiver switched off, until I had driven up into the Hampshire downs. This was because re-radiation from the super-regenerative detector could be detected on any receiver tuned within 10MHz. Policemen equipped with hand-held transceivers on foot patrol always seemed to know when I was coming around the corner, and it became rather embarrassing. I soon put an r.f. stage in to isolate the oscillator from the antenna! But those were the days where you could hear some excellent quality a.m. signals on the band, and my little 955 acorn-valved receiver picked them up really well.

Top Band Mobile

By the time I was active on the bands, I'd graduated to Morris Minors. I fell in love with those amazing little machines and along with Chris G8DXF and Richard G8CEH (now sadly a silent key) we visited virtually every mobile rally in the country, enjoying many QSOs on 1.8 and 144MHz.

Everyone had fun on 1.8MHz a.m. mobile during

the '60s. It was fascinating to walk around the grounds of the various rallies and meet other mobile enthusiasts, and look at the many varieties of gear. It was even more interesting to see some of the often (horrendously!) large home-brew 1.8MHz mobile antennas. I wonder how many of the huge systems we used to see, would survive one juggernaut passing by nowadays?

Rallies then, were much more of a meeting place than the scramble to get bargains that they've turned into now. Other things have changed too, but are they changing again?

High Frequency Mobile

I recently enjoyed a few hours at the Longleat rally in Wiltshire. Despite the very fickle weather, the car park filled rapidly and I noticed a strong contingent of 1.8MHz mobile antennas. Many of the antennas I saw were well made, home-brew jobs. Are we perhaps at the dawning of a new age of h.f. band mobile operation?

During my recent visit to the Dayton Ham Vention, I saw a great deal of evidence indicating that h.f. mobile working is still very popular in America. Literally every band from 1.8 to 28MHz was in use for mobile working. Speaking as a 7MHz mobile devotee, I was particularly pleased to see that the band is favoured by

many operators in the USA.

So, why don't we see more h.f. mobile work here in the UK? I must admit that I only saw one h.f. mobile rig in operation at the Friedrichshafen Hamfest last year, so it seems from my brief observation, that the same situation exists in mainland Europe.

No Antenna Problems

Nowadays there are very many h.f. mobile antennas available. Even the 1.8MHz versions can be very small, and some can be smaller than 144MHz antennas!

I realise of course that there are many reasons why many amateurs don't try working mobile on the h.f. bands. One reason is of course that h.f. rigs with s.s.b., usually come much larger than the freely available v.h.f. multi-mode transceivers. However, this argument is basically defeated by the many excellent UK-made and imported v.h.f. to h.f. transverters.

I'm not going to waste valuable space discussing the possible reasons behind the decline of interest in working mobile on h.f. Instead, I want to tempt those of you who do operate mobile, to write in and tell us what you find so fascinating working at h.f.

Surely I can't be alone in thinking that we are neglecting this aspect of the hobby. You don't actually need to be

an 'on the move' mobile to enjoy the fun. I found that operating my Yaesu FT-75 s.s.b. rig from my motor-caravan while parked overnight in remote spots in the Scottish Highlands, turned me into an instant celebrity!

I found over the years, that the simplest rigs could provide tremendous fun. Even a one-valved c.w. transmitter working from a rotary converter on 7MHz, provided good results.

Simplest Rig

Here's a challenge for you! Although I did it simply enough with valves over 20 years ago, perhaps you could do it in a simpler fashion using transistors.

My recipe for a (VERY) basic 1.8MHz transmitter-receiver combination went like this: One home-brew base-loaded whip, resonated on 1.915MHz. The receiver consisted of an early PW designed, crystal-controlled transistorised 1.8MHz to medium wave converter working into the car radio.

The two-valved crystal controlled transmitter sat in the boot, and was remotely controlled by a typical G3XFD (cheap-skate) method! Not wanting to have huge multi-way control cables snaking through my beloved Morris Minor, I managed to control the entire rig via the 2-cored screened microphone cable.

One Control

Closing the press-to-talk switch on the hand-held carbon microphone provided the polarising current for the mike, and operated the change-over relay at the same time. The antenna changed over to transmitter, and the valve power supply came into action. The transmitter antenna tuning was pre-set, and as I stayed on one of two crystal-controlled channels, there were no problems. After a few adjustments, I was on the air and the rig worked well during my time on the Isle of Wight.

The rig provided several years of inexpensive enjoyment. However, we soon had to modify the receiver converter. This was found to be necessary after Ivor Richardson G3XLP and I passed each other on the Newport to Freshwater road while in QSO, and my front-end transistor melted!

So, I'm going to offer you a challenge. How about coming up with ideas for simple h.f. band mobile rigs? George Dobbs has shown us the way with the 'Chatterbox'. Can you come up with an idea for a similar rig to work mobile?

By the way, if by the remotest chance any of you are interested in my favourite 1.8MHz a.m. mobile design (the basic TX was a PW design of course), drop me a line enclosing an s.a.e. I'd be fascinated to work anyone else using such simple 'fun rigs'!

Cheerio for now, and try to enjoy what's left of the summer.

73 DE Rob Mannion
G3XFD.

Receiving You...

Dear Sir

Regarding the 'Spot the Difference' competition, I wondered if there was room for a little extra competition. Knowing the radio amateurs' flair for understatements, etc., how about an amusing caption for the cartoons used in the 'Spot the Difference'? Best or perhaps most apt/funniest could be awarded a small token, everyone likes competitions!

**Geoff Bulleyment
Eastleigh
Hants**

Editor's comment: I think Geoff Bulleyment is a reader of *Punch* magazine as well as *PW*! For many years, *Punch* has reprinted some of its old cartoons, asking for new, apt, captions. They can be very funny. I look forward to seeing any ideas readers send in. We might even make it a regular feature, running at the same times as the 'Spot The Difference' competition

Dear Sir

John Heys G3BDQ, writing in June's 'Receiving You', cannot understand why *PW* carried the article 'A Valved Transmitter For 3.5MHz'. I don't agree with his opinion as I have built the 'Three Valve Blooper'

The rig works well with 7W input. I am always happy to find projects like this in *PW*, now and then. My only problem is that I cannot find the word Blooper in my English dictionary!
**Johann Hans OE7UT
Kufstein
Austria**

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

Dear Sir

It was interesting to read the letters from Bob Hurst and John Heys in June's *PW*. Having been interested in radio myself for the last 40 years, it seems to me to be a hobby with many aspects such as making, mending, modifying, etc. Providing they don't break the law, I would also encourage others to do the same.

My own interest is collecting and renovating valved radio receivers. They take up a huge space, but I

would not swap any for the modern 'wonder boxes'.

I was disappointed however, in your answer to Bob Hurst, when you replied that you intend to "offer the occasional valve project" in future issues. I'd look forward to *PW* a lot more, if you included a valved equipment feature every month!

**D. Andrew
Torrington
Devon**

Editor's reply: The letter from John Heys

provoked a big response, and I'm very grateful to those of you who took the trouble to write to *PW*. Most of the letters received so far reflect a keen interest in valve techniques. The next valved project in *PW* should appeal to many readers, especially as it uses a valve that has no direct semiconductor equivalent. It should prove useful to everyone. Watch this space!

★★★★★STAR LETTER★★★★★

Dear Sir

In the May *PW*, I found some very interesting letters from readers. You asked for reactions from younger readers, and here you have one! I am 18 years old and managed to get my first licence when I was 15. I'm very proud of this, because I had to learn all the technicalities by myself.

The average Belgian amateur is much older than I am. However, I'm very pleased to say that in my area, I know of some youngsters who are very interested in amateur radio. So I keep on hoping to meet more amateurs of my age!

Young amateurs are often criticised because they don't build equipment, but why should we if there are so many commercially-made transceivers available? Another important factor here in Belgium, is that all our equipment has to meet legal standards.

The problem here is that these regulations have become very strict. This makes it impossible for a novice to build a transceiver that satisfies the PTT tests and requirements!

The novice licence **IS** a good idea, and it's certainly an alternative if we don't want our hobby to die out. All young radio amateurs should spread the news about our exciting hobby to their friends.

To finish my letter, I have noticed in *PW*, that some amateurs regard hand-held transceiver users as 'wallies'. But what's the alternative for very young amateurs to start with? Should they work hard for a long time and save £1000 for an expensive rig, just to be respected by other operators?

Olivier Hoet ON4AGM, Roeselare, Belgium

Editor's reply: Thank you for writing Olivier. We realise of course that *PW* has many readers over in Belgium, and we're always pleased to hear from you. Fortunately, the Department of Trade & Industry's Radiocommunications Agency in the UK has adopted a sensible attitude towards standards and specifications for amateur radio equipment. However, there is still a great deal of concern as to what's going to happen in the future, with the EEC 'Common Market' regulations. If very high, rigidly enforced standards are ever applied, amateur radio construction and the *PW* approach to the hobby could suffer very badly.

Dear Sir

I wish to comment on John Heys G3BDQ's letter, in the June issue. Firstly, I felt that the May article under debate was refreshingly different, and certainly most enjoyable. Contrary to G3BDQ's comments, I think the author took pains to cover the safety aspects in quite reasonable detail.

My only minor criticism, is that regenerative designs are not always an exact science. They often require a degree of 'tailoring' for best results, and further details in these areas would have helped.

I use a variety of valved and solid state regenerative receivers on a regular basis and use them on a number of bands. They've provided many hours of pleasure, and their performance can be very effective with some operational care.

I found John Heys's pre-1950 antique criteria amusing. This is because it can be said that any form of manually generated c.w. is similarly old-fashioned and inefficient compared to other forms of data communication. Are we to assume, therefore, that these pre-1950 methods are also redundant and not worthy of *PW* coverage?

Let's have more valved projects in *PW* please! Finally, I'd like to mention that I work with the very latest technology. So, I'm not prejudiced, but I do have a love of the history of radio and the pleasure of using equipment based on ideas from the earlier years.

**Terry Parker G4NXX
Nr. Sudbury
Derbyshire**

Services

Dear Sir

In reference to Bob Hurst's praise and John Heys's criticism of valved construction projects, I'm writing to support the relevant articles and Bob Hurst's views.

I was 12 when I first became interested in radio. With the help of a retired postman, I was soon introduced to the art of radio construction.

A teacher at my school, who was a radio amateur also encouraged me. Receivers made by the school radio club, out-performed the imported transistor radios of the day, although they weren't so portable!

I agree that extreme care must be taken, due to the lethal voltages present in a valved rig. Many newly-licensed amateurs, find that ignorance of valve technology is a disadvantage when buying on the second-hand market. There are many bargains to be had with valved transceivers.

If the solid state revolution had taken place five years later, I believe that we would still be using valves in many more applications, if valve technology had only been allowed to reach its zenith.

Colin Topping GM6HGW
St. Andrews, Fife

Dear Sir

John Heys G3BDQ's comments on the recently published 3.5MHz transceiver were somewhat pedantic. He only had to read young G7HIU's 'Star Letter' on the previous page to find the answer to his question!

Valves and valved equipment circuitry still hold great fascination for enthusiasts of all ages. Despite the occasional opposition from converts to 'solid state', this interest will be with us for many years.

When they're in use, valves can look beautiful and are a joy to behold. By comparison, the most complicated solid state device has the aesthetic appeal of a building brick! It may surprise John Heys, that valves of all types are still

being produced in large numbers by one well-known American company.

I'd also like to dispel the myth about the lack of valve-related components. It may appear to be true, if your search is limited to the pages of the current 'hobby' catalogues. It's not true if you're a practised rally visitor. I've yet to come back from any rally without a holdall stacked with goodies for valved projects.

Older valved oscilloscopes sell very cheaply at rallies. If you can't find enough bits in an old 'scope, to build either a valved transmitter or receiver, then you're in the wrong hobby!
Nev Kirk G3JDK
Rotherham
Yorkshire

Dear Sir

As a faithful follower of *PW* since the early 30s, I was interested in the correspondence regarding valves in June's 'Receiving You'.

Despite the fact that letters in favour were two to one (that 15 year-old young man will go far!), I feel that John D. Heys comments really hit the spot! Like anyone of my generation, I'm keen on valves, but I feel your projects so far will have limited appeal.

I use a legally converted CB rig for 28MHz. This is not from choice, but simply because I'm on a pension and cannot (brief pause for sympathy) afford the high prices demanded by dealers. This limits me to around 10W output, and I'd like to see a simple, no frills, valved p.a. design dedicated to one band.

It doesn't have to be a sophisticated circuit, it could use an OKD6 or 6LF6 or even the 807! An amplifier like this would compare most favourably with a commercial product, with the added advantage of being virtually indestructible.

So come on *PW*, what about it? Let's see a nice simple circuit for a 100W 28MHz p.a. In view of my advancing years, I ask that you don't make it too far in the future, because I'd like to build it before departing to the great shack in the sky!

With very best wishes to *PW* and all who sail in her!

Trevor C. Harris G0OIB
Peacehaven
East Sussex

Editor's reply: Trevor has an interesting suggestion. If there's enough interest, we could come up with something fairly quickly. So, readers, it's up to you and your comments for a project like this would be welcomed (on postcards please) as soon as possible.

Dear Sir

Can I suggest that part of the Rev. George Dobbs G3RJV's series 'Getting Started the Practical Way' might include the use and manufacture of various pieces of test equipment, such as wavemeters? It could be very useful.

This subject came to my notice when my wife and her friend were taking their RAE in May. They said that this subject was not covered very well in the RAE syllabus.

R. G. Oldridge
Stourbridge, West Midlands

Editor's comment: Life is full of amazing coincidences Mr Oldridge, for George Dobbs has just sent in the next batch of projects for the series. Among them is a delightful little wavemeter, which will be featured soon. The series is proving very popular, and both George and the *PW* team are pleased to hear from readers with ideas.

Queries

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

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

Back Numbers & Binders

Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing.

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Send all orders to the Post Sales Department.

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

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Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. The printed circuit boards are available, mail order, from the Post Sales Department.

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Wireless Line

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Newsdesk '91

RAE Courses

London: The City of Westminster College (formerly Paddington College), will be running an RAE evening course, commencing early September 1991 (for May 1992 exam). Both class A and class B licences will be catered for (i.e. a Morse course will run concurrently). Professional college lecturers will conduct the course. For enrolment details, etc., prospective candidates should contact: **Ann James, The City of Westminster College, Science and Technology Department, 25 Paddington Green, London W2 1NB. Tel: 071-723 8826.**

Kent: Poverest School, Poverest Road, Orpington, Kent, are running an RAE course on Wednesday evenings, 7.30 to 9.30pm, commencing September 18. Early enrolment is advised, to Bromley Adult Education Centre, Church Lane, Prince's Plain, Bromley BR2 8LD, tel: 081-462 9184. The course leads to the May 1992 examination which will be held at the school. Course tutor is **Alan Betts G0HIQ on (0689) 831123.**

Kirkcaldy: The Glenrothes & District ARC are planning to run a course to prepare candidates for the radio amateurs examination to be held in May 1992. The course will be from 7 to 9pm Monday evenings, beginning late September, leading up to the City and Guilds examination in May 1992. A second course in Morse code will be run during the same period on Tuesday evenings from 7 to 9pm. It provides training for beginners and those amateurs wishing to improve on the basic 12w.p.m. required for the A licence. Both courses will be held at Balwearie High School in Kirkcaldy. For further details of enrolment dates, contact **Ken Horne G3MYBQ on (0592) 265789 evenings or Mr McGill at Balwearie High School, Kirkcaldy (0592) 640335.**

Wolverhampton: RAE classes will run on Mondays 7.15 to 9.15pm at Ounsdale High School, Ounsdale Road, Wombourne, Wolverhampton. First class on September 16. Enrol now. Details from **Roger Price on Wolverhampton 895198.**

Surrey: The Electrical Engineering Department of Kingston College of Further Education hope to run the RAE Course from September 1991. Lecturer is Tony G7DGW. Enrolment takes place September 9/10. KCFE is also a centre for the City & Guilds 765 exam (RAE) as well as the 773 exam (Novice RAE) and welcomes external candidates. Please note that they cannot offer the September 773 exam. For further information, please contact G7DGW at: **EE Dept, Kingston College of Further Education, Kingston Hall Road, Kingston-Upon-Thames, Surrey KT1 2AQ. Tel: 081-546 2151 Ext. 2066.**

Stockport: The RAE is available as a course of 25 Monday night sessions leading up to the May 1992 exam, with the option of sitting the exam in December 1991 for those needing to re-sit a component or for students with a good knowledge of electrical theory. The lessons run from 7 to 9pm. Students sit the exam within the centre.

A Morse course of 25 lessons for all levels of ability up to about 17w.p.m. Several tutors will be available to assist. The lessons will run on Thursday evenings from 7 to 9pm.

Both of the above courses will begin at the start of the September term at Reddish Vale Evening Centre, Reddish Vale Road, Stockport, Cheshire SK5 7HD. Tel: 061-477 3544. Enrolment will take place on September 16th, 17th and 19th between 7 and 9pm. Further details can be obtained from **Dave Wood (Course tutor) on 061-430 6246 most evenings.**

Merseyside: The Wirral ARS at Ivy Farm, Arrow Park Road, Birkenhead, Merseyside, are running an RAE course, commencing early September for the May 1992 examination. Norman G3CSG and Denis G00TD, are conducting the course. Prospective candidates should contact **Norman Kendrick G3CSG at 77 Grampian Way, Moreton, Wirral L46 0QF. Tel: 051-677 6368** for full details.

Taunton: Somerset College of Arts & Technology, Wellington Road, Taunton, are offering the RAE Course for the May exam. It will be held on

Tuesday evenings from 7 to 9pm and the tutor will be Peter Upton G7CCV. For enrolment details, please telephone **(0823) 283403 Ext. 373 or Ext. 211.**

Stockport: Avondale Adult Education Centre will be running a Morse code course on Monday evenings and an RAE course on Tuesdays. Both courses are from 7 to 9pm. Enrolment takes place week commencing September 16, when the course tutor, Rik Whittaker G4WAU, shall be available to answer any enquiries about the courses. Further information is available from Avondale School and Rik can also be contacted on **061-427 4730** evenings and weekends.

Staffordshire: The Rugeley Adult Education Centre, Aelfgar Centre, Taylor's Lane, Rugeley will be running an RAE course on Thursday evenings 7 to 9pm, starting in September. Course tutor is Brian Smith G4EQC. The course has been running successfully for a number of years and is aimed at beginners of all ages. Further details from the principal, **Mr B. Golemboski on Rugeley 578738.**

Kent: Len Buck G0DLR has been running very successful RAE courses since 1983, and this years class will commence in the last week of September to run until the May examination. His candidates sit their exam at the North West Kent College at Dartford.

The course is held at his private address, and therefore the accommodation is relatively limited as it is only practical to teach about twelve people at any one time. However, if there is a sufficient number he will be happy to run the course on two evenings of the week.

The cost of the 32-week session is £50.00, plus of course the examination fee that is payable to the College. People who are interested should contact **Len on (0732) 823483.**

Doncaster: Doncaster College will again be running the City & Guilds course leading to the RAE from September. The classes will be on a Tuesday evening from 6 to 8pm. Anyone interested should contact **Mike Parkin G60SD at the School of Electrical & Electronic Engineering. Tel: (0302) 322122 Ext. 287 or 282.** There will also be a basic practical electronics course on a Wednesday evening 8 to 8pm, the tutor being Trevor Jones, who can be contacted on the same extension.

Birmingham: The Summer 1991 RAE course begins on June 6 at a cost of £63.60. The course fee includes tuition, books, folder, paper, calculator and refreshments at break time. The examination fee is extra. The course is run by Chris G8YPE, who has eight years of experience in tutoring people through City & Guilds 765. They offer free tuition until pass, providing that the student takes every available examination. **B&C Electronics, 51 Sir Hiltons Road, West Heath, Birmingham. Tel: 021-475 2426.**

Derby: The City & Guilds course 765 (RAE) will run on Wednesdays, 6.30 to 9pm at the Derby Tertiary College, Wilmorton, London Road, Wilmorton, Derby DE2 8UG. Enrolment for this course will be in September. For further information, contact 'Student Services' on **(0332) 757570** or course tutor **Frank Whitehead on (0332) 519955 Ext. 226.**

Derby: The City & Guilds Novice course 773 (NRAE) will run on Thursdays, 6.30 to 9pm at the Derby Tertiary College, Mackworth, Prince Charles Avenue, Mackworth, Derby DE3 4FL. Enrolment for this course will be in September. For further information, contact 'Student Services' on **(0332) 519955** or course tutor **Frank Whitehead on (0332) 519955 Ext. 226.**

London: Hendon College, Corner Mead, Grahame Park Way, Colindale, London NW9 5RA, are offering an evening class for the RAE. On Thursday evenings, 7.30 to 9.30pm, starting Thursday 19 September. They also have evening classes in Practical Electronics (City & Guilds), Electronics (BTEC) and Micro Electronics (BTEC), as well as full-time and day release courses. **Chris Halford on 081-200 8300.**

Extra Special Event Station

During the weekend of September 14 and 15th, the Solihull ARS will be operating a special event station with the callsign GB2BRM (Birmingham Railway Museum). The event is the museum's 'Friends of Thomas the Tank Engine Weekend'.

This is no ordinary event station, as the radio station will be operating from the Royal Coach complete with the original table and furniture as used by royalty and Sir Winston Churchill during World War II. Sir Winston used the coach as a meeting and communication post when in conference with General Eisenhower. The coach was built in the 1930s and is of great historical interest and value.

The radio station will be operating on 144, 7 or 3.5MHz, depending on band conditions. The RSGB's recruitment video will be on show nearby.

Birmingham Railway Museum is located at Tyseley, approximately three miles south of Birmingham city on the A41 (near to Tyseley railway station) and will be open from 10am to 5pm Saturday and Sunday.

If more information is required, please contact **Norman Parker G4VMP on 021-707 3376.**

Silent Key Sale

A large collection of amateur radio equipment gathered over a period of 50 years, is to be sold at a Silent Key sale on Saturday 21 September

1991. The sale, which is being organised by radio amateurs on behalf of Mrs. E. Verrinder, will start at 11am and take place under cover in the

garden of her home in Dorset.

Equipment to be sold ranges from vintage receivers and books, to modern transmitters, receivers, test gear,

antennas, magazines and much radio 'bric a brac'. Full details of how to get to the sale, with short-form listings of equipment can be obtained by sending an

A5 sized s.a.e. to: **Box No. 24 PW Publishing Ltd. Enefco House The Quay Poole Dorset BH15 1PP**

Newsdesk '91

The Shetland Bus

In August 1941, the first of a series of daring wartime voyages was made between the Shetland Islands and Nazi occupied Norway, in small fishing boats, 5 to 6m long.

The Norwegian crews were carrying out a variety of missions, including landing agents in Norway to aid the resistance movement and returning with refugees and escaped prisoners of war.

Despite setbacks, the voyages continued throughout the war until the enemy were removed from Norway. So frequent were the dangerous missions run, that they became known as the Shetland Bus.

To commemorate the 50th anniversary of the start of the Shetland Bus, until the end of 1991, the Lerwick Radio Club plans to operate a special event station with the callsign GB5OSB from its club station. A special QSL card will be issued, and an award to all amateurs who contact GB5OSB and two other Shetland stations during 1991. To assist in identifying Shetland radio amateurs, it is hoped to operate two other special event stations GB2KER from Kergord and GB2LUN from Lunna, both bases of Shetland bus operations. In addition the club station GM3ZET will be active throughout 1991.

The Shetland Bus is well known to many Norwegian amateurs and has been a source of bonding between Shetland and Norway. To commemorate the Shetland bus, the Shetland Island Council have struck a commemorative coin at the Tower Mint, London. A book has also been published on the subject.

For more details, please contact **R. G. Miles GM4CA** on (0595) 6411.

South Dartmoor School ARC

As a direct result of the Novice amateur radio course, South Dartmoor School, Ballard Lane, Ashburton, Devon, has now formed a radio club.

It is called South Dartmoor School Amateur Radio Club, and it will be active after the school summer holidays.

The South Dartmoor School has nine students and one teacher taking the Novice amateur radio exam, with another five from Knowles Hill Comprehensive School at Newton Abbot in Devon.

The support from the parents, teachers and head teachers has been 100% and all their courses finished in time for the school summer holidays. This will give time for revision when they return after the holidays, ready for the September Novice amateur radio exam.

The School's Headmaster, Ray Tarleton, is very keen on the project and is making a room available for a radio club in the school with funds for some equipment. To justify the room it will also have a weather satellite station, so that it can be used by the geography and science departments in the school.

Local radio amateurs will also help, and it is proposed that they get a club callsign for the school. Hopefully this can all be carried out in the summer holidays, ready for when the autumn term starts in September.

The students will be the first in Devon to take the exam and hopefully will have their callsigns at the end of October.

Peter Thornhill G6ZKQ, Tutor, 21 Elmbank, Buckfastleigh, Devon TQ11 0DN.

Lothians Radio Society

The Lothians RS will be holding its third Open night at the start of the next session of club meetings in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh, commencing at 7.30pm on Wednesday 25 September.

The Open night is for all radio amateurs, s.w.l.s and interested enthusiasts, and will this year feature both a Fleamarket and a Bring & Buy sale for both members and non-members of the society. For details of tables and space available in the Fleamarket, please contact Mel Evans on **031-664 5403**. To take part in the Bring & Buy, simply bring along your items clearly marked with your callsign and price.

Also present, will be their registered Novice Licence instructor with details of proposed Novice Licence and c.w. classes for those interested.

So, why not go along and take any interested parties with you!

August Bank Holiday Sale

Garex Electronics have an August Bank Holiday Monday (26th) Sale - One day only from 10am to 4pm.

Regular lines: new & second-hand scanners, antennas, components, plus lots of lovely junk and surplus materials. All the clearance items offered at 'must go' prices.

Garex are easy to find, with ample parking. South Brent is just off the main A38 between Exeter and Plymouth.

Garex Electronics Station Yard South Brent South Devon TQ10 9AL. Tel: (0235) 72770.

Big Event

On August 31/ September 1 - GB60NTS - will be on the air for the Third Annual 8 Nations National Trust Event (Diamond Jubilee Event). This is the big event for the National Trust For Scotland for 1991.

This event involves all call areas in the UK and Ireland and they are all operating from National trust properties to combine with Scotland to celebrate 60 years of NTS.

Taking part in this event will be the following stations: GB2NTU, EI7M/P, GB2NTW, GB2NTC, GB0NTJ, GB2NTE, GP3FLH, GT3FLH, GH3DVC and GB60NTS.

A special certificate is available for overseas, contacting any of the above stations in three call areas. UK and Ireland,

contacting any of the above stations in five call areas. Cost to UK and Ireland is £1 and overseas is 4\$ or the equivalent. There's a special QSL card for every contact, with all QSLs via the bureau.

Log extracts only please, to:
Robbie GM4UQG Awards Manager PO Box 59 Hamilton Scotland ML3 6QB.

Northern Sound, Vision & Electric Show

Millions of people will be making their way to Blackpool this autumn for the Illuminations. Not all will be travelling just to see the Lights.

Thousands will be travelling to see a new public exhibition - The Northern Sound, Vision & Electric Show.

The exhibition will be staged at the Norbreck Castle Hotel, on Friday, Saturday and Sunday 13-15th September. The well-known seafront venue is easily found and has good car parking facilities.

The Northern Electric Show, will present to the public all that is best in the world on consumer electrics, from computers to curling tongs, hi-fi to hot plates. If it's powered by electricity and consumer-orientated, it will be on show in Blackpool!

For more information on the show, contact:
Nicola Woodcock Northern Sound Vision & Electric Show 335 Red Bank Show Bispham Blackpool FY2 0HJ. Tel: (0235) 52557.

Car Boot Rally

The Madley Satellite Earth Station Amateur Radio Group (G7BTI) are holding their annual car boot rally, within the grounds of the Communications Centre, on Sunday September 8. Madley Comms Centre is located 10km south-west of the City of Hereford. In addition to the amateur radio section there will be a segregated conventional car boot sale. The gates open at 8.30am and talk-in is available on S22. Further details can be obtained from our own 'Backscatter' columnist, **David Butler G4ASR** on (0873) 87679.

USA Special Event Station

Amateur radio station WBIU will be operating a special event station from the USA Marconi site on October 5 and 6th. Starting at 1300UTC to celebrate the 90th anniversary of Marconi's Wireless station, South Wellfleet, Massachusetts, USA, (construction started in 1901).

Operating frequencies will be the general section (lower 25kHz) of 21, 14 and 7MHz and the Novice section of 28MHz (28.400MHz) and 3.5MHz (3.700MHz).

To receive a certificate, please send a QSL card, 9x10 envelope and IRCs to: **Ray Hilson WB1U**
6 Sherman Place
Norwalk CT 06851
USA.

Scottish Tourist Board RA Expedition Group

On August 17/18 - GB6SM will be on the air for the Summerlee Museum in Coatbridge, Lanarkshire Steam Fair.

It was 150 years ago when Summerlee Iron Works were at the Hub of the Industrial Revolution, when coal and iron brought prosperity to Scotland. Fifty years ago, the works became derelict. Today, the site is the home of a major working Museum illustrating 200 years of Scottish industry and people. The site won the Museum of the Year 1990 and there's a special QSL card for every contact.

John (Paddy) McGill GM3MTH
Tel: (0236) 40495.

Newsdesk '91

Club News

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm at the old Village Hall, Hardwick, except during June, July and August when there is only one meeting on the 1st Wednesday of the month. September 4 is a talk by Bill G6WDF on 'Amateur Satellites, All I Know About Them!' Further details about the club from Geoff on (0280) 817496 or Martyn on (0908) 560026.

Bradford ARS meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service club, Shearbridge Road, Bradford, West Yorkshire. August 22 is G3NN - Portable operation and September 4-7 is special event station GB50ATC. **Charles Boh G0ACX** on (0247) 494694.

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. August 14 is 'Weather Measurements' by Derek G3MMA and September 2 is 'Packet Radio' by Ted G8NPF and Mick G6DFZ. **D. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ.** Tel: (0376) 27431.

Bromsgrove ARS meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. August 13 is 'Ceramics' by Eric Danks G8BKL and the 27th is a night on the air. **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF.** Tel: (0527) 546075.

Coulston ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. August 12 is an RSGB Video evening with Cheese & Wine and September 9 is 'Linear Amplifiers' by John Stockley G8MNY. Further details from **Andy Briars G0KZT** on 081-668 7004.

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. August 17 is a special event, the 70th anniversary of No. 4 Flying Training School, the 19th is club station HF night, September 2 is a construction night and the 7-8th is another special event. Seven Nations National Trust event. More details from **Tony Rees GW0FMQ** on (0248) 600963.

Echelford ARS meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. August 12 is The Great Egg Race G0BZF/G1XHP and September 9 is 'Keys and Keyers' G3ESH. Further details from **P. Towshend G6PMT** on (0344) 843472.

Fareham & District ARC meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. September 11 is a talk on 'P Up Mountains' by Peter G0FIM. Details from **Rod Smith G0ERS** on (0705) 373572.

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. August 22 is an Informal meeting with programme review and September 12 is also an Informal. **Eric Fielding G4IHF** on (0253) 726685.

GB3HZ Repeater Group meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Their next meeting is on September 26. Details from **Francis Rose G2DRT** on (0494) 814240.

Gloucester ARS meet at St. Johns Ambulance HQ, Heathville Road, Gloucester, 7.30pm. August 14 is Construction Group, the 21st is Morse Sending Practice and the 28th is Homebrew Clinic. More info from **J. Beckingham** on (0425) 28533 Ext. 2741.

Hambleton ARS meet in Room A5 of Northallerton Grammar School at 7.30pm. September 9 is Gulf Gossip by Nigel Robertshaw G0NHM. For more details, contact **Nigel Robertshaw G0NHM** on (0609) 776608.

Ipswich RC have a new secretary, **Mrs S. M. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PD.**

Kettering ARS meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. August 31/September 1 is an HF Field day at Loddington. All enquiries to **Len G7EHM** on (0536) 514544.

Lothians RS meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. September 11 is The President's Address. Further details from **Mel Evans** at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.

Loughton & District ARS meet in Room 14 of Loughton Hall, 7.45pm. They haven't any meetings in Loughton Hall during August but on August 9 and 23rd they have Informals at Victoria Tavern. For more details contact **Mike Pilsbury G4KCK** on 081-504 4581.

Maidenhead & District ARC meet at The Red Cross Hall, The Cres-

cent, Maidenhead, 7.30pm. August 20 is Quiz against Bracknell ARC (at home) and September 5 is Technical Questions & Answers. Details from **Neil G8XYN** on (0628) 25952.

Mansfield ARS meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. On September 5 they have a talk on the 'Short Wave Broadcast Bands' by John G4GYU. Further information from **Mary GONZA** on (0623) 755288.

Norfolk ARC meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', the Livestock Market, Harford, Norwich. August 14 is a Real Radio evening, the 21st is QRP Activity week - hints & advice, the 28th is 'Science For All' by Arnold Tomalin G3PTB, the 31st is HF SSB NFD at East Tuddenham site, September 4th is Town & Country Show final briefing, the 8th is Club demonstration at Town & Country Show, Royal Norfolk Showground, Costessey and the 11th is 'Flying Kites' by Kevin Appleton. **Jack Simpson G3NJJQ** on (0603) 747992.

North Bristol ARC hold their meeting at S.H.E., 7 Braemar Crescent, Northville, Bristol. August 16 is JARL visit to China, a video from the RSGB audio-visual library, September 1 is Motorama, details from **Graham G0MGC** and the 7th is SSB National Field Day at Woodhouse Park. **Chris Budd G0LOJ** on (0454) 616267.

Prudential ARS is open to employees of the Prudential companies and you can get details from **Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF64TE.** Tel: (0222) 512959.

Reading & District ARC meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. August 22 is a 'Power Amplifiers' talk by Roy Church G3KJC and the 31st is a special event station for Guide Dogs for the Blind. **Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR.**

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. August 11 is Hamfest Rally, Wimborne and September 3 is an Activities evening. **Geoff Gwillian G4FJO, 13 Overlands Road, Wyke Ragis, Weymouth DT4 9HS.** Tel: (0305) 781164.

South Notts ARC meet at Highbank Community Centre, Farnbrough Road, Clifton Estate, Nottingham. August 9 in Preparing for Open day, the 11th is Open day, the 16th is On Air Operating/P from leek, the 18th is a Foxhunt, the 23rd is talk-in on 2m/talk on Packet Radio by Eddy G0INA, the 30th is talk-in on 2m/Open Forum and September 6 is Construction (Fairham college). For further details call **Trevor G4IRH** on (0509) 672734.

Stevenage & District ARS meet in Ground Floor Lecture Room, 'D' Block, Ridgmond Training Enterprise, Ridgmond Park, 7.30pm. September 2 is their RAE course enrolment evening, the 3rd is talk on 'Mobile Operating' by Peter G7HCL and Gary G0ETA and the 10th is Practical Test Equipment. Details from **Pete Daly G0GTE, 48 Lincoln Road, Stevenage, Herts SG1 4PJ.** Tel: (0438) 724991.

Stratford-Upon-Avon & District RS meet 2nd & 4th Mondays, 7.30pm at Baptist Church, Payton Street, Stratford-Upon-Avon, Warwickshire. September 9 is an Open evening (10 minute story by members). Further details from **Alan Beasley G0CXJ, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE.** Tel: (0608) 82495.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. August 15 is a Barbecue, the 29th is a committee meeting at GOGZD and September 2 is a natter night. More from **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.**

The Three Counties ARC meet every other Wednesday, 8pm at the Railway Hotel, Liphook. August 14 is Video of the RSGB and other radio activities, the 28th is a Junk Sale and September 11 is 'Wines of the World'. **Kevin Roche G8GDS** on (0420) 83091.

Wakefield & District RS meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. August 13 is an 'Amateur Radio For Beginners' video - second showing the 20th is 'ATU/Antenna Principles' by G3WVWF, September 3 is contest final preparation and on the air and the 7-8th is 144MHz Trophy Contest - Blakey Ridge. **John-Lloyd Bailes G0MVA** on (0924) 220048.

West of Scotland ARS meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G0MKT0, PO Box 599, Glasgow G3 6QH.**

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. August 30 is a general activity evening. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR.** Tel: 081-397 0427.

Car Boot Sale

Milton Keynes & District ARS have an amateur radio car boot sale on Sunday 8 September at Cranfield Airfield, Beds (south side). It runs from 9.30 until 4pm. Hot & cold snacks and drinks, admission 50p. Talk-in S22. Advance bookings are £7 private (£9 on the day) and trade £12.50 (£15 on the day). Enquiries to **Ray G1LRU** on (0908) 860798.

Auction

The Tyne & Wear Repeater Group Auction is to be held on Sunday 3 November at Fencehouses Community Centre, Fencehouses, Nr Chester-le-St., Co. Durham. Doors open at 11am for booking in goods. The Auction starts at 12.30pm. For further details, please contact **Ian G4OCQ** on 091-384 0827.

Kenpro K Hand-Held



The overall impression received, when I first saw the Kenpro KT-44, was one of a spartan, but smart rig. This u.h.f. hand-held has none of the many multi-functioned front panel keys found on many hand-held transceivers.

The frequency controls are limited to three decade thumbwheels and one small slider switch. The three decade switches control the frequency in 10kHz, 100kHz and 1MHz steps.

At first, I experienced a little difficulty when trying to set the frequency. I even managed to try to call up a local repeater some 200kHz higher in frequency than it really was. I had the repeater shift on '+1.6' and fortunately, was unlikely to have broken into any conversations with repeated use of the toneburst. It was an exercise on how to feel foolish in one easy lesson!

Setting The Frequency

If you look at the photograph of the top panel, you'll see that the frequency is set for 433.350MHz, a local repeater channel. The MegaHertz decimal point is assumed to lie between the first two numbers.

By adding 430 to these and you'll have set 433.350MHz on the rig. The final 0 or 5kHz is selected with the aid of a small slide switch, which is just visible below the Kenpro name.

In the UK we use a +1.6MHz repeater offset. Two of the three small slide switches, hidden on the back panel above the belt clip, may be used to select this requirement.

The switch marked '+1.6' and '-1.6' is almost self-explanatory. In use, this switch selects a transmission frequency either 1.6MHz higher or 1.6MHz lower than the thumbwheel set frequency. You may regard the switch as a 'preset', and it may be left on '+1.6' for use within the UK.

When you're about to use a repeater, all you have to do is move the middle slider switch on the back panel, to the 'DUP' (Duplex) position. To use the normal, or simplex channels, slide this switch back

REVIEW

Tex Swann G1TEX isn't one to turn down the chance of trying out a useful piece of equipment. He tried out the Kenpro KT-44, and was impressed with this budget-priced rig's excellent performance.

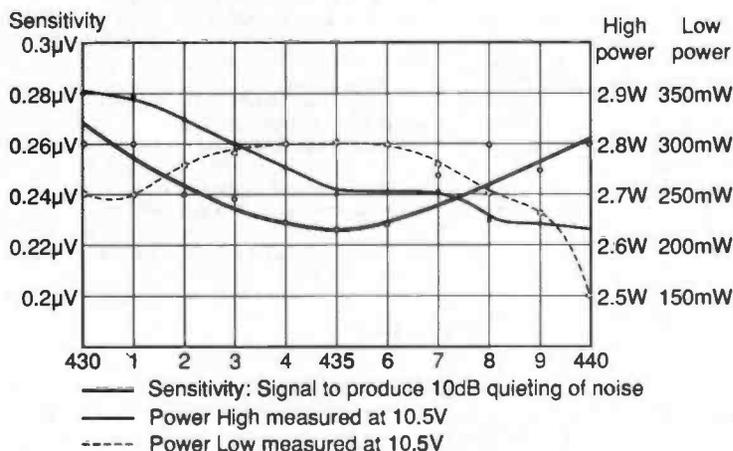
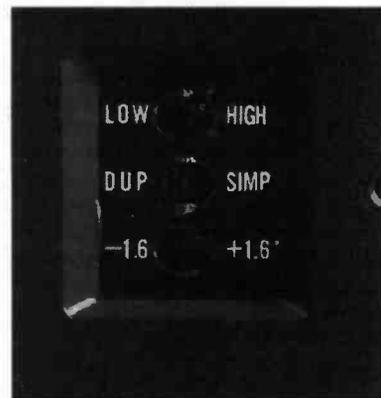


Fig. 1: Combined sensitivity/power diagram.



The cluster of three switches on the back panel.

T-44 UHF Transceiver

over to the 'SIMP' setting. What could be simpler?

The final switch, in this cluster of three controls is the r.f. power output. The actual measured power out was as shown in the composite diagram in Fig. 1.

Using The Transceiver

Two of the transceivers had been supplied for evaluation and Rob Mannion G3XFD and I tried them out in the office, and during lunchtime walks in Poole High street. Rob also took his transceiver out on the Dorset hills, and thoroughly enjoyed himself as a pedestrian portable. Band conditions were so good he managed to work into Bedfordshire and East Anglia using just the 'rubber duck' antenna!

We found that the rigs were very sensitive, and they provided crisp and clear audio on transmit and receive. This is an area where some hand-helds, can show their shortcomings.

The PW editorial office is one floor down from the technical sub-editor's workshop (it's known as the 'Tardis' because of the specially screened measurements cubicle) where much of our development work is done. Despite masses of r.f. noise from the various computers in our, and other nearby offices, the rigs coped very well indeed. Rob and I were able to chat away with no bother, over the short but very badly obstructed pathway.



David, 14 year-old son of Mike Owen G4YTA is looking forward to his Novice Licence and a KT-44 of his own.

Summary

To sum up, I think that the Kenpro KT-44 is a very nice and easy set to use, once the initial fumbling with the frequency selection switches had been overcome. It's a simple, but comprehensive little transceiver with a more than adequate performance for portable use.

The local repeaters were more than happy with the transceiver's signals. Reports received from other operators said that it provided good audio, with a very crisp and clear transmission. This is most likely to be due to the sensitive electret microphone insert, and partly due to good speech processing circuitry.

It's not often we get two rigs of the same type to evaluate and I was able to check the specifications and to put both transceivers through their paces. I'm pleased to report that the final, composite results below reflect the quality of the product, as both rigs were within or better than the manufacturers specification. PW

Our thanks go to Nevada Communications of 189 London Road, North End, Portsmouth PO2 9AE. Tel: (0705) 662145, for the loan of the review sample transceivers which cost £159 and will be available during September.

Measured and tested specifications

General

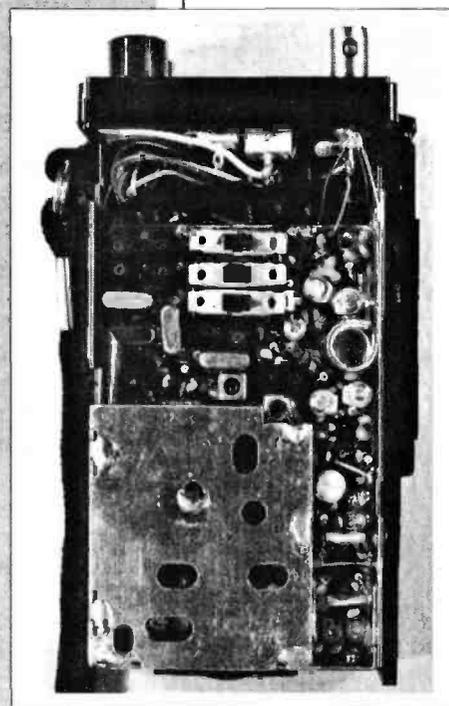
Frequency range	430-439.995MHz in 5kHz steps
Type of modulation	Frequency Modulation (F3)
Antenna impedance	50Ω
Power requirements	5.5-12V d.c. (battery packs available with 8.4 or 10.8V)
Consumption (at 10.8V)	22mA (standby) 170mA (Max received audio) 700mA (High power transmission) 300mA (Low power transmission)
Operating temperature	-10° to +60°C
Dimensions	65(w) x 40(d) x 180(h) mm (excluding antenna)
Weight	490g (approximately) (includes 8.4V battery pack and antenna)
Frequency selection	Thumbwheel, 10kHz steps +5KHz switch (three decade range, add 430 to read frequency '335' equates to 433.350MHz (RB14 channel))

Receiver Section

Receiver type	Double Superhet
Intermediate frequencies	21.6MHz (1st i.f.) 455kHz (2nd i.f.)
Sensitivity	better than 0.5μV (see Fig. 1)
Squelch setting	0.16-3.5μV (measured)
Selectivity	better than 60dBμV (see Fig. 1)
Bandwidth	±7.5kHz
Audio Power	Better than 400mW (10% distortion)

Transmitter Section

Output power	1.5W (high 8.4V) 2.5W (10.8V) (see Fig. 1) 250mW (see Fig. 1)
Modulation	Reactance
Maximum deviation	±5kHz
Frequency offset	±1.6MHz repeater shift (+1.6MHz in UK)
Spurious emissions	-60dBc or less
Microphone	Electret type
Repeater tone	Separate access tone switch on the front fascia.



The rig is very neatly shoehorned into the casing.



Castle Electronics

Tel: 0384 298616

Fax: 0384 270224

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- ★ Trade service enquiries welcome (special rates)

Castle Electronics are a fully equipped DTI approved radio engineering company based in the West Midlands, who specialise not only in PMR equipment, but in land and marine based HF communications equipment of all types.

Our engineers are widely experienced in not only early but also digital/synthesised radio equipment covering a wide range of makes and models.

A 24 hour emergency call out service is available covering the whole of the UK.

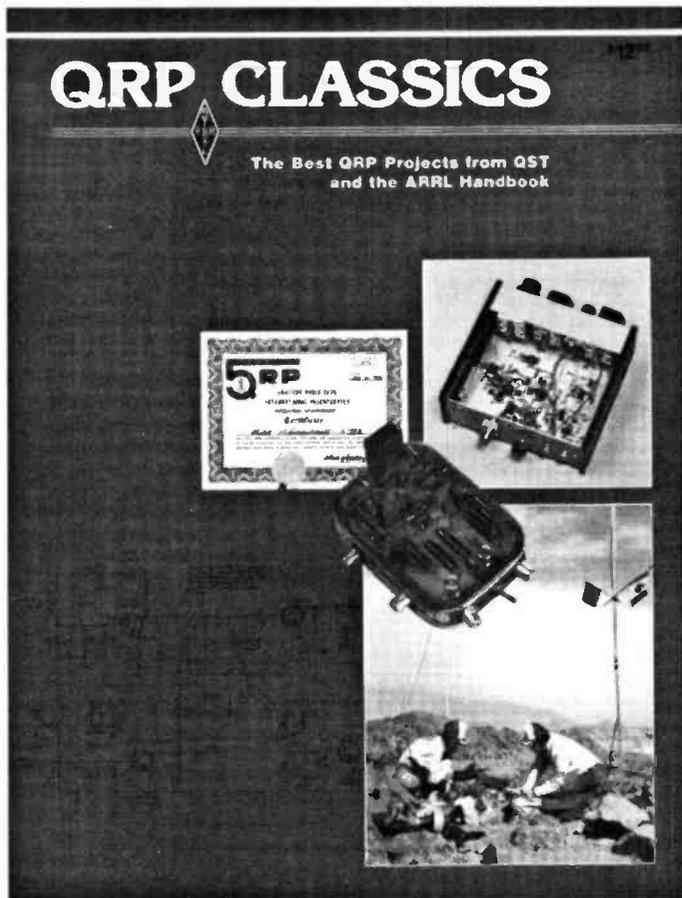


**UNIT 3, "BAIRD HOUSE", DUDLEY INNOVATION CENTRE
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PW SUBSCRIBERS' CLUB

If you have a subscription then you will know all about the *Practical Wireless* Subscribers' Club. If you do not have a subscription then doubtless you will be wondering just what this page is all about. Membership of the *PW* Subscribers' Club is free and automatic for all Subscribers, and is our way of saying thank you to all those who have enough faith in their favourite magazine to pay for it 'up front'. Each month there will be Special Offers and occasional competitions with some really useful prizes to be won.



Once again we've another special offer for *Practical Wireless* Subscribers' Club members and it's *QRP Classics*, published by the ARRL. This book contains selections of what are considered to be the best QRP projects published in *QST* and the *ARRL Handbook* in recent years.

If you're a QRP or home-brewing enthusiast, this book will certainly provide many hours of reading. Amongst a host of fascinating constructional projects, there's an s.s.b. and c.w. transceiver for 50MHz and an interesting QRP 14MHz s.s.b. and c.w. design for portable working.

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The PW Chatterbox



The prototype PW Chatterbox receiver.

Before starting on the receiver side of the 'Chatterbox', we ought to take a final look at the transmitter itself. The Chatterbox transmitter is built separately, because many constructors will want to use it in conjunction with an existing receiver on 1.8MHz.

It's been assumed that an existing antenna tuner and low-pass filter unit will be used with the transmitter. However, if you intend to use the complete transmitter and receiver combination as a 'stand alone' unit, it will be necessary to use a suitable low-pass filter to reduce potential harmonics.

A filter of this sort can be built into the transmitter, or it can be an outboard type used in conjunction with a small antenna tuner. What the individual constructor does of course, will depend on the size of casing and whether or not the project is built as separates or as one small unit.

With the change-over switching described in the previous article, the transmitter can be used with any 1.8MHz receiver. If you don't have a suitable set, you can add a simple single board receiver of the sort described here. However, bear in mind that the receiver is not a DX model and it's designed for using the Chatterbox combination in local a.m. nets.

The Receiver

The receiver section is based on the TDA1072A a.m. receiver i.c. This is an inexpensive chip which performs all the functions of an a.m. receiver between the antenna and the audio stages.

The TDA1072A's sensitivity and signal handling capabilities are such that it's suitable for this application. The i.c. also supports several features not used in this design.

Some of the features are made available on the p.c.b., should you wish to incorporate them in the receiver. For example, the chip provides an S-meter output, a muting facility and a buffered oscillator output for driving a frequency counter. The circuit is shown in Fig. 2.1, and it closely follows the manufacturer's specification sheet.

The incoming signal is filtered with a high-pass

In Part 2 of the two-unit 1.8MHz a.m. project, George Dobbs G3RJV describes the construction of the separate receiver section.

filter, L6 (wound on a toroid) and associated capacitors, and a two stage band-pass filter, comprising of T2 and T3. The high-pass filter was included because the receiver operates close to the medium wave broadcasting band.

Winding the toroid for L6 is a simple job and it only requires a little concentration for a neat job. All you need to do is wind 24 turns of 0.4 or 0.5mm enamelled copper wire on a T37-2 core.

I have a local commercial broadcasting station at the top end of the medium waveband that can light bulbs in my location in Rochdale! The high-pass filter was included to kill the pop music breakthrough. The band-pass filter has manual tuning provided by a polyvaricon capacitor, C36, to peak the wanted band signals and reduce the out-of-band signals.

Receiver Tuning

The band is tuned using a variable capacitor, C39, in conjunction with T4. Although the TDA1072A was designed for varicap tuning, this arrangement allows for very stable tuning over the band.

The variable capacitor, C39, is a standard value, 75pF, (a 100pF may be used as an alternative) which more than covers the whole band. This tuning capacitor is mounted directly on the printed circuit board.

The ground connection on C39, is made through the mounting nut to the p.c.b. To avoid any problems with poor connections, I also added a wire between the tag to the moving vanes and the ground plane on the top of the printed circuit board.

Intermediate Frequency

The i.f. at 455kHz, is filtered by using a CFW455HT ceramic filter and an i.f. transformer, T5, placed between the mixer output, pin 1, and the i.f. amplifier, pins 3 and 4.

It's possible to inject a b.f.o. signal at pin 4, to make the receiver available for c.w. and s.s.b. reception. Several radio amateurs have used this i.c. to make a c.w. and s.s.b. receiver. I tried injecting a 455kHz signal at pin 4, but found that it triggered the internal a.g.c. This reduced the overall gain of the receiver, to what I considered to be an unacceptable level.

Sprat Debate

There was a debate between DF2OF and G8SEQ, reported in the G-QRP Club journal *Sprat* (issue 57), on using a b.f.o. with the TDA1072 without a.g.c. problems. The technique is obviously open to experimentation!

One possible idea, would be a b.f.o. which only injects a signal when netting the transmitter to the receiver. This technique would make the netting process somewhat easier.

The circuitry around pins 5 to 8, clearly demonstrates that the TDA1072A requires considerable decoupling

Errors And Updates

Wrong Toroidal Core.

The PW Chatterbox transmitter parts list, page 23 of the August 1991 issue of PW, has L5 described as being wound on a T50-12 toroid. This is incorrect. The inductor L5 should be wound on a T50-2 toroid. Our apologies to those who've started to build the transmitter.

1.8MHz Receiver

around the audio stages. Don't miss out these capacitors, as reducing the decoupling causes instability. To further help stability, the receiver is built on a double-sided p.c.b.

The audio amplifier is the popular LM386 i.c. in its high gain configuration. A muting switch can be applied to pin 2, but in this application the receiver is switched off during transmit cycles, so pin 2 is grounded. Switching off the receiver is quite acceptable in this particular application.

Building The Receiver

The receiver is built on a single p.c.b. which also holds the three controls, peak (C36), tune (C39) and audio volume (R29). The board is a double-sided p.c.b., the top of the board forming a ground plane. Wherever possible, the grounded connections and leads should also be connected to the top side of the board.

It can be helpful to build and test the audio stages first. This job would start from the loudspeaker output as far as pin 6 on the TDA1072A. The capacitors C45 and 46 are tantalum bead types to fit in the small space available. When the audio stages are wired, the rest of the components may be added.

Setting Up

The method used to set up the receiver will depend upon the available test equipment. Although some test equipment is helpful, the receiver can be set-up by using signals on the band.

Even after a setting-up operation on the test-bench, I tend to make final adjustments using signals on the band. The first task is to get C39 to tune over 1.8 to 2MHz. It is, of course, tuning 455kHz lower than the range 1.8 to 2.0 MHz.

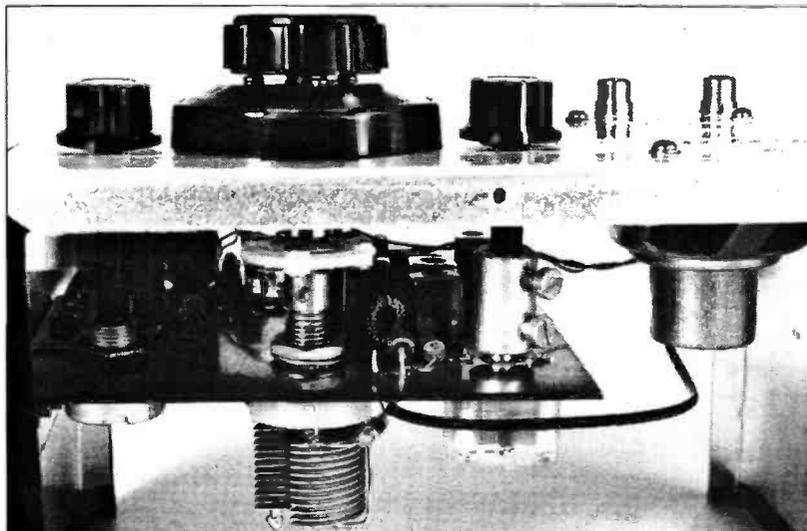
One suitable method is by using a frequency counter to take a signal from TP1. This is a simple technique, but some poorly buffered counters can change the frequency of the signal.

Another method is to listen for the signal on a receiver, set to receive c.w. or s.s.b. This is done by connecting a short wire antenna to the receiver, and then draping it close to C38. The adjustment is by means of the core in T4. You may find it necessary to increase the value of C38, by perhaps 56 or 68pF (the actual value depends on the individual coil) to achieve this easily.

Bandpass Adjustments

The adjustment of the band-pass filter is rather more exacting, and it's done by adjustment of T3 and T4. The ideal method is to set the two cores to peak the band in conjunction with C36.

This may be done by injecting a low level signal of the required frequency into the receiver input or using signals on the band. There are enough 'jingle-jangles'



Looking at the receiver from above. The method of mounting the main p.c.b. on stand-off pillars can be clearly seen along with the slow-motion tuning drive.

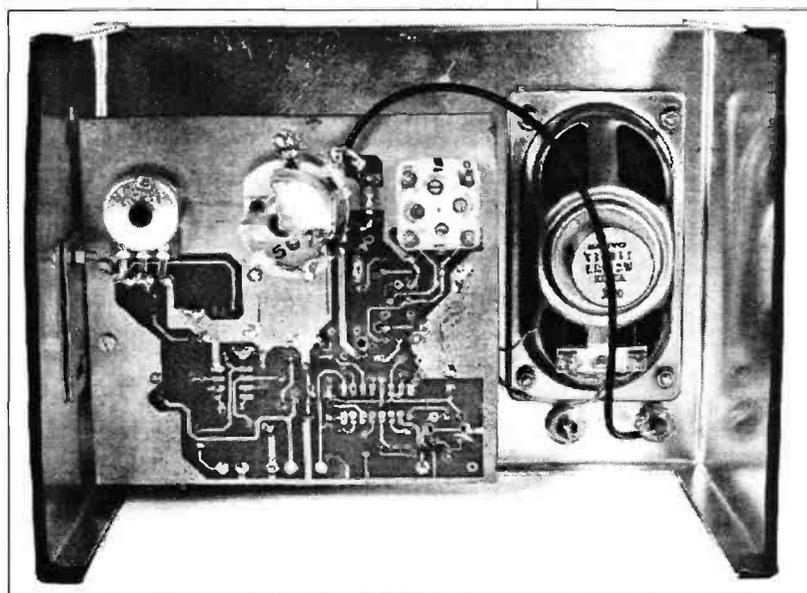
from navigational beacons on 1.8MHz to provide tuning signals. The signals to avoid are any popular songs creeping in from medium wave broadcasting stations!

Begin the process by setting C36 about midway, and injecting or finding a signal at around 1.9MHz. Next, T2/3 are adjusted to peak the required signal.

You should then set a signal at about 1.8MHz, rotate C36 to peak the signal, and then re-adjust T2/3. This operation should then be repeated at around 2MHz. It's worth repeating the whole tuning up process at least twice, and then perhaps re-peaking on a favoured frequency on the band. To finish the job off, you should peak T5, the i.f. transformer, for maximum signal.

The receiver input is designed for 50Ω, and it should be used into a correctly matched 50Ω input from an antenna or tuning unit. An antenna tuning unit will also help to reduce adjacent channel broadcast signals.

Rear view of the receiver showing the p.c.b., gain, receiver tuning and 'peak' controls.



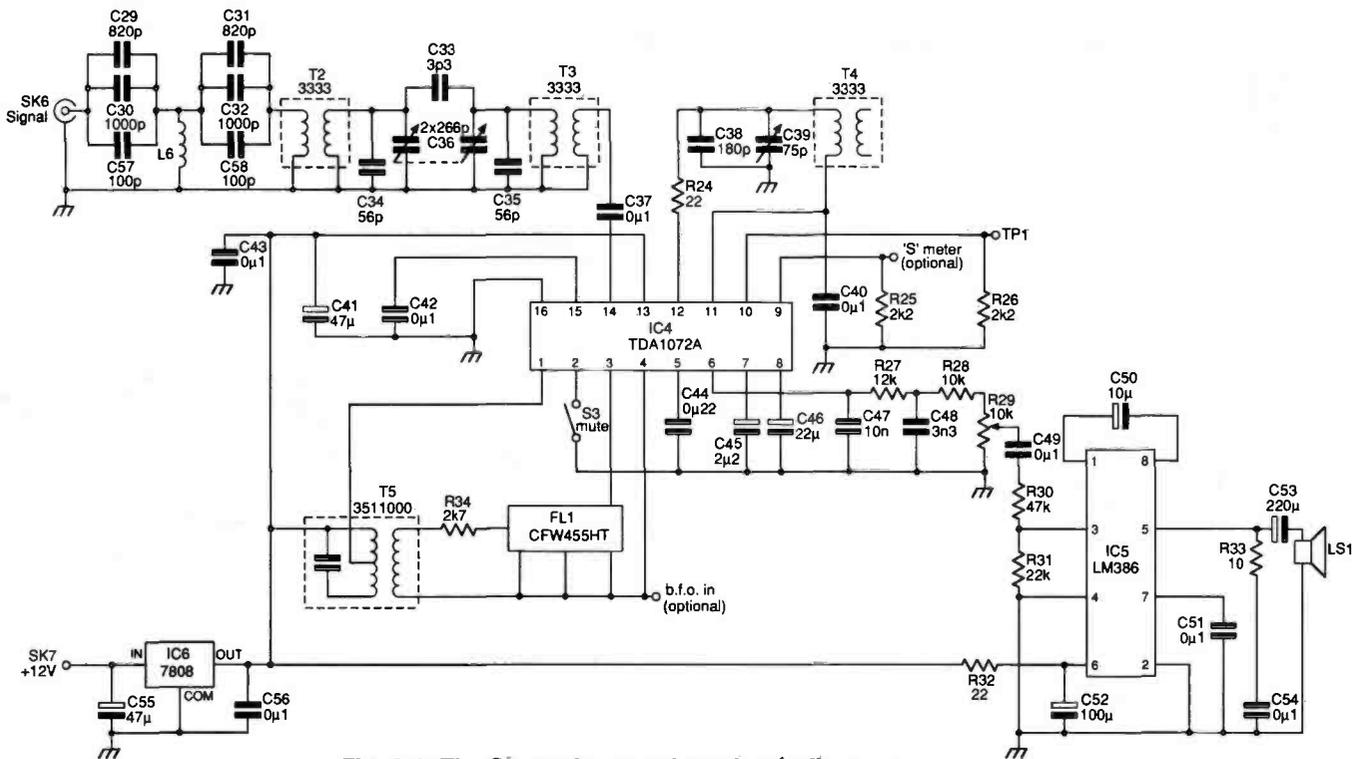


Fig. 2.1: The Chatterbox receiver circuit diagram.

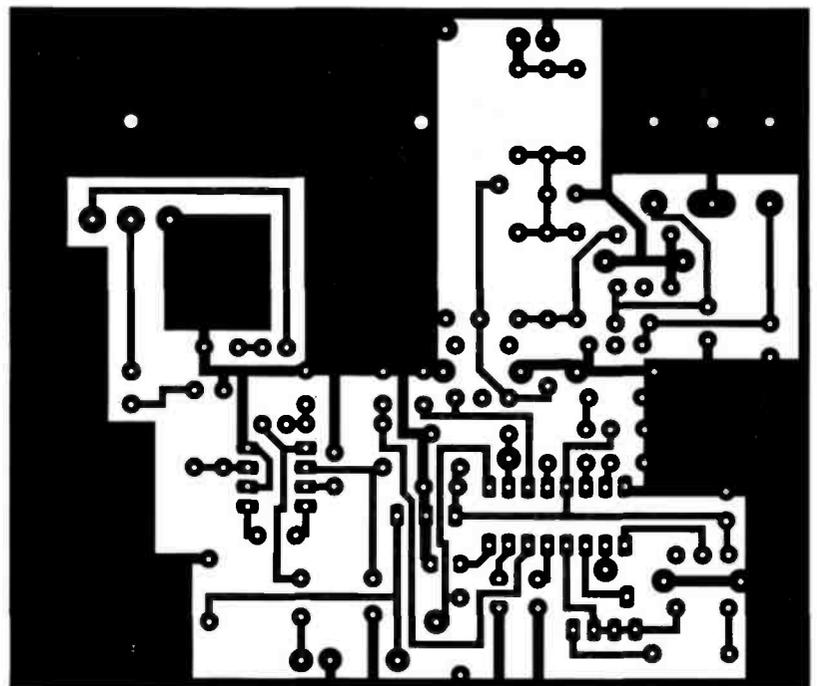


Fig. 2.2: The Chatterbox receiver p.c.b. copper track layout.

Boxing The Chatterbox

The receiver unit can be mounted in a box the same size as the transmitter. The interconnecting leads that form part of the transmit to receive switching, are clearly shown in the photographs.

To provide a suitable receiver tuning rate, a slow-motion drive is required for C39. I used an in-line epicyclic drive. To enable the slow-motion drive to be

used, the receiver p.c.b. is mounted behind the front panel, using stand-off pillars spaced to suit the drive.

Switching Modification

As the unit uses a.m., and frequency stability is less critical, several short-cuts may be taken in the transmit-receive switching arrangements. For example, the v.f.o. is switched off during the receive periods, as the 'warm up' drift is insignificant in terms of an a.m.

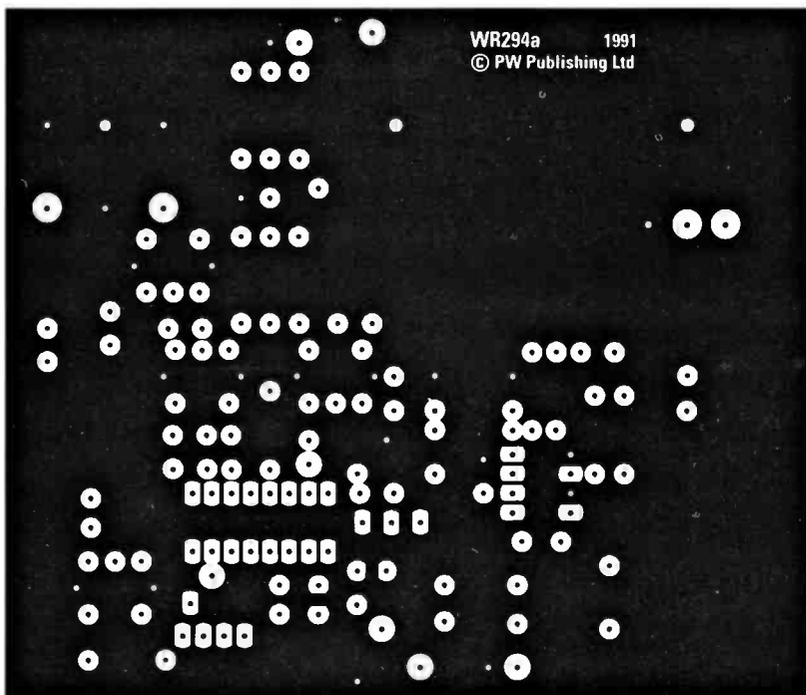


Fig. 2.3: Receiver ground plane details.

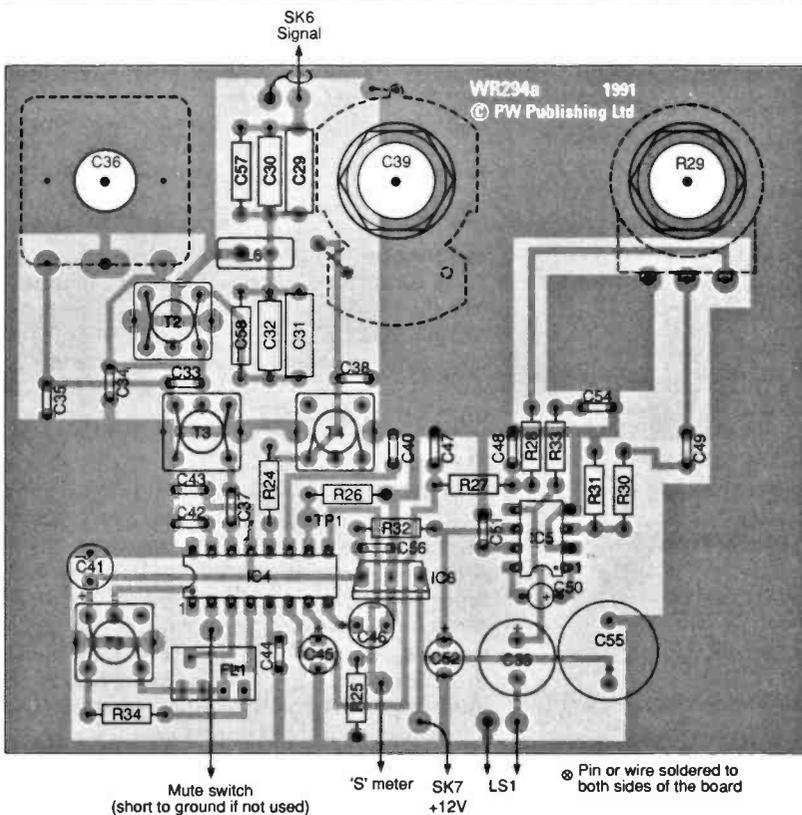


Fig. 2.4: The Chatterbox receiver component placing overlay diagram with off-board connections shown.

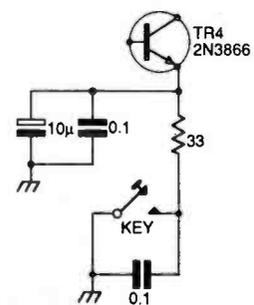


Fig. 2.5: The c.w. modification for the Chatterbox suggested by G3VTT.

signal. For the same reasons, the receiver is completely switched off during transmit periods.

The circuit of the change-over arrangement was shown in Part 1 as Fig. 1.1. The switching circuitry now requires a small modification to incorporate the receiver half of the project.

The change-over action is centred around a 12V relay, RL1, operated by the p.t.t. switch on the microphone. This is a double-pole change-over relay which switches the antenna between the receiver and

the transmitter output.

An extra supply wire is added to the contacts on the switch. This supplies 12V to the transmitter and the v.f.o. The extra wire, from the normally closed contact, supplies the receiver with 12V which is disconnected when the p.t.t. is operated and the relay switches to transmit.

As the transmitter and receiver are separate units, the transmitter has to be 'netted' to the receiver frequency. This is done by switching on the v.f.o., and

I hope you build, and enjoy using this delightful little rig. There's quite a few of them about already. Perhaps your Chatterbox could be the next one on the air!

then tuning it to the desired frequency on the receiver. The 'Net' Switch, S2, connects a 12V supply directly to the v.f.o. when the unit's in the receive mode.

If the transmitter is to be used for c.w., a more sophisticated method of change-over will be required. In this case, the v.f.o. should be left to run all the time. Additionally, a method of off-setting its frequency is required during receive periods, to prevent it being picked up on the receiver.

Chattering In Morse

Although the Chatterbox was designed as an a.m. transmitter, it works very well on c.w. Colin Turner G3VTT, has built a prototype Chatterbox transmitter and uses it successfully on c.w. with the slight modifications shown in Fig. 2.5.

The 2N3866 driver transistor is keyed, using the arrangement shown in the diagram. This produces pleasant keying characteristics.

With the key added, the microphone p.t.t. point still provides the change-over from transmit to receive. The microphone really needs to be unplugged when you're using c.w., but an extra switch can be added to the transmit section for change-over.

A better arrangement is to disable the modulator. Ideally, this is done by removing the supply to the 2030 audio integrated circuit and shorting out the modulation transformer, T1. The 12V supply then goes directly to the IRF510 p.a. stage. However, after telling you about the proper way to do it, I understand that Colin G3VTT, merely shorts out the modulation transformer!

PW

How Much? £28 + p.c.b. + case

How Difficult? Intermediate

Shopping List

Resistor

Carbon Film 0.25W 5%		
10Ω	1	R33
22Ω	2	R24, 32
2.2kΩ	2	R25, R26
2.7kΩ	1	R34
10kΩ	1	R28
12kΩ	1	R27
22kΩ	1	R31
47kΩ	1	R30

Variable Rotary

10kΩ	1	R29
------	---	-----

Capacitors

Miniature Disc Ceramic		
3.3pF	1	C33
3.3nF	1	C48
10nF	1	C47
0.22μF	1	C44
0.1μF	8	C37, 40, 42, 43, 49, 51, 54, 56

Polystyrene

56pF	2	C34, 35
100pF	2	C57, 58
180pF	1	C38
820pF	2	C29, 31
1000pF	2	C30, 32

Miniature Radial Electrolytics 16Vw

10μF	1	C50
47μF	1	C41
100μF	1	C52
220μF	1	C53
470μF	1	C55

Tantalum Bead 16Vw

2.2μF	1	C45
22μF	1	C46

Variable

75/100pF	1	C39 Jackson C804 type either value.
266pF	1	C36 (Polyvaricon, double variable capacitor)

Inductors

T5 is Cirkit Stock code 35-11000 (455kHz i.f. transformer)		
BKANK 3333	3	T2, 3, 4
L6	See text for winding details	

Semiconductors

7808	1	IC6
LM386	1	IC5
TDA1072A	1	IC4

Miscellaneous

A ceramic filter type CFW455HT, one T37-2 type toroid core (Cirkit), p.c.b. from PW services, slow-motion coupling, spacers, nuts, screws, etc. Miniature coaxial cable, interconnecting wire, a suitable 8-16Ω loudspeaker. A box to enclose the unit (I used a box from Minfford engineering).

Suppliers

Cirkit
Park Lane
Broxbourne
Herts, EN10 7NQ.
Tel: (0992) 464457.

Maplin Electronics
PO Box 777
Rayleigh
Essex SS6 8LU.
Tel: (0702) 554161.

Minfford Engineering
Sun Street
Ffestiniog
Gwynedd LL41 4NE.
Tel: (0766) 762572.

Errors & Updates

Low Cost NiCad Tester, February 1991 Page 26

This E&U corrects a second mistake that crept into an earlier Errors & Updates (PW March 1991). Refer to the diagram Fig. 3 on page 27 of the February '91 issue of PW. The battery under test is connected with its positive terminal to Pin A of the circuit, not pin G as stated in the previous E&U. The negative of the battery under test goes to Pin C. A further mistake, spotted by reader David Dunn-Johnston, was in the same diagram, Fig. 3. The negative supply rails for both IC1 & 2 are shown as returning to the centre rail. In fact they should return to the most negative point of the circuit, Pin F. The overlay pattern shown in Fig. 4 on page 27 is correct. Our thanks to Dave, and apologies to all.

PW Robin Frequency Counter Part 2, August 1991 Page 35

Several readers have contacted us about the testing of the PW Robin, the description on page 35 is not very clear. In the paragraph beginning 'Testing Time' the links to IC3 pins 7 and 10, are made to the socket, as IC3 has not been fitted at this point. The temporary connections in (b) should be to IC3 pin 5, not IC2 pin 5. Further down in the same column beginning, 'Remove power and transfer the link from pin 5 of IC3 to pin 10', this should have read 'pin 10 of IC2'. This is the input to the counter which is 256Hz. There was also some confusion about which parts DJ Electronics were sourcing for the PW Robin. We asked them to supply the electronic parts only. See PW August '91 page 35, for more details. The p.c.b.s WR290 and WR291, are available from the PW PCB Service at £5.42 and £7.25 respectively. These prices include VAT and p&p. Once again our apologies to all involved.

'Quaynotes' comments on some of your critical letters this month, and asks for some help from you, to plan for the future of the CB page in PW.

Okay, so I booped! I'm sorry that I got so carried away with my interest in SSTV that the rules were broken. I must say thanks to the various CBers who took the trouble to write in and warn me of the problem. One or two of you even took the trouble to explain what had happened after your own experiments with SSTV and packet radio.

Several readers who'd mistakenly tried SSTV and other data modes, reported that they were visited by the DTT's Radio Investigation Service. The RIS men put them 'on the right track' and left it at that. Fortunately, the same happened to me, and apart from some finger-wagging and an outsize Dunce's cap, here I am. The Editor's intervention and the statement produced on last month's page says it all. So, enough said.

Moans And Groans

While I'm on the whipping block, it's perhaps a good idea to look at some other criticisms that have come my way. I get a big postbag every month, and although the feedback is usually very favourable, one or two adverse, although constructive comments have arrived. It's not my job to ignore them - if I'm to do my job properly.

I must start the ball rolling by mentioning a letter from Mr A. B. Stanley from Appleby in Cumbria, who says that he's disappointed in the column. He says it's full of trivia and doesn't reflect the needs of the CB enthusiast reading PW. In his long letter, which contained much constructive criticism, Mr Stanley suggests technical reviews of CB rigs, news on licensing, and other related items.

What do you think? Would you like to see some reviews on new gear? Drop me a line and let me know. I shall be replying in full to Mr Stanley in a personal letter, but I do appreciate the time he's taken to write to me. I'm also hoping you'll write and let me know what you prefer to see, now that we've got our own little corner in PW.

Other letters have come, notably from M. A. ('Lofty') Phillips in Slough, who comments, amongst other things, that it must be difficult to produce a page covering 27 and 934MHz. In reply, I've got to say that I enjoy the feedback from you, but now that we're established, it's time to see where we're going!

Finally, on the brickbat front, a letter arrived from Leon Greenfield who lives just around the corner from the famous Chalkpits Industrial Museum at Amberley in West Sussex. Leon says that he'd like to see an article on the CB REACT service. He also points out

that he's active on 27 and 934MHz, and considers that many amateurs would not be on the air now, if they hadn't had their first introduction through CB.

So, to sum up, I must thank all of you for writing. To be honest, even the most critical letters ended up with 'thanks for the column'. It's obvious from your letters and final comments that 'CB High & Low' is needed, but we've got to try and reflect the CB radio scene in an effective way. I'll do my best, but to achieve our aim you have to do your bit and let me know what YOU want. It may be that you



Fig.2: Frank Fuller, Chairman of the 934MHz Club UK operating his much travelled u.h.f. hand-held transceiver.

CB HIGH & LOW

By 'Quaynotes'

might want to see a rig reviewed occasionally, an antenna project, and constructional ideas with 'High & Low' appearing in this form during alternate months.

In the meantime, I'm going to reply personally to as many of you as I can, and look forward to your ideas and suggestions arriving from the office.

Antenna Time

One of the problems associated with magazines, is the limited amount of space available each month. The editor has to juggle his plans and ideas for each issue, and

I've got to fight for this little corner.

As you all know, the 934MHz antenna design from Fred Judd is 'ready to go'. So, I'm going to suggest that so we can get the idea published as soon as possible, that the project appear instead of 'High & Low'. There's method in my madness, because it means I can take my holiday knowing that those of you who've been waiting for the antenna project can go ahead and build it.

In the meantime, I'll get busy collating all your letters and ideas regarding the future of 'High & Low' so that we can forge ahead. So get busy!

Fig. 1: Inside Frank Fuller's mobile CB shack. Frank's travels throughout Britain have provided many contacts for 934MHz operators.



Finding That Rig

There's great demand for second-hand 934MHz transceivers. The newly-introduced and popular 'Bargain Basement' has proved that. I was far too late to buy either of the u.h.f. CB transceivers offered in PW recently.

Because of the interest shown in second-hand gear, and as I'm still looking for a rig myself, I was pleased to hear that Brian Hollins is offering a solution to the problem of finding 934MHz gear. Brian, based in Weybridge in Surrey, runs the '934MHz Exchange' where he offers a service of buying and selling u.h.f. CB gear.

I haven't met Brian myself, but the Editor Rob Mannion G3XFD, met Brian at the Longleat Mobile rally on June 30th. He had quite a chat with Brian and Frank Fuller, (Fig. 1 and 2) the Chairman of the 934MHz Club, about the 934MHz Club UK itself and the difficulties in buying second-hand equipment. Brian took the opportunity of telling the editor about his service, and the news was soon passed on to me.

It's a great pity that I work most weekends, as it means that I can't get along to rallies. For my sins, I'm 'on call-out' duty to repair specialised communication equipment, but at least I can see our delightful countryside.

Still, at least I can pass on Brian Hollins address and 'phone number. I've no doubt that either Brian or Frank Fuller (as prominent members of the 934MHz Club) would do their best to help you find a rig. You can call or write to Brian at Beech Rise, Rodona Road, St. George's Hill, Weybridge, Surrey KT13 ONP. Tel. (0932) 852656.

That's the lot for this month, don't forget to write, brickbats and all!

Quaynotes

Mathematics For The RAE

Part 6

*Ray Fautley
G3ASG continues
with his look at
algebra, dealing
this month with the
multiplication and
division of terms.*

How, when the terms contain different symbols, do we multiply simple algebraic terms together? The answer is quite simple and logical. Multiply any **COEFFICIENTS** together and then write down the symbols in order. Examples are the best way to explain, so we will start with a simple one:

(i) Multiply together $2a$ and $4b$:

$$2a \times 4b = (2 \times 4) \times (a \times b) = 8 \times a \times b = 8ab$$

(ii) Multiply together $5b \times 6a^2 \times 2b^3$.

Multiply the coefficients together, then the 'b' terms and finally the 'a' term:

$$\begin{aligned} &= (5 \times 6 \times 2) \times (b \times b^3) \times a^2 \\ &= (60) \times (b^{1+3}) \times a^2 \\ &= (60) \times (b^4) \times a^2 \\ &= 60b^4a^2 \end{aligned}$$

or as the terms are usually written in alphabetical order:

$$= 60a^2b^4.$$

More Rules:

You may have noticed that the above terms were all positive (+). What happens if some or all of the terms are negative (-)? Don't worry, there's a series of rules which cover these cases.

(i) Multiplying a 'plus' quantity by a 'plus' quantity gives a 'plus' answer.

$$(+)\times(+)=(+)$$

(ii) Multiplying a 'plus' quantity by a 'minus' quantity gives a 'minus' answer.

$$(+)\times(-)=(-)$$

$$(-)\times(+)=(-)$$

(iii) Multiplying a 'minus' quantity by a 'minus' quantity gives a 'plus' answer.

In short:

$$(-)\times(-)=(+)$$

I'm afraid these rules will have to be committed to memory as they are very important. But there is a small memory jogger that can help. **If the signs are the same, the answer is 'plus'. If they're different the answer is 'minus'.** Not really as difficult as you may have thought, is it?

Now let's make the terms a little more complex. Don't shrink away it's not too difficult. Get all the terms having the same symbol together and add their indices. Then multiply ALL coefficients together.

Remember that $a \times b \times c = abc$

or when it has some terms more than once:

$$a \times a \times b = a^{(1+1)}b = a^2b$$

now add a few more terms:

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$$a \times b \times c \times a^2 \times b^3 \times c^5$$

$$= a^{(1+2)} \times b^{(1+3)} \times c^{(1+5)}$$

$$= a^3 \times b^4 \times c^6 = a^3 b^4 c^6.$$

Here are few more worked examples.

(i) Multiply $3a \times 6c \times 8b \times 2a$
 $= (3a \times 2a) \times 6c \times 8b = 6a^2 \times 6c \times 8b$
 $= 6 \times 6 \times 8 \times a^2 \times b \times c$
 $= 288a^2bc.$

(ii) Multiply $c \times 3a \times 2c^{-4} \times 4b^4 \times 6a^{-5}$
 $= (3a \times 6a^{-5}) \times (4b^4) \times (c \times 2c^{-4})$
 $= (18a^{1-5}) \times (4b^4) \times (2c^{1-4})$
 $= (18a^{-4} \times 4b^4 \times 2c^{-3})$
 $= (18 \times 4 \times 2) \times a^{-4} \times b^4 \times c^{-3}$
 $= 144a^{-4}b^4c^{-3}.$

Division of simple terms is not much different (if you remember the rules for indices).

$$\frac{a^2}{a} = a^{(2-1)} = a^1 = a$$

The coefficients are divided in the usual way. Sometimes you may need to 'break' the individual terms down to make simplifying easier.

$$\frac{6a^3}{2a} = \frac{6}{2} \times \frac{a^3}{a} = 3 \times a^{(3-1)} = 3a^2$$

Terms In Brackets

Now for some more more difficult problems involving the use of brackets.

$(a-b)(a+b)$ means $(a-b) \times (a+b)$.

To multiply the bracketed terms together needs a little care if the answer is to be correct. The rules (there are always rules!) to be followed are:

(i) Multiply the first part of the first term by the first part of the second term.

(ii) Multiply the first part of the first term by the second part of the second term.

(iii) Multiply the second part of the first term by the first part of the second term.

(iv) Multiply the second part of the first term by the second part of the second term.

(v) Add all four answers together.

As usual, an example is far easier to follow than the rules on their own!

Multiply $(a+b)$ by $(a+b)$

From rule (i) $(+a) \times (+a) = +a^2$

From rule (ii) $(+a) \times (+b) = +ab$

From rule (iii) $(+b) \times (+a) = +ab$

From rule (iv) $(+b) \times (+b) = +b^2$

Finally from rule (v) we arrive at:

$$a^2 + ab + ab + b^2$$

$$= a^2 + 2ab + b^2.$$

That was very dry and dusty with just letters wasn't it? So now to check if we've got it right, and to make

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it more interesting, let's assume that $a = 6$ and $b = 7$
 $(a + b) \times (a + b) = (6 + 7) \times (6 + 7)$
 $= (13) \times (13) = 169$ (answer i).
 Now our answer was $a^2 + 2ab + b^2$
 Putting $a = 6$ and $b = 7$:
 $a^2 + 2ab + b^2 = 6^2 + (2 \times 6 \times 7) + 7^2$
 $= 36 + 84 + 49 = 169$ (answer ii)
 Good! As (answer i) is the same as (answer ii) we were correct. Now just to check your answers, try other figures in place of a and b above.

Try another similar problem:
 Multiply $(a - b)$ by $(a + b)$.
 From rule (i) $(+a) \times (+a) = +a^2$
 From rule (ii) $(+a) \times (+b) = +ab$
 From rule (iii) $(-b) \times (+a) = -ab$
 From rule (iv) $(-b) \times (+b) = -b^2$
 Finally from rule (v) we get:

$$+a^2 + ab - ab - b^2$$

and as the addition of $+ab$ to $-ab$ is 0 (or zero) we are left with: $a^2 - b^2$.

Once again, let's check the results with some simple numbers. Assume $a = 9$ and $b = 5$.

$$(a - b) \times (a + b) = (9 - 5) \times (9 + 5) = 4 \times 14 = 56$$

Our answer was $a^2 - b^2$. Substituting the numbers:
 $a^2 - b^2 = 9^2 - 5^2 = 81 - 25 = 56$.

Using the same rules multiply $(x^3 - y^2)$ by $(x + y)$. It looks far more difficult; doesn't it? But this is not the case, following the rules from above.

- (i) $(+x^3) \times (+x) = +x^{(3+1)} = +x^4$
- (ii) $(+x^3) \times (+y) = +x^3y$
- (iii) $(-y^2) \times (+x) = -xy^2$
- (iv) $(-y^2) \times (+y) = -y^2+y^3 = -y^3$
- (v) $x^4 + x^3y - xy^2 - y^3$ is the answer.

Let's check again. Substituting, say 4 for x and 6 for y , from the original we have:

$$(4^3 - 6^2) \times (4 + 6) = (64 - 36) \times 10 = 28 \times 10 = 280$$
 (answer i).

Now the second worked-out algebra:

$$4^4 + (4^3 \times 6) - (4 \times 6^2) - 6^3 = 256 + (64 \times 6) - (4 \times 36) - 216 = 256 + 384 - 144 - 216 = 280$$
 (answer ii).

Well once again, it looks as if algebra does work! Now that you can set and check your own questions and answers, I'll leave you without homework again this month. We'll start with transposition of formulae in the next part of this series.

Don't forget, keep practising!



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West Devon's RAYNET Fleet's Growing!

Ian Harley G6BJJ, former Group Controller of the West Devon Radio Amateurs' Emergency Network, tells us the story behind their mobile control-centre, and how a 'high profile' approach is helping the group's expanding emergency communications service.

The members of the West Devon RAYNET have found that having a 'high profile' is paying dividends. The latest addition to our growing fleet of vehicles is a Mark II Ford Transit ambulance, which formerly belonged to the Plymouth branch of the St. John's Ambulance Brigade.

I had the job of Group Controller and I'd heard that the local St. John's group were about to replace their old ambulance. We've got a strong and close relationship with our St. John's branch, and we offered to buy the vehicle for conversion into a group control vehicle.

Empty Shell

When we eventually took delivery of the ambulance in December 1989, it was an empty shell with several major faults. It took some three

months of hard work to make the vehicle roadworthy again.

Once we'd done this, Ken Parker, a friend of mine who's the signals officer at the local Air Training Corps, helped me to convert the inside of the ambulance. It was quite a job, but the finished result was worth the effort!

The re-furnished control unit now seats six people. Four of the seats are around the main table and there are two others nearby. We also fitted several lockers, a sink and a cooker unit.

There's also a white 'blackboard' inside the vehicle and we managed to find room for a colour TV receiver for those periods of 'stand-by duty' when things can be very quiet!

Much thought went into the radio equipment needed for our control unit. We eventually ended up with a telescopic mast and provision for 144 and 430MHz transceivers, plus communications equipment for St. John's, British Red Cross Society and County Ambulance Service frequencies.

Overnight Exercises

Overnight exercises, or duties away from home, meant that we had to incorporate somewhere for the crews to sleep - in a limited space. Fortunately, we were able to arrange the four seats around the control desk to convert into a double bunk.

The 'Battle Bus', as it's affectionately known

The West Devon RAYNET team pause for the picture, but they're ready for action!



West Devon RAYNET's former ambulance, now converted to a versatile mobile control centre.



There are RAYNET groups all over the UK, why don't you offer to help? This long established service not only provides an excellent communications 'back up', it also promotes Amateur Radio in a very positive way. *Practical Wireless* will support RAYNET in every possible way, why don't you?

RAYNET Mobile

The West Devon RAYNET Fleet.



to the group, had its first outing during September 1990. The occasion was a two-day operation when the vehicle, based at Plymouth Hoe, became the base for RAYNET operations assisting with a 53km cycle 'fun ride' in aid of three local charities.

The control unit was soon in action again, on October 10, during the traditional Tavistock 'Goose Fair'. On this occasion the 'Battle Bus' became the communications liaison point for the Tavistock Town Council, Devon & Cornwall Police, St. John's Ambulance Brigade, Devon County Ambulance Service and several local bus services!

Quick Response

For the shorter exercises or mobile escort duties that our RAYNET group has been asked to do, we've found that the 'quick response' vehicle offers the best solution. The vehicle is manoeuvrable when escorting runners or cyclists and with their distinctive marking and flashing overhead beacons, provide useful front or rear 'markers' for road events.

Over The Top?

Some of you may think that this approach is 'over the top', but we are trying to provide as near a professional a service as possible, and it's often said that 'looks are everything'! If you look the part, not only do you feel the part, but others, (user services) respect you more for what you do and stand for.

To this end we have developed a group



The West Devon RAYNET's 'Battle Bus' in action and manned by Peter Kerton G0EOZ who is now Group Controller.

standard of dress to be adopted at 'call-outs', very much along the lines being discussed by other RAYNET groups. Our own 'rig of the day' consists of dark trousers, with either the group's navy-blue sweat-shirt, a T-shirt, or woollen pullover with the yellow and black RAYNET logo on the front.

British Weather

The standard RAYNET 'tabard', or for the more usual type of British weather, reversible black and yellow fluorescent coat with reflective badges, has proved to be practical and hard wearing.

So, when you've just completed an overnight stint on RAYNET duty, in the cramped confines of the usual family car - just think what an old ambulance could do for your RAYNET team's efficiency, health and moral!

PW

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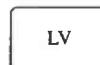
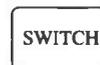
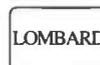
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The PW-50V Vertical Antenna For 50MHz

Construction

Now that many of the restrictions on 50MHz have been removed, Fred Judd G2BCX begins a short series on suitable antennas for the band, by describing a 'homebase' vertical.

The Department of Trade and Industry now permit the use of vertically polarised antennas on the 50MHz band for both main station, and mobile operation. This article (Part 1) provides construction details of a relatively simple design for main station use.

I'm also going to provide references for alternatives, and most importantly, explain how the performance of vertical antennas at these frequencies are affected by their physical height above the ground.

The quarter-wave vertical antenna with a ground-plane will be considered separately, for reasons that will become apparent. I shall cover the special requirements for mobile antennas for these frequencies, including a design for home construction, in Part 2.

Critical Height

The physical height of all 'vertical' antennas above ground becomes a critical factor, particularly in view of the various 'modes of propagation' that are possible. Some understanding of what follows is important, and incidentally, the same factors apply equally to vertical antennas for the 21, 24, 27(CB) and 28MHz bands.

With all vertical antennas, radiation in the horizontal plane is omni-directional. That means the radiation pattern is circular, regardless of the frequency of operation or height of the antenna above ground.

With multiple element antennas, e.g. Yagi type beams, a multiple element cubical quad, etc., radiation in the horizontal plane will be either bi-, uni- or multi-directional. This will depend on configuration, but is virtually unaffected by frequency of operation, or height above ground.

Vertical Plane

Vertical radiation occurs at angles considered vertical with respect to ground. The pattern of radiation depends very much on the height of the antenna above ground. This incidentally, applies to ALL types of antenna except the 'ground plane'.

Radiation patterns, even at these high frequencies are difficult, if not impossible to measure physically. However, computers can be used to illustrate on screen or by print-out, both vertical and horizontal radiation patterns for virtually any type of antenna. This can be at any frequency of operation and at any height above ground.

Vertical Half-wave

The computer produced vertical radiation patterns, shown in Fig. 1, apply to a vertical antenna above ground. The distances, to the centre of the antenna are, $\lambda/2$ and $3\lambda/4$ at the frequency of operation.

These patterns are based on perfect ground conductivity. They are derived by multiplying one lobe, of what would be the 'free-space' pattern of the antenna, by the ground reflection factor that applies at each wave angle for the selected height. As the height above ground is increased, so the number of vertical lobes increases.

The variations in magnitude in vertical radiation for other types of 50MHz vertical antennas, at relatively low height with respect to ground, are much the same as those illustrated. In other words, the lobes increase

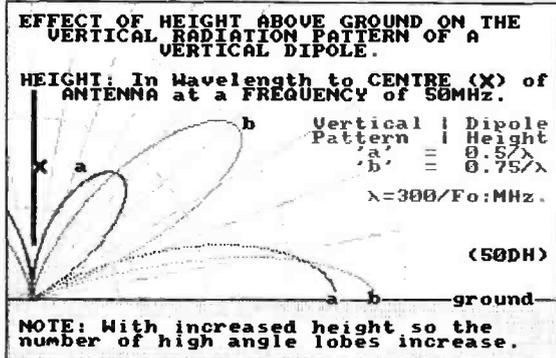


Fig. 1.

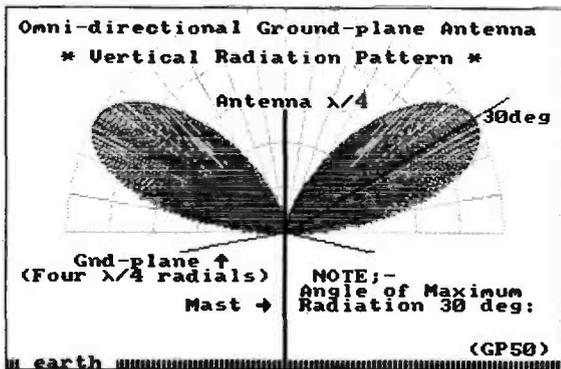


Fig. 2.

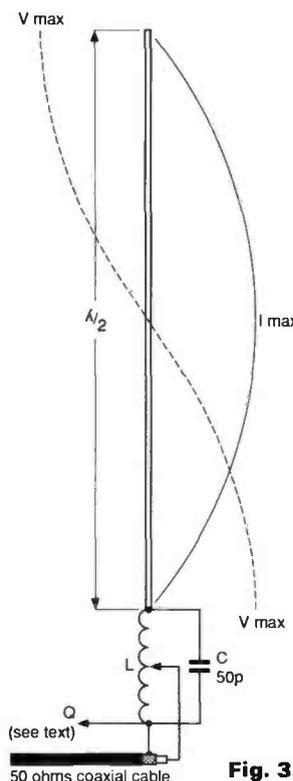


Fig. 3.

Fig. 1: Vertical radiation patterns for a half-wave antenna at 50MHz. Height above ground as given (see notes in text).

Fig. 2: Vertical radiation pattern of a 'ground plane' antenna with the quarter-wave radiator and radials.

Fig. 3: Circuit, voltage and current distribution of the PW-50V end-fed half-wave antenna for 50MHz.

Fig. 4: Photo of PW-50V mounted on a mast. Note: The sleeve joint, visible near the base of the radiating section, is not required and was only used for original development work.



in number as the height of the antenna above ground is increased.

Note: The patterns exist all around the antenna. You need height to obtain a 'free-space' symmetrical vertical radiation from a half-wave dipole operating at 50MHz. The antenna would have to be at least 5λ above ground, which is a height of 30m!

Antenna Choice

One of the simplest antennas for any frequency is the $\lambda/4$ ground plane. The antenna consists of a single vertical radiating element and a minimum of four horizontal radials, each at least a quarter-wave in length ($\lambda/4$ at 50MHz is approximately 1.5m).

The magnitude of radiation from the antenna as a whole, is NOT equal to that of a $\lambda/2$ dipole as many people think. The vertical radiation will have a lobe with an angle of about 30° , as shown in Fig. 2.

This angle is not a good proposition for short, ground path working. It should be more effective for Sporadic-E, intense E and even F region working, if the 'critical frequency' is high enough.

A more efficient single element vertical antenna is the $\lambda/2$ antenna. This could be centre fed from a

coaxial, or better still via a balanced line. However, close proximity of the cable to the antenna could distort the otherwise omni-directional radiation pattern, and make it difficult to obtain a low v.s.w.r.

A better, and much more convenient arrangement is an end-fed half-wave (monopole). It's this type of antenna for which constructional and performance details are described here.

If specific directivity gain is required, there are of course the active and parasitic arrays, such as the Yagi type beam antenna, the quad, and 'end-fed' systems that can be operated vertically.

The Design

The theoretical circuit is illustrated in Fig. 3. The diagram also shows the voltage and current distribution on the half-wave radiating element.

The antenna is voltage-fed from the high impedance matching action of the tuned circuit. **Note:** The line marked 'Q' may be used to prevent r.f. currents flowing back down the feed cable, if this is less than 5m long. I'll explain the theory behind this technique later.

The radiating element is made from aluminium tubing 2.74m long, and 15-20mm in diameter. I recommend a wall thickness of 1 or 1.5mm, but it isn't critical.

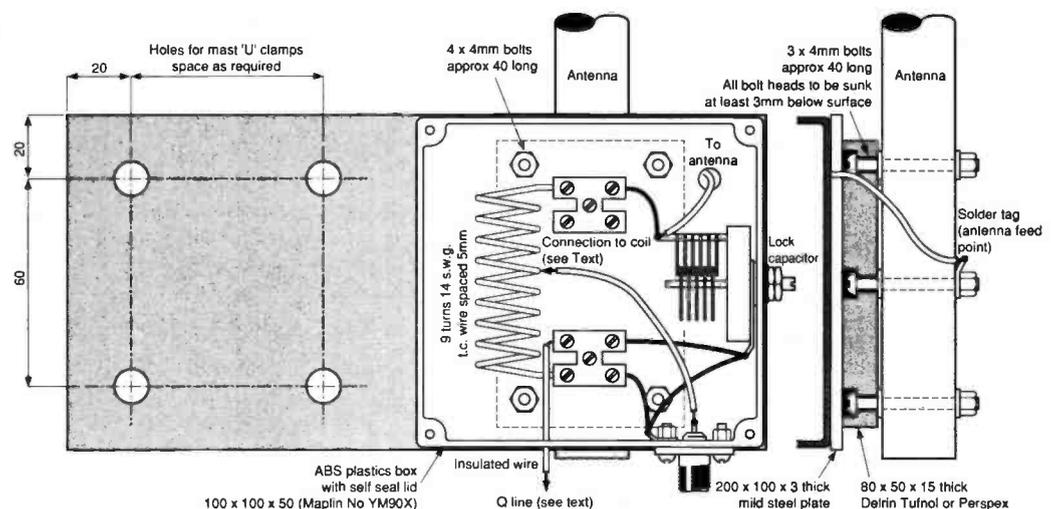
The length is a little less than the electrical half-wavelength of 3m, owing to the inductance (L) at the base. The whole system is assembled on a flat mild steel or aluminium plate. It may be mast-mounted with 'U' clamps or through bolts, as in Fig. 4, which shows part of the radiating element.

The plastics box also shown in Fig. 4, houses the inductance and tuning capacitor and is mounted on one side of the plate. The solid insulating block that supports the radiating element is on the reverse side. Both items are secured to the plate with four through bolts.

Further Details

The inductance, the electrical connectors and the tuning capacitor (C) are assembled as shown in Fig. 5. The wire from the coaxial cable inner conductor, to the inductance may be a short length of insulated wire with a small 'crocodile' clip attached, so that the

Fig. 5: Dimensions and assembly details of the antenna base, showing the tuning components box mounted on metal mounting plate. The coil is wound with an internal diameter of 20mm.



correct tap to the coil can be found experimentally (more later).

The completed assembly is shown in Fig. 6. I recommend that you use only the specified wire gauge, number of turns, diameter and turns spacing for (L).

Next job in line is the antenna mounting block, Fig. 5, this must be a good quality insulator. The bolts that hold the radiating element to the block are countersunk, so as not come into contact with the mounting plate. They are secured to the block with nuts, as shown, before it is attached to the metal plate (C).

The housing box with its internal components and the antenna mounting block, is attached to the metal plate with four 'through' bolts marked (a). The insulated lead marked (X) from the top of the capacitor, is taken through a hole near the top of the box and also goes through the metal plate as in Fig. 7.

This lead is long enough to reach either of the antenna securing bolts, and is terminated with a large solder tag. Details of the assembly is shown in Fig. 5. Finally, the radiating element is attached to the three countersunk bolts that go through the holes in the insulating block in Fig. 5.

Antenna Adjustments

To start the adjustments, mount the whole antenna so that it is vertical, and with the base at least 1.25m above ground. It may be clamped to a temporary short mast, a pair of steps, or suspended from a rope between two points.

If possible, you should use the length of coaxial cable that will be used when the antenna is finally sited. This cable may be (M)UR43 or (M)UR67.

Should the cable length be 5m or less, then the line marked 'Q' will be required. This is indicated in Fig. 5, and is connected to the earthy part of the circuit, i.e. the screen braid. The line may be any thin insulated wire 1.5m long.

The line is taken through a hole at the bottom of the box with its full length taped, at intervals, along the outer cover of the coaxial cable. The 'Q' line will cancel any r.f. currents that may flow along the screen if the cable run is short. If the coaxial cable is longer than 5m, the 'Q' line won't be necessary.

An s.w.r. meter may be used at the transceiver end of the coaxial line. First, clip the lead from the coaxial inner to the centre of the inductance and set the capacitor about half mesh. The lead to the radiating element is connected to one of the bolts, as in Fig. 5.

Tuning Up

Adjust tuning capacitor for the lowest s.w.r. at 51MHz. If you cannot achieve a 1:1 ratio, try another tapping point on the coil and adjust it again.

It may be necessary to try several combinations. When you have achieved this ratio, check the s.w.r. at 50 and 52MHz. The readings should not exceed 1.25:1. The prototype measurement results are shown in Fig. 8.

Next, you should solder the 'tap' lead on to the inductance, and then fit a lock cap on the tuning capacitor. If the specified (Maplin) plastics box is used, the lid is watertight when screwed on. Fill all the holes in the box with a sealant to prevent water getting in.

The vertical radiation pattern for an optimum height of $3\lambda/4$ (4.5m) to the centre of the antenna. The diagram, Fig. 9, gives more details.

This antenna provides a strong very low angle lobe for maximum ground and tropospheric path distance, as well as F region propagation when the 'critical

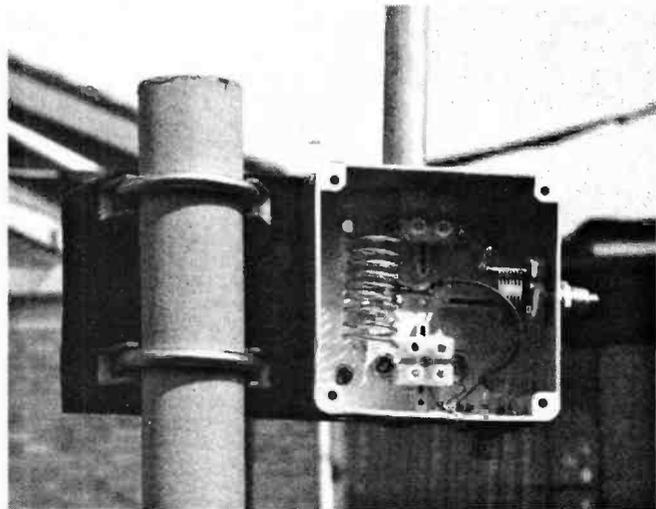


Fig. 6: Photo of the completed assembly as in Fig. 5.

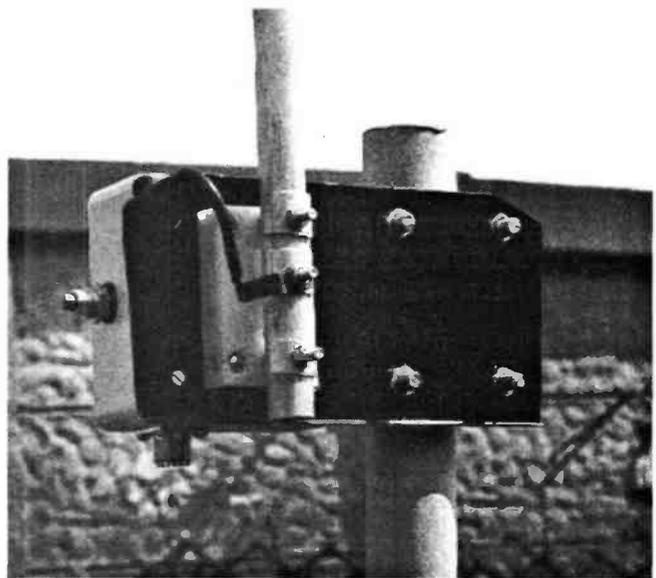


Fig. 7: Showing the antenna mounting, on metal plate. NOTE: The lead through from housing box to centre fixing bolt of antenna element.

frequency' is very high. The stronger, but higher angle lobe may serve for fairly long distance propagation via sporadic-E and/or an intensely ionised E region.

Final Note: If the use of power higher than 10W is to be used, then the tuning capacitor must have wider spaced vanes. If this is the case, a slightly larger housing box may be necessary. A quarter-wave stub match, with the stub horizontal could be used as an alternative.

Acknowledgement

I'm indebted to Waters & Stanton Electronics of Hockley, Essex for the loan of a Yaesu FT-690II 50MHz transceiver, along with a Yaesu FL6020 10W linear amplifier. All tests on the antenna prototype were carried out using the above equipment and a Bird 'Thru-line' power meter.

Fig. 8: Measured s.w.r./bandwidth of the PW-50V half-wave 50MHz antenna.

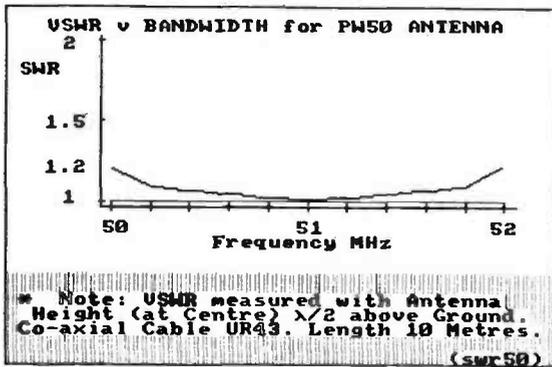
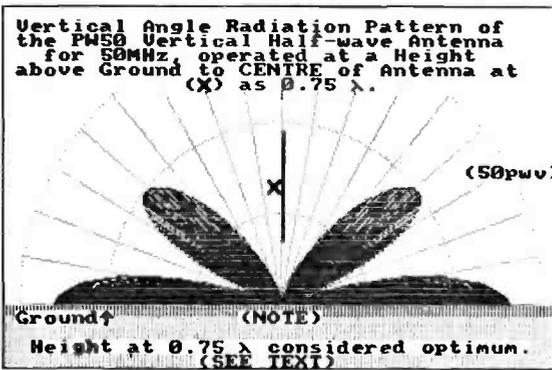


Fig. 9: Full vertical radiation pattern of the PW-50V at optimum height to CENTRE at 0.75 λ above ground (4.5m) see text.



Further Reading

The ARRL Antenna Handbook, ARRL.

All About Vertical Antennas, Orr and Cowan.

Beam Antennas Handbook, Orr and Cowan.

Wires & Waves PW Publishing. Some designs in this selection of reprints from *PW*, could be re-dimensioned for 50MHz operation.

The RB10 (28MHz Ring-base Antenna *PW* July 1990) antenna dimensions could be scaled for 50MHz operation, or any other band of interest.

SANDPIPER COMMUNICATIONS ARE SUPPLYING A KIT OF PARTS TO MAKE THE PW-50V, SEE THEIR ADVERTISEMENT IN THIS ISSUE ON PAGE 66.

Next time I'll be looking at ideas for antennas to use on 50MHz mobile operation.

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August 11: The 32nd Annual Derby Mobile rally will take place this year at a new venue, Littleover Community School, Rykneld Road, Littleover, Derby. The school is situated on the A5250 road, just north of its junction with the A38. Talk-in on 144MHz. All the usual attractions, including the famous monster Junk Sale. **Martin Shardlow G3S2J, QTHR. Tel: (0332) 556875.**

***August 11:** Hamfest 91 will be held at the Flight Refuelling Sports & Social Club Grounds, Merley, Wimborne, Dorset. The event opens at 10am and will feature a Bring & Buy, trade stands, radio and electronics car boot sale, craft fair, field displays and attractions for the whole family. Special disabled parking is available in the grounds and overnight camping can be arranged. **John GOAP. Tel: (0202) 619649, Rob G6OUN. Tel: (0202) 479038.**

August 18: The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level, with facilities for the disabled. Refreshments and bar available all day. Doors open at 10.30am for disabled and 11am for the general public. Admission £1, children free. **Dave G110D on (0204) 24104 evenings only.**

August 25: Galashiels & District ARS have their Open Day at the Focus Centre, Livingstone Place, Galashiels. All the usual activities, Bring & Buy, traders, club stalls, refreshments, etc. **John Campbell GM0AMB, 9 Brunton Park, Bowden, Melrose TD6 0SZ. Tel: (0835) 22685.**

August 26: Huntingdonshire ARS will be holding their annual rally and Junk Sale at The Medway Centre, Coneygare Road, Huntingdon, Cambridgeshire. Doors open 10am, rally closes at 4pm. Trade stands, Bring & Buy, components, junk and refreshments. Car boot pitches available or a second hall on standby in case of bad weather. Talk-in on S22 and GB30V (433.125). **O. C. Leech G7DIU, 4 Rydal Close, Huntingdon, Cambs PE18 6UF. Tel: (0480) 431333.**

September 1: Preston ARS will be holding their 24th Annual Rally at the University of Lancaster, as in previous years. **Godfrey Lancelfield G3OWQ, QTHR. Tel: (0772) 53810.**

***September 1:** Telford amateur radio rally will be held at the Telford Exhibition Centre, Telford Centre, Shropshire. Doors open 11am (10.30 disabled). **John Bumford G0GTN, 19 Bewdley Avenue, Monkmoor, Shrewsbury SY2 5UL.**

September 8: Vange ARS will be holding their annual rally at the Laidon Community Centre, Laidon High Road/Aston Road, Laidon, Basildon, Essex. The centre is only a short walk from Laidon Station (British Rail) on the Fenchurch Street to Shoeburyness Line. Doors open from 10.30am to 4.30pm with admission at 50p. The rally will include many traders, Bring & Buy, refreshments and a free raffle. Talk-in is on S22. Approach roads will be signposted. **Doris Thompson on (0268) 552606.**

***September 8:** The Lincoln Hamfest will be held at the Exhibition Centre, Lincolnshire. Doors open 10.30am to 5.30pm (10am disabled). **Sue Middleton, 14 Toronto Street, Lincoln LN2 5NN.**

***September 8:** The Scottish amateur radio convention will be held at The Northern College of Education, Gardyne Road, Dundee. Parking available for 1000 cars. **Alan Gishan GM4JCM, 35a Lochinver Crescent, Dundee DD2 4UA.**

***September 15:** The BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Located close to London, it is a 10-minute drive from the M25 (junction 10) and is not far from the M3, M4 and M40. Free parking for over 5000 cars. On-site catering, hot and cold meals, snack, beverages and licensed bar. Doors open 10.30am to 5pm, admission £1 for adults and DAPs, with children under 14 free if accompanied by an adult. Talk-in on S22. **Peter Nicol G8VXY, 38 Mitten Avenue, Rubery Rednal, Birmingham B45 0JB. Tel: 021-453 2676.**

September 15: The East of England radio rally will be held in the ICI Building, The East of England Showground, Dundle Road, Peterborough. Admission is £1, doors open 10.30am (10am for the disabled). There's a main traders' hall with bar and catering, a traders' marquee with Bring & Buy, separate outside area with flea market plus radio and electronic car boot sale. Various other attractions - Which-Kit Car Show, Caravan Club Rally, Banger Racing, Golf Driving Range & Go-Karts, Nene Park & Nene Valley Railway, acres of free parking. **Nigel G1ARV. Tel: (0733) 78685.**

***September 15:** The Bristol Radio Rally will be held at Brunel's Great Train Shed, Temple Meads, Bristol. **D. Farr (0272) 839855.**

***September 22:** The Norfolk Amateur Radio, Computer & Electronics Rally is being held in Swardeston,

about 8km south of Norwich. The rally itself will be held within the grounds of G3LDI. All normal trade stands, along with a Bring & Buy, food and drink, etc. Talk-in will be available on S21 and the gates are open between 1000 and 1600. **G4ONF. Tel: (0603) 747782.**

***September 22:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, DAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. **Frank Martin G4UMF. Tel: (0952) 598173.**

***September 28/29:** The RSGB HF Convention will be held at the Penguin Hotel, Daventry, Northants. Featuring two lecture streams in parallel sessions throughout Sunday, which should offer something interesting for everyone. There will be the usual bookstalls, club stands, c.w. pile up competition, raffle and refreshments. Reduced rate for overnight accommodation. For more details, contact **Bob Whelan G3PJT, 36 Green End, Comberton, Cambridge CB3 7DY. Tel: (0223) 263137.**

September 29: The Harlow & District ARS will be holding their 33rd Amateur Radio and Electronics Rally at the Harlow Sportscentre. The Main Hall will provide a large and varied selection of traders, both old and new to the event. The studio upstairs will also have some traders along with the Bring & Buy, there will also be the usual special interest groups. Adjacent to the centre there's parking for 1000 cars. On-site reserved disabled parking is available, with full facilities inside for the disabled. Catering and licensed lounge bar. Talk-in on S22 and SU22 by G6UT. Entry is £1, with children under 14 and OAPs half price. **Liz G0MDL. Tel: (0277) 364742 evenings and weekends only.**

***October 6:** Great Lumley Amateur Radio & Electronics Society will be holding their rally in the Community Centre, Great Lumley, nr. Chester-le-Street, Co. Durham. Doors open 11am, 10.30am for the disabled. Trade stands, Bring & Buy (£200 value limit), refreshments available. Talk-in on S22 by G6GLR. Admission 50p, children under 14 (accompanied by an adult) free. **Berry Daverton G1JDP. Tel: 091-388 5936.**

October 6: Blackwood Amateur radio rally will be held at Oakdale Community College, Blackwood, Gwent NP2 0DT. **Brian Matthews GW0JWF, 25 Manor Park, Newbridge, Gwent NP1 4RS. Tel: (0495) 243858.**

October 13: The Armagh & Dungannon District ARC will be held in Gosford House Hotel, Markethill, Co. Armagh. Doors open at 12pm. Usual trade stands plus other events. For further information please contact **Mr T. Hall G10MSJ, 1 Hamiltonsbawn Road, Armagh City BT60 1DL. Tel: (0861) 523454.**

October 13: South Devon RC have their seventh annual Ham radio & computer exhibition and rally at Hill Head Camp, Hill Head, Brixham, Devon. Doors open 10am. Trade stands, AR supplies, kits, computer sales, raffle, refreshments, unlimited free parking and overnight camping. Car boot sale, bigger and better this year. Outside attractions. Talk-in on S22 + SU22 by G7FDC and G4SSB. Special event station G84CPU. Details from **G6ZRM. Tel: (0803) 522216 or (0836) 577220.**

***October 25 & 26:** The Leicester Amateur Radio Show will again be held at the Granby Halls, Leicester.

***November 2/3:** The 5th North Wales Radio & Electronics Show will be held at the Aberconwy Conference Centre, Llandudno. The rally opens at 10am with the entrance fee at £1, OAPs 50p and children under 14 free of charge. **Stiggy Fergusson GW0DYH. Tel: (0492) 532459 (day). Tony Wilkinson GW4PVU. Tel: (0492) 49121 (evenings).**

November 10: Barnsley & District ARC will be holding their first Radio Rally at Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley, South Yorkshire. Details and trade enquiries from **Ernie G4LUE, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN. Tel: (0226) 716339 (6-8pm).**

***November 17:** Bridgend rally. Further details from **Charles Sedgebeer, 50 Minfrwd Road, Pencoed, Mid Glamorgan, South Wales CF35 6SO.**

November 24: The West Manchester Radio Club's 'Winter Rally'. All details as August Rally. Admission £1. **Dave G110D on (0204) 24104 evenings only.**

***December 15:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, DAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. **Frank Martin G4UMF. Tel: (0952) 598173.**

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CTV	Colour TV
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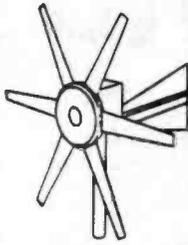
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Getting Started The Practical Way

“O world invisible, we view thee”
Francis Thompson : *The Kingdom of God.*

Electricity is invisible. We can't tell if a power cable is 'live' by simply looking at it. But if electrical energy is converted into some other form, we can see, and sometimes measure, the result.

If I connected a 12V bulb to a 6V supply, it would light up. If I then increased the supply to 9V, it would glow more brightly. Although this would provide an indication of the difference between the two voltages, it would be a crude way to measure voltage.

In electronics, there are instruments designed to show and measure electrical quantities. The most commonly used instruments are based upon the use of a meter. To start off this time, we're going to look at workings and simple applications of the moving coil meter, which is a very popular instrument in amateur radio equipment.

Voltage And Current

What do we want to see, when we try to 'look at' electricity? Obviously, the basic things are how much we have and how much of it is flowing. These two basic units are **voltage** and **current**.

What are these units? To make life simpler at this stage, we are only going to consider **direct current** (d.c.) electrical flow. This is the term used when the electrical 'flow' is in only one direction through a conductor.

Many of you will already know that electricity involves the movement of electrons. But if you want to know more about electron theory, you'll have to read a physics text book, and not this article!

It will do, for the time being, for us to know that **current** is the quantity of electricity passing through a given point. Its unit of measurement is the **Ampere (A)**. In fact, one ampere is measured as 6 250 000 000 000 000 000 electrons passing a point in one second!

Large Unit

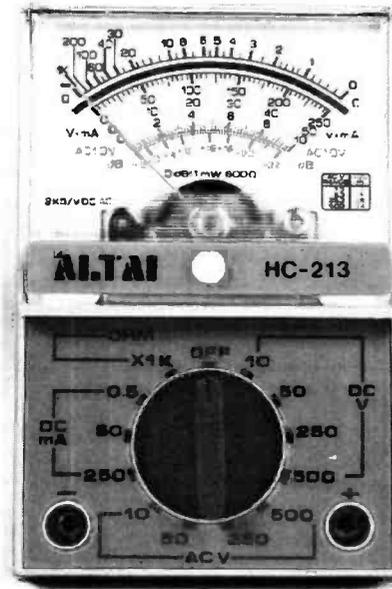
Although the **ampere (A)** is often used in domestic power applications, it's a large unit for use in electronics. More frequently we use the **milliampere (mA)** which is a **thousandth** of an ampere and the **microampere (μ A)** which is a **millionth** of an ampere.

It is usually said that **voltage** is a measurement of the **electro-motive force (e.m.f.)** which is sometimes called the potential. This is a measurement of the 'electrical pressure' present in the circuit. It's called the 'potential' because the electric charge present is capable of doing some work, but in fact, may be doing no work, a little work or a lot of work!

To put it simply, we might say that the voltage represents what the electricity present could do, and the current tells what it is doing. The amount of work the voltage does (hence the amount of current that flows) in a circuit depends upon the **resistance** present in the circuit. Perhaps you've noticed that we've come full circle back to **Ohms Law** once again!

Theory

A typical budget-priced multimeter based on a moving coil movement.



Analogue Meters

If you look at the front panels of most amateur radio equipment, you'll probably have seen a type of analogue meter. These meters are the clear dials with moving needles that everyone seems to associate with radio equipment, because they seem to go together like peaches and cream!

You may also have noticed equipment fitted with digital meters. These indicating devices are the indicators with actual digits or numbers, forming the display.

Analogue meters can be divided into two main types, the **moving coil** and **moving iron** meter. Generally speaking, in amateur radio work we use moving coil meters. The moving iron meters are simpler and cheaper, but less accurate in use.

Although we're only going to look at moving coil

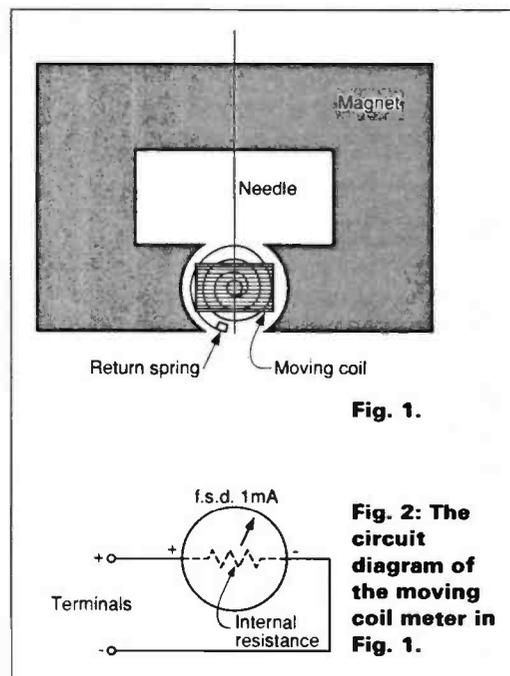


Fig. 1.

Fig. 2: The circuit diagram of the moving coil meter in Fig. 1.

This month the Rev. George Dobbs G3RJV, takes a look at meters and their use in measuring. George likes to use the occasional quotation to start a new theme, and as usual he's managed to find one to fit the job!

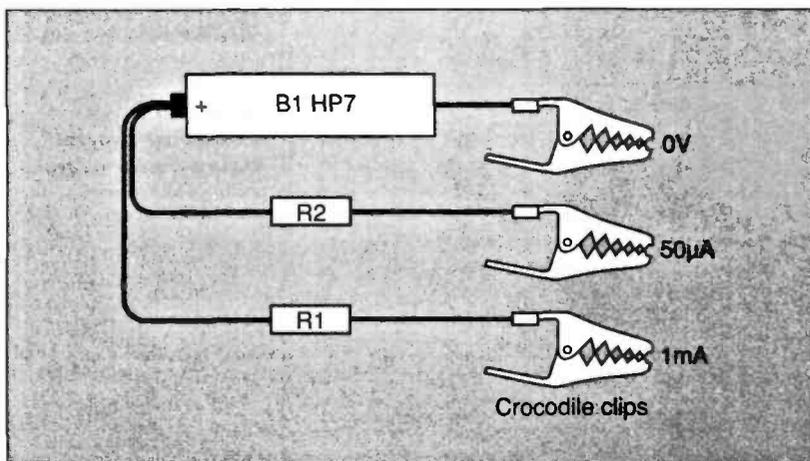


Fig. 3: A simple meter tester, capable of checking most meters available on the surplus market.

instruments, the moving iron type is useful. Most of the indicating devices for fuel gauges and temperature displays on car dashboards are usually moving iron, although nowadays the l.c.d. and l.e.d. is beginning to become popular.

Physics Lessons

Perhaps you will remember from your school or college physics lessons, wrapping some wire around a compass and then passing a current through the wire.

The current flow sets up a magnetic field in the wire and deflects the compass needle. That action is roughly how a moving iron meter works.

The moving coil meter actually works in the reverse way to the compass action. The magnet (a compass needle is a small magnet) is fixed, and it's the coil which is allowed to move. When the current passes through the coil, the magnetic field in the coil reacts to the magnet field in the fixed magnet and the coil deflects.

The illustration, Fig. 1, shows how this is done in the moving coil meter. A coil is held on a pivot in the centre of a fixed magnet. When a current passes through the coil, a magnetic field is set up in the coil. The interaction between the magnetic field in the coil and in the fixed magnet, causes the coil to rotate on its pivot. An indicating pointer (or needle) is attached to the coil which shows the amount of rotation (or deflection).

Right Hand Drive

Usually, the construction of the meter is arranged

Your project this month, a simple meter tester.



so that deflection of the coil (and the needle) is to the right. As the current passing through the coil increases, the needle moves more towards the right, indicating the increase in current flow.

The coil has a return spring so that when current no longer passes through the coil, the coil (and needle) returns to its original position. This is 'zero' on the meter, and it indicates when no current is passing through the instrument. Many moving coil meters can be accurately adjusted. It's usual to have a 'set zero adjustment' screw to move the needle at the bottom end of the scale, when no current is passing.

Moving Coil Meters

The diagram, Fig. 2, shows the electrical circuit diagram of a moving coil meter. It's represented by a circle with a pointer. This illustration also shows two other important factors about a moving coil meter which you shouldn't ignore!

You can see from Fig. 2, that the meter has fixed positive (+) and negative (-) terminals and therefore must be connected the right way round in a circuit. The direction the current flows controls the polarity of the magnetic field. Connect a moving coil meter the wrong way, and it will try to read backwards!

The diagram also shows the internal resistance of the meter. The coil itself has an electrical resistance. This factor, although small, is added to the total resistance of any circuit into which the meter is connected.

Sometimes the internal resistance is small enough to ignore. But we shall see later, that it becomes important when we wish to make accurate measurements with a moving coil meter. The internal resistance of a moving coil meter may appear in small print on the face of the meter, and it should certainly be mentioned in the maker's specification for the meter.

The main specification given for a moving coil meter is the full scale deflection (f.s.d.). This is a statement of the amount of current required to make the needle indicate to the highest mark on the scale.

If a meter is marked as '1mA f.s.d.', it requires 1mA to make the pointer deflect fully across the whole of the marked scale. Information about the f.s.d. of a meter is vital, because the user needs to know how much current the meter will indicate.

The Multimeter

Moving coil meters measure current, but they can be contrived to measure voltage and resistance. This is commonly seen in the analogue multimeter.

The multimeter is a meter equipped with several switched ranges marked in current, voltage and resistance. The maximum deflection permitted by each particular switch position, is clearly marked. The user can then immediately 'read' the values from a calibrated scale, which is directly below the 'needle' pointer.

A Meter Checker

Moving coil meters are expensive. It's not unknown for a constructor, wishing to add a meter to the front panel of a project, to find it could cost more than the rest of the project added together! Many constructors use surplus meters, bought cheaply at radio rallies or sales and modify them for their own particular use.

Very often, meters bought cheaply can be excellent instruments. But they can also have odd

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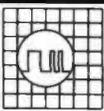
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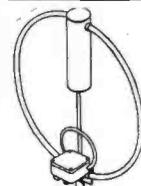
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things marked on their scales and what is worse, they may have no indication of the f.s.d. of the movement.

One of my amateur radio friends has an excellent, and large meter indicating the output power of his transmitter which is marked in 'revolutions per minute'! It's usually a simple task to remark a meter scale, but for it to be useful, the f.s.d. must be known.

Meter Tester

The circuit in Fig. 3, shows a simple piece of test equipment which I've used for many years with unknown surplus meters. The gadget does two very useful jobs. It checks that the meter movement is good, and also gives an indication of the f.s.d. of the meter. Sometimes surplus meters can be defective, the commonest fault being sticky movements, and this little tester will show up such a defect.

It's a simple project, and only requires a battery with two fixed resistors arranged to pass two set currents though the meter being tested. Usually, surplus meters have a f.s.d. of no less than 50µA, and more often the maximum will be in the region of 100µA, 200µA or even as high as 1 to 5mA. The meter checker project will show the f.s.d. value accurately enough to be useful.

Internal Resistance

The simple meter tester ignores the internal resistance of the movement, but still provides reasonably accurate results. If a meter is connected (the right way round) between the negative lead (-ve) and the 1mA lead, the 1.5V battery and the 1.5kΩ resistor will cause about 1mA to flow through the meter.

You can work it out using Ohm's Law, remembering that 1mA is one thousandth of an ampere. A meter connected between the negative lead and the 50µA lead, will cause (approximately) 50µA to flow. This is less accurate (try it with Ohm's Law) but I have used the preferred values of resistor.

Building The Project

This month's little project is very simple to build.

It only needs three parts, three wires and a container. For the wires, I used small clip leads which come complete with crocodile clips.

Power is supplied by the HP7 battery and the two resistors just fit inside a plastics 35mm film canister. Some reliable way must be found to identify the three leads. You could do this by having colour coded wires, or marking them at the point where they leave the canister.

The wires are soldered directly onto the battery. The most difficult connection, will be the negative lead which is soldered to the zinc casing of the cell. To make the connection, scrape the end of the case with a knife edge until it shines (or use a small file) and then tin a small portion of it with solder, before adding the lead.

Do not use a NiCad rechargeable battery for this tester. It is unsafe to solder leads directly to NiCad cells (they also provide less than 1.5V).

Using The Tester

Using the tester is as simple as the circuit. The negative lead of the tester is connected to the negative (-) terminal of the unknown meter. Then the 50µA lead is connected.

You should always connect the 50µA lead first to the positive (+) terminal. This will show how far 50µA moves the needle. If the indication is low, try the 1mA lead. Then by observing whether there's either full scale deflection, or part deflection, a useful approximation of the meter's f.s.d. can be found.

That's the lot for this month, I hope you're finding the series useful. Don't forget to write and let me know if you've got any problems or suggestions to make.

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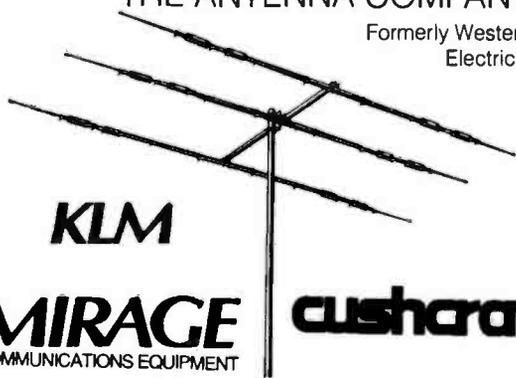
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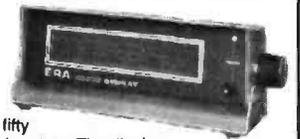
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Taking Another Look At Fuses

Although it's annoying when a fuse blows, the device is only doing its job. Ken Green G1NAK thinks we take fuses for granted, and that it's about time we had another look, to see what they can and cannot do.

Fuses are certainly the best known and the simplest defensive tools in the engineering armoury. They're accepted generally as being extremely unreliable, but few either know why or look into the reasons.

It's best to tread warily when things seem simple. This rule certainly applies to fuses. Designed as the 'weak link in the chain', they're used to break an electrical circuit when the current increase to a certain value.

Fuses provide a visual check when you're seeking a break in a circuit. Their failure to work effectively, has more to do with what happens after a fuse has ruptured, than with the fusing process itself.

Voltage Limitations

As I've already said, fuses are used to protect circuits from the heating effect of excessive currents. As such, they are connected in series with the circuit they protect. So why does voltage enter the argument?

The answer is that a fuse is simply a form of thermal switch. When the switch opens, (when the fuse 'blows') the e.m.f. of the source appears across its terminals. It then becomes very important whether that e.m.f. is 5, 50 or 5000 volts.

A fuse must have a small thermal capacity so it heats rapidly, and ruptures before damage is caused. In other words, a fuse needs to be made from a fine

gauge wire. However, fine wires tend to have high resistance, which causes a voltage drop. This generates heat and encourages the fuse to blow!

The real difficulty is because the fuse wire has to melt. As the wire vapourises it can generate an ionised and conducting media. This can keep the current flowing by means of an arc. When the arc is quenched, the vapour cools, depositing copper over the surrounding area and can re-establish a conducting pathway.

A fuse in a 5V circuit is not very likely to sustain an arc. However, the same fuse employed in a high-voltage circuit is far more likely to form an arc.

Another important factor, is whether the circuit involved is resistive or reactive. An inductive circuit, even at 5V, can generate enough voltage to set up an arc. On the other hand, a capacitive circuit can supply a very large current for a short time, helping an arc to become established.

Choosing A Fuse

It is important to understand the markings on a fuse. When you replace a fuse, you must use an exact equivalent or substitute.

Speed of operation is an important factor. Digital circuits, for example, are extremely intolerant of overloads and any protective fuse must rupture very quickly to be effective.

In some circuits there's a need for a fuse to 'wait and see'. Before it interrupts a circuit, the fuse has to 'decide' whether there's a fault condition or an acceptable transient.

A typical example, is the in-rush of current occurring when equipment is switched on. This happens because large value reservoir capacitors are virtual short circuits until they're charged up.

In-rush current is a reality, and was a menace before modern fuses became available. I can remember throwing the main switch in a television studio, only to be greeted by a heavy 'crump'. I then had to replace 15 sets of mains fuses!

In-rush current probably accounts for many of the so called 'tired fuse failures'. Nowadays, equipment likely to suffer this problem, is fitted with time delay or anti-surge fuses.

Making And Testing

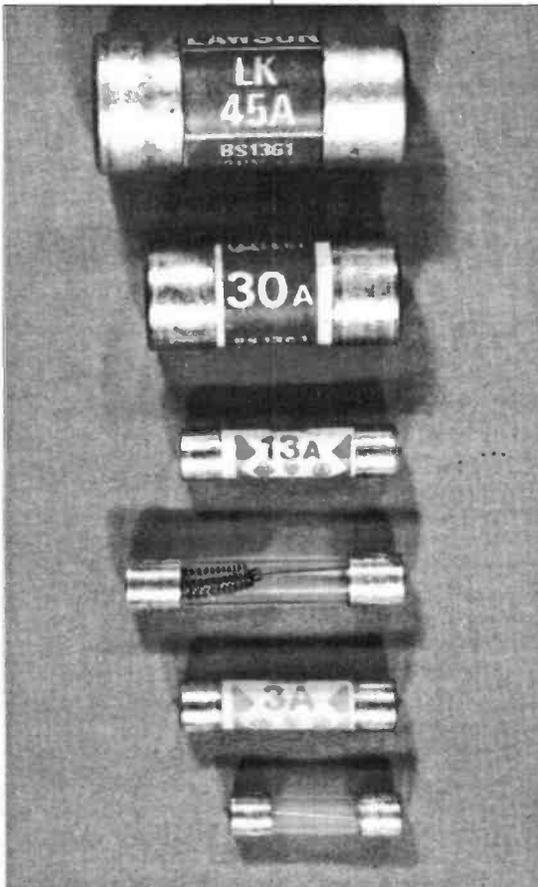
Fuses are made and tested under standards laid down by the Underwriters Laboratories Inc. (UL) in the USA, the Canadian Standards Association (CSA) and the International Electromechanical Commission (IEC) in Europe and Asia (there are others). All fuses are batch tested and must be marked as follows:

Super Quick Acting (FF)

These are specified for protecting semiconductors and other equipment where the 'quick-acting' F-fuses are too slow.

Quick-acting (F)

These are for use in circuits not subject to surges or transients and don't produce high short-circuit currents. Some are provided with a filler to help



Fuses are available in a wide range of sizes and ratings. Ken Green reminds us it's important to get the right fuse for the job.



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quench arcs. In American terminology this type is known as a 'Normal Blo' fuse.

Medium Time-lag Fuses (M)

M-type fuses will withstand the small transients or surges encountered in normal operation.

Time-lag (T)

These are intended for use in circuits subject to high in-rush currents. They're called anti-surge or delay fuses, and in American terminology, as 'Slo-Blo' fuses. They have a built-in thermal delay.

Super Time-lag (TT)

These are similar to the T-fuses, but provide an even greater time delay before rupturing.

Fuse Ratings

The current-value marked on a fuse is the maximum current loading. The exact meaning of this, depends somewhat on the standards to which the fuse was tested. Fuses tested to IEC standards, should be selected so that the normal current equals the fuse-rating. Fuses tested to UL standards should be rated at 25% more than the normal circuit current.

Voltage Rating

The rated voltage marked on a fuse, refers to the maximum it can safely clear a short-circuit. A fuse can be used at any voltage **not exceeding** its rated voltage.

Breaking Capacity

The breaking capacity is also known as the short-circuit or interrupting rating. The term refers to the maximum short-circuit current the fuse can safely interrupt, without risk of explosion.

Derating Fuses

Fuses are thermal devices, but few technicians realise that fuse performance is affected by the temperature of their surroundings. It's often forgotten that fuses are usually close to heat generating components and their surrounding temperature is likely to exceed the ambient levels.

The temperature assumed by any body stabilises when the heat which it generates is exactly balanced by the heat which it loses. The higher its surrounding temperature becomes, the higher that stabilised temperature becomes.

A fuse which is running hotter than the test-value, must rupture more readily. That's why in determining the rating of a fuse, its operating temperature must be taken into account.

A fuse also runs hotter when the normal operating current approaches the rated-current of the fuse. This perhaps might explain why rogue fuses persistently fail for no apparent reason!

Current Carrying Ability

Fuses are tested for their current carrying ability at a temperature between 20°C and 25°C. However, a fuse rated at say 1.6A, would have to be replaced by a 2A fuse if it is to perform at 70°C.

Some fuses are manufactured with wire connections. In general it's best to crimp and clamp the connections into place. If you solder the connections, it's most important to use a heat-sink. The application of heat to any fuse, is likely to re-flow the internal solder and so change the characteristics of the fuse. PW

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PLEASE NOTE: that we at PW may not have built and tested the circuit, but present it on an 'as-is' basis. We do take the greatest care in preparation of the article, but cannot be held responsible for the suitability of the original suggestion, or for any damage that may occur to property or equipment in implementing this idea.

What A Good Idea

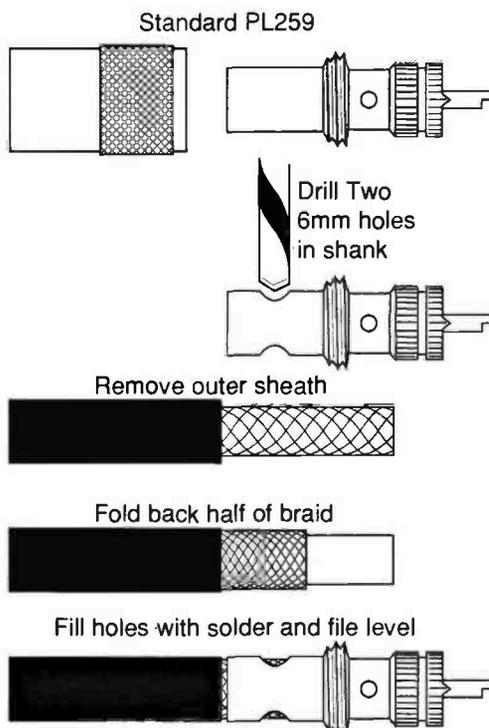


Fig. 1.

Like most amateurs I use the best quality coaxial cable, usually low loss type, for all cable runs. Imagine my feelings after paying quite a large sum for this cable, to find that within a few months the v.s.w.r. has risen once more to an almost unacceptable value.

After several occurrences, of this nuisance, I decided to investigate. I discovered that the major problem is actually the contact resistance of the outer braid to the body of the coaxial plug. I have tried many ways to maintain contact, and met with apparent success. But when one plug fails, the whole cable run becomes suspect.

Then I had a brain-wave. Solder, had to be the answer! Refer to the drawing of Fig. 1, here the operation is shown in sequence. Starting at the top of the series, by drilling two 6mm holes in the shank of the PL259 plug. Trim the outer covering back about 40mm from the end of the cable. Fold the braid back upon itself as shown. Cut the inner insulator back, about 12mm, to clear the centre conductor. Screw the coaxial cable into the PL259 as far and as tight as possible.

Using a large HOT soldering iron, solder the braid to the body of the PL259 plug, filling up the hole completely with solder. File the excess solder away to clean up the joint. Finish off the job by soldering the inner conductor in the plug tip. After screwing the shroud back into place the plug is ready for use.

In almost two years of use, I haven't had another case of poor contact to the plug body.

You did put the shroud the right way round on the cable first, didn't you?

J. D. Bolton G4XPX
Crook, County Durham

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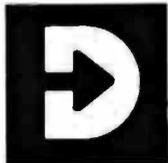


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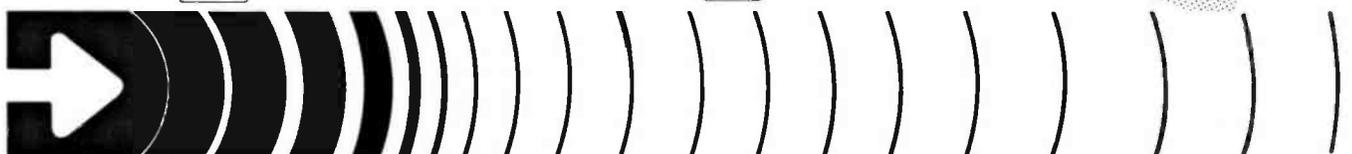
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VISA AND ACCESS WELCOME



This time Roger Cooke G3LDI looks at the problems of catching up with the news, packet guidelines, and suggests some good reading.

Catching up with news and bits and pieces is not always easy. Especially when it has to be planned some months ahead. Some of the news, when seen in print, seems to be out-dated, much like delayed bulletins!

However, I've got to start with apologies to Simon GM4LPM who, some months ago, sent me some news for inclusion in the column. I hope that most of it is still current. Simon is sysop at GB7HFF in Glasgow, and is hoping to run an AMTOR h.f. port on a number of frequencies in the 7, 10, 14, 21 and 28MHz bands. It is also hoped to link up with GB7PLX and GB7SCA to provide a 'wormhole' from North to South. This pathway has always been somewhat of a problem. The Satgen bulletins from John GM4IHJ, rarely make it to Norfolk, much to the consternation of Pat G3IOR, several of the local users and myself.

However, by using the Amlink software developed by Peter G3PLX, Simon hopes to close a few gaps. Knowing the lengthy business of licensing, he may or may not be active yet, but I wish him luck with the project.

Peter has also joined the Data Communications Committee (DCC), with specific responsibility for h.f. planning. I'm corresponding with him regarding h.f. bandplans, so hopefully something will be sorted out at the next IARU meeting, preferably internationally, not just in our own back-yard. If you have any views on this in relation to AMTOR/Packet, drop Peter a line.

One of the problems associated with the h.f. side of packet operations, is knowing just how many BBS stations to licence for any one country. As an example, a letter just received from Dave G3VOM, says he's having quite a difficult time justifying the need for another h.f. BBS besides the ones already licenced in the UK. This could of course, lead to a lot of congestion if we all operated in similar vein.

I feel that there are several jobs to be done on h.f., not all of which can be undertaken by just one or two lone BBSs. Dave mentions that

much of the private mail from his area, destined for abroad, doesn't reach my h.f. port. This would seem to be quite an indictment on the UK packet network. This only serves to support my theory regarding the North/South divide as mentioned above!

Packet Guidelines

The DCC, in agreement with the RA, has just issued the latest packet guidelines for both users and BBS sysops. There is a responsibility placed on both parties as to the content of messages, private as well as bulletins. This should help to both guide/dissuade the user from sending questionable packet messages. It will also support the sysop in his unenviable editorship.

The guidelines, recently propagated on the network by Ian GM4AUP, are reproduced below for those that have not seen them. It may be useful to duplicate them and keep them for reference.

Finally, I have had quite a mailbag over my article in the July '91 issue of *PW*, both in support and some against some of my suggestions. If you would like to add to the arguments, please let me have your views and I will present them in a subsequent article.

Guidelines For Sysops

1. In addition to these guidelines please read carefully, and comply with, the 'Guidelines for the use of the Packet Radio Network' (*Guidelines*).

2. Always ensure that the TNC parameters are adjusted correctly and suit the conditions on your Local Area Network (LAN). Especially PACLEN, MAXFRAME and CSMA parameters.

3. Ensure that you have a second sysop (who must be a licenced amateur, or more than one) who is familiar with the mailbox so that the service can be continued whilst you are away on holiday, etc. The second sysop need not have regular access to the equipment, but must know how to close down your station in an emergency. He, or she, should be able to do basic remote housekeeping on the mailbox on a

daily basis. You should also ensure that the RSGB Mailbox Co-ordinator knows who your additional sysop is in the case of an emergency.

4. Review all messages at least once per day, to ensure that nothing contravenes the conditions of your licence. If in doubt about a message consult the *Guidelines* and act appropriately. Sysops are advised to err on the side of caution: it is **your licence which could be at risk**. During the daily review, check why any messages have remained unforwarded, and look for any duplicate messages.

5. Ensure that the mailbox will auto-start after any power failure.

6. Where possible, limit the downloading of large files to off-peak times, or less congested frequencies. You should advise your users accordingly.

7. IARU for Region 1 have advised that there should be no formal network links on the 144MHz band. You are strongly recommended to link on other bands covered by your Notice Of Variation.

8. Forwarding should only take place on fast efficient routes, preferably on a dedicated forwarding frequency. If it is essential to use the 144MHz band, or frequencies which are shared with users, then forwarding should only take place during the less busy, off-peak periods in your area.

9. Do not forward to unlicensed mailboxes, or use unlicensed stations for forwarding. It is however, permissible to forward personal mail automatically to the licenced amateur who is the intended recipient of that mail.

10. If you have any problems, ask the DCC mailbox co-ordinator to help. He will probably have encountered your problem before, or will be able to put you in touch with someone who has.

11. Remember that at all times, you are providing a service which should be as reliable and efficient as possible for your users, whilst at the same time causing minimum channel congestion for other packet radio stations.

12. The RA have advised that using the band 1298-1300MHz for

mailbox linking, is likely to be subject to occasional severe interference from the primary band-users. Different parts of the country will experience problems on different frequencies and time of day. The radio frequency environment is also likely to be less hostile outside normal working hours.

13. For those providing an end user service, it is permissible to restrict the message categories available to the users, provided this is pre-advertised and even-handed. **ALL** trunk traffic must be carried until forwarded unless it contravenes the *Guidelines*.

14. If a user persists in sending messages that contravene the *Guidelines* after having been warned, he may be excluded. Users should not be excluded for any other reason.

Users Guide

Section A

1. All messages should reflect the purposes of the amateur licence, in particular 'Self-training in the use of communications by wireless telegraphy'.

2. Any messages which clearly infringe licence conditions could result in prosecution, revocation of, or variation of a licence. The Secretary of State has the power to vary or revoke licences if an amateur's actions call into question whether he is a fit and proper person to hold an amateur licence. An example of this could be unreasonable behaviour, such as, using the packet network to carry on a dispute or to deliberately antagonise other amateurs.

3. The RA has advised that the Amateur Radio Licence prohibits any form of advertising, whether money is involved or not.

4. Messages broadcast to 'ALL' are considered acceptable but, should only be used when of real value in order to avoid overloading the network.

5. Do not send anything which could be interpreted as being for the purpose of business or propaganda. This includes messages for, or on behalf of, any social, political, religious or commercial

PACKET PANORAMA

organisation. However, our licence specifically allows news of activities of non-profit making organisations formed for the furtherance of amateur radio.

Section B

1. Do not send any message which is libellous, defamatory, racist or abusive.
2. Do not infringe any copyright or contravene the Data Protection Act.
3. Do not publish any information which infringes personal or corporate privacy, e.g. ex-directory telephone numbers or addresses withheld from the call book.

Section C

1. Any cases of abuse noted should be referred, in the first instance, to AROS. This is coordinated by Geoff Griffiths G3STG, who will take the appropriate action.
2. It is worth noting that any transmissions which are considered grossly offensive, indecent, obscene or menacing, should be dealt with by the police. This action, initially, should be coordinated by AROS.
3. Mailbox sysops have been reminded by the RA, that they have an obligation to review messages daily. They (sysops) should not hesitate to delete those they feel are unacceptable. It is worth remembering that their licence is also at risk as well as your own.

Section D

1. Do not send 'Open Letters' to individuals.
2. Do not write in the heat of the moment. Prepare your bulletin first, then re-read it. You may feel differently after a few minutes.
3. Obey the golden rule - **If you wouldn't broadcast it in speech, don't send it on packet.**

Reading Material

I am often asked what books I'd recommend regarding information on packet radio for the beginner. Well, recently a copy of just such a book has been sent to me for comments. It is written by Mike Mansfield G6AWD and is called -

Practical Guide to Packet Operation in the UK, available from the PW Book Service priced £6.95 plus P&P.

The book, spiral bound like many TNC manuals, runs to some 90 pages. It's ideal for somebody with little knowledge of packet, who wishes to obtain the basic principles. The introduction is followed by a step-by-step course through to the actual operation of a packet station on v.h.f. In-depth technical aspects are avoided, so as not to confuse the reader. The 'innards' of a TNC need not be a major topic. These days many of us can purchase a ready-made unit. However, understanding the parameters is important, and Mike covers the parameters of a typical TNC and explains its use.

Parameters Explained

Explaining packet parameters takes some 17 pages, and covers the full command set, the PMS (personal messaging system) set plus the error messages. Instructions on using a BBS are followed by similar instruction on using nodes, PMS, digipeaters, net-nodes and KA-nodes. Also included in its own section, is how to use the DX Cluster. This is the latest innovation from Pavilion Software in the USA.

Following on from this information, are four separate helpfiles from four different BBS systems G1NNA, WORLI, AA4RE and G4WSD. I must admit I hadn't heard of the last one! The other popular ones, MSYS, F6FBB and SV1AIZ are not covered, or even mentioned. Lists of v.h.f. BBSs and h.f. BBSs complete the book. When all is considered, I think it is a very worthwhile book for the beginner, and it will answer a lot of the questions that some operators seem afraid to ask.

Only Criticism

If I were to criticise the book, I would say that not enough space was devoted to the actual interconnections required for setting up a station. Only one page is devoted to this topic. I feel the beginner needs more diagrams,

Starting Frame

Data Circuit-terminating Equipment or Data Communications Equipment. (DCE): The device that provides communications between a DTE and radio equipment or telephone lines. A master station in unbalanced mode at the link layer. Compare DTE and DXE.

Data communications software: A computer program that causes a computer to function as a DTE for the purpose of transferring data over a communications medium.

Data Rate: The speed at which information is transferred, usually expressed in bauds or bits per second. Also called baud-rate and bit-rate.

Data Terminal Equipment (DTE): A device that is used to interface between a human and a computer to allow the human to exchange information with the computer. A slave station in unbalanced mode at the link layer. Compare DCE and DXE.

Datagram Protocol: A Network layer protocol that transfers each packet independently along the best available route. Also called connectionless Protocol.

DCE Ready: EIA-232-D serial interface signal, formerly called Data Set Ready, that informs the DTE that the DCE is prepared for data communications.

Default: The state of a TNC parameter after the TNC is initially switched on or reset.

Destination: The station that is the intended recipient of a packet frame sent over a radio link, either directly or via a repeater.

Dibit: A group of two bits. Dibit modulation is a technique for transferring two bits of information during one time period. (Two bits per baud).

Digipeater: A DIGITAL REPEATER, a device that receives, temporarily stores and then retransmits (repeats) packet-radio transmissions that are specifically addressed for routing through the digipeater.

Disconnect Frame: (Disc) An AX-25 unnumbered frame that indicates the rejection of a Set Asynchronous Balanced Mode frame.

Download: To receive files from a BBS or other packet-radio station.

DTE Ready: An EIA-232-D serial interface signal that informs the DCE that the DTE is prepared for data communications. The signal was called Data Terminal Ready under RS-232C.

Domain: In packet-radio, the combination of a frequency and a geographical service area.

Dumb Terminal: A simple DTE that provides only basic input and output functions.

Duplex Operation: Operating method where transmission is possible simultaneously in both directions of a telecommunications channel.

more specific help, especially with the RS232 connections. There also ought to have been more emphasis on the importance of the audio levels.

If I were to be hyper-hyper critical, GB7LDI was left out of the World-wide BBS list! In fact there were only two from the UK mentioned, GB7BNI and GB7TED, both in Northern Ireland. Ah well, can't win 'em all I guess!

Hungarian Activity

I have a file, received from HA5DI showing the amount of activity now taking place in

Hungary. Actually the file is a few months old, so it may be more widespread. This information may still be useful to some of you. If you'd like the information, send a large s.a.e. to the editorial offices, marked 'Hungarian Packet Lists'.

That's it for this month, please send any information, hints etc., to G3LDI QTHR, @ GB7LDI. The time of response may drag out a little however, as I am off to the USA for a holiday. I intend capturing some of their packet scene on film!

73 and happy packeting de
Roger G3LDI.

Reflections

This month Ron Ham takes a look at the close relationship between photography and radio interests and tells us about modern TV broadcasting techniques.

Light

It is generally accepted that electrons, light and radio waves all travel at the same speed, 300 000km per second, and because they can each be reflected from its intended path, they become, individually and collectively, a subject for discussion in this column. After all, closely allied to our prime subject radio, is computing, which sends electrons darting in a multitude of directions at the same time and photography, which basically works on reflected light. Many of our present-day readers have a camera or computer, or both, either entirely dedicated to their radio activities or for a completely separate domestic or scientific interest. Whichever, there is space in 'Reflections' to cater for you.

Active People

On June 9th, I had the pleasure of meeting two of our readers **Hugh Griffiths** and **Pete Dickerson** (Malvern) who appear, complete with cameras, on the left and right respectively of Fig. 1. In addition to their general interests in broadcast band listening and photography, they are both narrow gauge railway and model engineering enthusiasts. Pete uses RA17 and NRD515 receivers fed by a long wire antenna and an ERA Morse reader to decipher the c.w. signals. Hugh has a Sony ICF7600D for general listening and a vintage collection of Hammarlund (600), Marconi (T1154/R1155), National (HRO) and RCA (AR88) communications equipment. Hugh and Pete are near neighbours and, without their radio, they have plenty in common what

with Hugh's model railway and Pete's Atari and Einstein computers and collection of scientific and technical books.

Watching The BBC

On the subject of cameras and broadcasting, Joan and I spent a pleasant afternoon on the 27th at nearby Parham House recording, on film, for archives and posterity, the live production of the BBC Radio 2 programme, *A House In A Garden*. That title aptly describes Parham, an Elizabethan House set in a most beautiful garden near the village of Storrington. Throughout the two hour programme, co-presenters, **Gloria Hunniford** and **Alan Titchmarsh** were each

accompanied on their 'walk-about interviews' by an engineer with a v.h.f. back-pack transmitter, a pair of microphones and a talk-back set. The signals from these portable stations were sent to a BBC control vehicle elsewhere in the grounds, and then on to London via a microwave link. I had an enjoyable chat to the BBC's engineering team, Fig. 2, under the charge of **Doug Taylerson G3PPC**, (left Fig. 2). At the end of the day **Richard Earle**, (centre Fig. 2), showed me the pack sets and the 'base' antennas. Richard is holding the set carried by the engineer, (front Fig. 2), who operated for **Gloria Hunniford**, Fig. 3, mainly inside the house during the programme. The sound engineer (right Fig. 2) who worked in the



Fig. 2: Ron Ham (4th from left) with BBC engineers at Parham House.



Fig. 1: Hugh Griffiths and Pete Dickerson (Malvern).

garden with **Alan Titchmarsh**, Fig. 4, is still wearing his full gear.

The 'Instantaneous' Circle

At one time the broadcast from Parham could be heard on a Roberts portable, only a few metres away from one of the many interview points where I was working. My thoughts temporarily turned away from the photography in hand and toward the theme of this month's column. The Roberts was tuned to BBC Radio 2 on the domestic v.h.f. band, and receiving the programme

from one of the local Band II transmitters in the normal way. Now readers, let's marvel at this for a moment because it took less time than that for the following multitude of processes to occur. First, **Gloria Hunniford's** voice was changed from audio frequency (kHz) at the microphone to tiny electrical impulses which, when amplified, modulated the engineer's v.h.f. (MHz) back-pack transmitter. On arrival at the control vehicle, this v.h.f. signal was then converted to s.h.f. (GHz) to be carried via a microwave relay link on the South-Downs, to London. In London, the signal was processed again and then sent, for final transmission, to the BBC's network of Band II transmitters around the UK. The signal arriving at the Roberts, around 89MHz, was immediately changed inside the set from the incoming radio frequency back to audio frequency, so that **Gloria's** words were clearly understood by her listeners through the loud speaker. For the benefit of the camera buffs among you, **Joan** used a Canon EOS 1000 with a 80 to 200mm zoom lens for **Alan Titchmarsh** in the garden, and I used a Minolta 5000i with a 70 to 210mm zoom lens inside the house with **Gloria Hunniford's** team. Both cameras are computer controlled with auto-focus lenses.

Observations

The earth's natural light is a product of our nearest star, the sun, which like most other stars in the known universe is a complex nuclear furnace. Periodically, explosions on the sun eject vast streams of particles into interplanetary space which create a great deal of scientific interest if they collide with the earth's atmosphere. Solar observers have some prior warning of these events because dark patches, known as sunspots, appear on the sun's apparent yellow disc (photosphere) and are a source of much abnormal activity. Sunspots vary in size and often appear in groups and among the largest observed for some time can be seen in Fig. 5, which was observed and drawn by **Patrick Moore** at his observatory in Sussex, around 0700, on June 10. Although Fig. 4 shows this group's central meridian passage, **Patrick** first saw

it appear around the eastern-solar limb on the 3rd and progress with the sun's rotation until the 13th. In Plymouth, Ern Warwick heard solar noise on the 28MHz band at 1230, 1545 and 1820 on June 10 and at 0850 and 1345 on the 11th. "A very patchy period with a lot of disturbance from the sun," was the way Fred Pallant (Storrington) described the 28MHz band conditions to me on the 28th.

Solar Analogy

This group of sunspots like any other, can be compared with a large gun on a slowly revolving turret firing off random 'rounds' of nuclear waste, with the 'shot' taking between 20 and 40 hours to reach its target. At the point of 'fire' there is a flash of light and an emission of radio waves. Both of which can be seen and heard respectively from the earth, 8.3 minutes after the 'round' was fired. Sometimes giant groups like this, have a long life and reappear on the eastern-limb approximately 14 days after leaving the western limb.

Associated Disturbances

Richard Noble (Abergavenny) has designed and built a magnetometer with its sensor mounted in the attic. His recording chart, Fig. 6, for the period June 12 to 14, shows that a large magnetic disturbance took place from approximately 2000 on the 12th to 2100 on the 13th. The instrument's sensor coils for north-south and east-west are represented by the horizontal component and azimuth respectively. Fred Pallant heard a "pronounced" auroral 'rasp' on the signal from the Rutherford Appleton Laboratory beacon (GB3RAL-28.215MHz) at 1530 and "some rasping" on the German beacon's c.w. (DF0AAB-28.277MHz) at 1623 on the 5th. For

the benefit of newcomers, the 'rasping', known as tone-A, indicated that Fred, located in southern-England, did not receive these signals direct from the transmitter but indirectly by reflection from an aurora. Gordon Foote (Abingdon) consistently monitors the international radio beacons and he reports that another German beacon (DK0WCY-10.144MHz) was giving a weak auroral warning at 1637 on the 12th, strong at 1834 and weak at 1850 on the 13th. Prior to this Ern Warwick heard DK0WCY give a strong



Fig. 4: Alan Titchmarsh and sound engineer.



Fig. 3: Gloria Hunniford's crew ready for start.

auroral warning at 1500 on the 5th, and weak at 1700 on May 28, and 1500 and 1700 on June 8 and 11 respectively. He also found that the 28MHz band was generally 'dead' when he checked at 1701 on the 3rd, 0920 on the 4th, 1230 on the 7th, 1000, 1530, 1700 and 1815 on the 9th and 1930 on the 11th.

Sporadic-E

Although unlikely to have been caused by the prevailing solar activity, television pictures in Band I (48-68MHz) from Spain and Italy were received, during periods of Sporadic-E, by Bob Brooks (Great Sutton) on June 11, 13 and Italy and

the USSR on the 15th. Around 2200 on the 23rd Bob received strong pictures from three Norwegian regional stations, while a similar event was in progress. I received pictures from Spain at 1915 on the 15th, Norway and the USSR several times during the day on the 16th and from Sweden and the USSR at 0845 on the 20th. Also on the 16th, strong signals from a variety of eastern European f.m. broadcast stations were frequently heard in parts of the UK between 66 and 73MHz.

Computing

You may have already seen the

TEQNICHE PCW 102, industry standard keyboard for the Amstrad 8256/8512 and 9512 computers being advertised. This new style board, with a recommended retail price of £90.85, but offered by dealers around the £75-£85 mark, has 102 keys and is a direct, plug-in, replacement for the existing 85 key unit supplied with the 8000 machines. I have made the change readers, and found it a joy to use.

Astronomy

W. K. Willan G7IKM (Netherton) tells me that a number of his amateur radio friends in Yugoslavia "are very active in the world of astronomy" and that statistics of one of their stella discoveries is currently at Jodrell Bank for examination. WK feels sure that "any person wishing to exchange information would be welcome in Ljubljana" and gives the address of Primoz Kolman YU3JI, Velebtiska - 11, 61000, Ljubljana, Slovenia, Yugoslavia, to contact.

Reflections

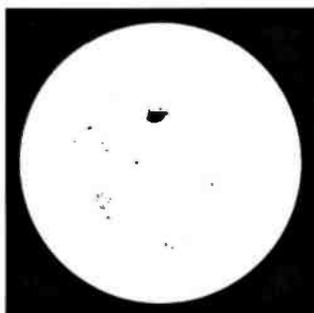
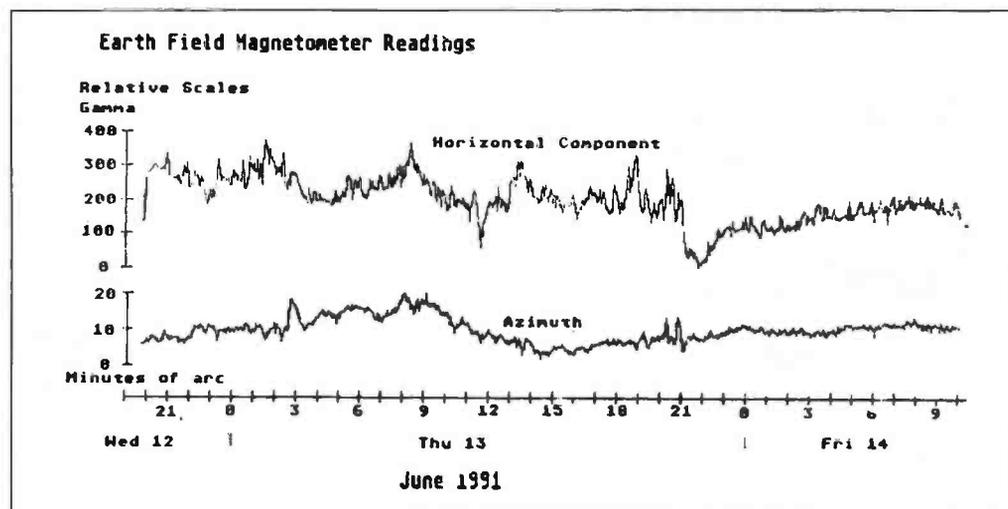
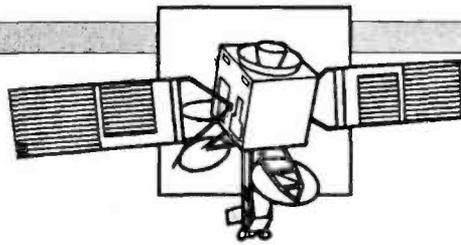


Fig. 5: Giant sunspot group June 10.

Fig. 6: Magnetic disturbance on June 12/14.





Satellites And SIDs

A very powerful series of solar flares were produced in June when a huge sunspot could be seen passing the equator of the sun. Turning my satellite antenna to the sun produced strong noise on 145MHz. Energetic protons of greater than 100 MeV were observed shortly after the peak X-ray flux, which gave over 1.8 Joules per square. Whilst the h.f. bands were wiped out by Dellinger fades and absorption, spectacular auroral conditions extending down to Spain and Italy, resulted in some good 144MHz DX.

John Branegan GM4IHJ writes "The sun has been more active in the past 40 years than it appears to have been in the previous 4000, and the last two sunspot Maxima have been exceptional. Indeed the present 1989/90 maximum has developed a second peak which has been extraordinarily rich in Solar Flares and Aurora".

Flares and the following geomagnetic storms are not good news for satellites. Another problem is the increase in radiation received by the occupants of manned space stations. Memory erasure of computer controlled spacecraft is also likely, and a lowering of orbit due to the atmospheric expansion resulting in more drag. The magnetic orientation sensing and steering of satellites is also upset, causing more problems.

On the plus side, some fascinating propagational abnormalities have resulted. At sub-horizon, RS-10's Mode A beacon on 29.357MHz has been coming in loud and clear even with the spacecraft at an elevation of -35°! This effect occurs most often when Mode A downlink signals are lined up with the receiving ground station through the earth's geomagnetic field, which runs between the poles of the earth. High ionosphere ionisation can also produce antipodal reception of Mode A downlink signals, when the transmitting spacecraft is on the opposite side of the earth to the receiving station. This was first observed in October 1957 from the 20MHz signals from Sputnik 1, and again later

SATELLITE SCENE

by Pat Gowen G3IOR

This month Pat Gowen G3IOR explains the effects of solar disturbances on satellites, and on their command and control, the story of the JUNO mission, plus, of course, the latest activity news of current OSCARS.

with 29.5MHz signals from OSCARS 5 and 6.

Angus GM4JYZ, reported a Dellinger fade-out (sudden ionospheric disturbance, or s.i.d. for short) which wrecked his reception of the 137MHz NOAA-12 weather satellite. An important point was that when NOAA-10 passed on the same track 20 minutes earlier, before the s.i.d. started, it was a perfect signal.

John explains, "We do not have to look far for a reason. Massive solar flares produce radiation which penetrates deep into the earth's ionosphere down to the E and D-layers, ionising these so much that they absorb all terrestrial h.f. signals for the duration of the event. What is never mentioned however, is 'What happens to the F-layer during these events?' Previously no one has cared, but now that we have satellites trying to put their signals down to us through the F-layer, this point becomes important. Clearly the F-layer must be very heavily ionised, producing a maximum usable frequency (m.u.f.) of a very high level, which of course we cannot (or have never tried to) use for terrestrial purposes. The result I've found is that this extraordinary ionisation of the F, lower D and E-layers, produces a savage deterioration of the downlink of the 137MHz NOAA weather satellites, a marked increase in Faraday rotation and multi-path fading and scintillation".

John GM4IHJ recommends an interesting experiment, and says "I ap-

preciate that we cannot predict Solar Flares (as yet), so we cannot predict the s.i.d.s which follow 9 minutes later, but anyone lucky enough to catch a s.i.d. h.f. fade-out would be well advised to try to copy v.h.f., u.h.f. and microwave satellites through it. Even the microwave geostationary TV band might show some effects!" Readers might wish to read page 156 in the new RSGB *Space Radio Handbook*, where Experiment 8.4.01 could be a good line to follow at any frequency from v.h.f. to microwave.

The 'JUNO' Schools Experiment

Despite the anticipated problems that always arise from high popularity operations, the JUNO mission involving Helen Sharman GB1MIR, using amateur radio to talk to UK Schools stations during her stay on the Soviet MIR Space Station, was a great success. The idea came from the many educational missions of Musa Manarov U2MIR, (UV3AM) who has been using the MIR amateur radio station on S22 (145.550MHz) to talk with fellow amateurs and schools around the USSR. The SHUTTLE mission of Ron Parise WA4SIR, did the same with the schools and colleges in the USA.

The S22 channel has long been the established frequency for simplex f.m. QSOs between both American and Russian spacecraft and earth bound amateurs. Because this fre-

quency is available to all amateurs, U2MIR, UW3AX, G3IOR and head JUNO co-ordinator G3XWH, decided that 145.550MHz should be maintained for the MIR downlink. The offset split frequencies operation employed by the JUNO school stations was used to minimise QRM to enable the successful educational contacts.

Following Richard G3XWH's trip to Moscow, to discuss the details of the times and frequencies of operations with Helen GB1MIR, Tim GB2MIR and Boris UW3AX, the recommended frequencies were tested. Contacts between U2MIR and G3IOR were made at times of peak European simplex usage on the previous Sunday evening. Although at MIR operational height, all the f.m. channels were in multiple use throughout the UK, and much of western Europe, those finally selected were found to be marginally superior.

The frequencies were further confirmed by an initial check QSO between GB1MIR and G3IOR at 1630UTC on Tuesday June 21, the first operational pass of MIR over the UK. Helen then went on to try to work the set schedules with the nine JUNO stations over the next three days of the mission. I'm pleased to report that six of the nine JUNO stations successfully contacted Helen. The successful six were: GB0JUNO at Harrogate Ladies College, GB2JUNO at Alford Academy, GB3JUNO at Norwich's Hewett School, GB4JUNO at Canterbury High School, GB7JUNO at Guildford's Royal Grammar School, and GB8JUNO at Orwell Park School, Ipswich. GB1JUNO at Bigyn County Primary School, GB5JUNO at Belfast Royal Academy and GB6JUNO at Looe School. Sunrising would undoubtedly have also completed their contacts if QRM and on board operational problems had not intervened, causing the loss of six of the earlier planned schedules.

Three of the GB0JUNO YL team are shown in QSO with GB1MIR in Fig. 1, which was snapped by Richard G3XWH. The team are all very enthusiastic, having taken their RAEs in May.

The Hewett School in Norwich GB3JUNO team are shown in Fig. 2. They are, standing from left to right: David Albury, Adrian Hendrick, Adrian Brooks, Graham Symonds and Charles Gregory. Those shown sitting are Sarah Fuller and Suzie Payne, Jonathon Rowles and Alan Wright GOKRU, their science teacher.

The Saturday in the museum was open day for all amateurs, and despite what must have been the UK's biggest ever 145MHz f.m. pile-up, Helen amazingly managed mixed simplex and duplex QSOs with five stations. She picked out from the massive



Fig. 1: Harrogate Young Ladies College team GB0JUNO.



Fig. 2: The Norwich Hewett School GB3JUNO team.

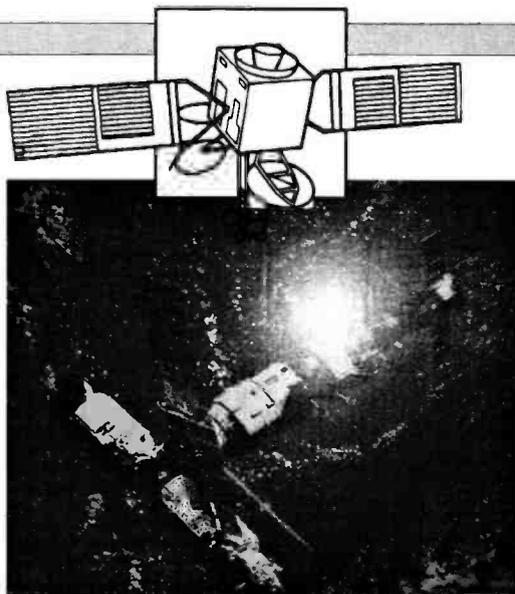


Fig. 3.

number of callers GW4VEQ, G4SMC, G4PIQ, G3MRJ and G5TU. Audiorecording tapes from dispersed sources such as G1YIL in Devon, G3IOR in Norfolk and others all helped resolve Helen's signal from the many stations simultaneously calling her. Sadly on-board MIR, shown in Fig. 3, experiments and preparation for return prevented her from operating on all the in-range passes or contacting amateurs in other parts of the world.

Tony Jones GW4VEQ of Anglesey got the Saturday calculated pass times from GB5JUNO at Belfast Royal Academy, and confirmed tracking precision by monitoring the 143.625MHz MIR communications link. Using his pair of 8-element horizontal quad antennas, Tony began calling as Helen came over the Atlantic toward the UK, to hear her return with "Hi - nice to hear you! How are things down in Wales today?"

John Tucker G5TU of Falmouth, Cornwall, writes how much he enjoyed his three minute QSO. He was running 100W to an 8-element crossed Yagi under directional control from his home made az-el interface from his BBC computer.

Helen, advised by Musa, had the good sense not to try to exchange numbers with as many operators as possible. Instead she seized upon any call heard to share some of the fascinating work, findings and experiences she had encountered. This provided great enjoyment to everyone who was listening.

The amateur activity side of JUNO was not without its critics. Whilst over 90% of amateurs expressed their delight and thanks, there were some complaints. In the main these balanced out. Those who complained of insufficient distribution of the pass times and frequencies, were equalled by those who said that by publishing the information we had encouraged the QRM problems.

Of some concern, was the bad publicity resulting to the amateur radio movement by the media quoting the disappointed student at Alford Academy who complained of the interference "by other radio amateurs". The comments were partially correct. It did not take long for some of those with scanners to locate the uplinks and overcall, or to intervene on the U2MIR frequency. The result was that some of the carefully pre-arranged schedules could not be completed in the all too short five minute allocated slots.

I'm pleased to say that JUNO was an outstanding success, mainly thanks to the vast majority of amateurs who listened, but did not intervene during the set schedule periods. Other amateurs provided passes with pre-deter-

mined Doppler corrections, while amateurs in both the UK and the USSR tutored our first cosmonaut, enabling her to get an amateur radio licence, which was arranged by the RSGB and the RSF at such short notice. Everyone, including AMSAT, the RSGB, the RSF and all involved in the mission, have stated that they are very happy with the organisation and the outcome. It would have proved impossible without full and mutual co-operation between all concerned.

Cards for QSLs will be arranged when Helen returns. This will be possibly through the services of UW3AX, the MIR co-ordinator and QSL Manager. Special commemorative certificates may also be available. Don't forget U5MIR will continue to be active on S22 from the space station on both voice f.m. and packet for the next five months, after which further amateur crews should follow.

OSCAR-10 Returns

Peter Guezlow DB2OS reports that OSCAR-10, which celebrated its 8th birthday on 16 June 1991, has returned in good transponding condition, and is providing excellent Mode B operation. Signals are reported to be very good during parts of the orbit, despite the apogee limitations imposed by the monopole antenna system.

OSCAR-13 Schedule

James Miller, one of the dedicated OSCAR-13 command team, which consists of G3RUH, VK5AGR and DB2OS, explains the coming modes of the A-O-13 satellite from now until the end of the current year.

From August 12 until 18 September 1991, a temporary re-orientation to ALON/ALAT 180/20 will result in squint (earth pointing) angles never better than 15 degrees for most users, so the Mode B transponder will therefore be on continuously, as the narrower beamwidth higher frequency antennas would not facilitate good communications on S and L modes. Towards the end of this period the

ALAT will be reduced to zero as sun angles permit. From September 18 until 12 December 1991 we have the new schedule:

- Mode B from MA 000 to MA 095
- Mode JL from MA 095 to MA 125
- Mode LS from MA 125 to MA 130
- Mode S from MA 130 to MA 140
- Mode B from MA 140 to MA 256

Over the period from November 17 to 9 December 1991, Mode B will be commanded off from MA 10 to MA 40 to cover the long duration eclipses then. The omni-directional antennas will be in use from MA 240 to MA 060, and the spacecraft attitude should then be an ideal ALON/ALAT 180/0.

Some OSCAR-13 users may not be aware of the amount of work and calculation that goes into orientating the spacecraft's angle to the sun. This is to allow for maximum illumination of the solar panels, and yet attempt to simultaneously maintain reasonable antenna earth pointing. This is accomplished by sending pre-calculated current pulses through specially designed electromagnets situated at the end of the arms of AO-13, known as 'magnetorquing'. As the satellite approaches perigee, the closest point to earth during the orbit where the earth's magnetic field is at its strongest, the electromagnets interact with this field. This results in G3RUH being able to slowly manoeuvre the spacecraft and change its angle, in such a way as to allow the solar panels to receive a greatest possible amount of sunlight, and thus maintain a maximum battery power charge.

For the first time, this previously 'routine' manoeuvre is complicated by the need to magnetorquing through solar eclipses occurring between Mean Anomaly 246 and 256. During eclipses the satellite loses its celestial marker (the sun) from its special sensor. In addition, when BLON reaches 203 degrees, when the sun angle will be less than 8 degrees, the separate earth sensor will trigger on the sun, which is

likely to cause the temporary loss of the attitude determination capability. Thus the last leg of the attitude change will be performed on 'open-loop', aided by a new magnetorquing simulator to help predict how the spacecraft will react during the magnetorquing sessions.

OSCAR-21/RS-14

AMSAT-U-Orbita, whilst trying to remedy a self-oscillation problem on the TR-2 transponder, temporarily took the RM-1 TR-1 and RUDAK transponder off the air. The No.2 RM-1 transponder has been activated, with its 30 channels of digital information at 1100bps. Its 2W beacon is on 145.800MHz, its 0.4W digital telemetry on 145.838MHz, and its 0.2W c.w. beacon at 145.948MHz. The transponder uplink runs from 435.123 to 435.043MHz, and the downlink from 145.866 to 145.946MHz. The receiver is very sensitive, and the 10W inverting downlink transmitter very strong indeed, with even 1W uplinked signals being transponded fully readable. Bob McGwier N4HY, reports first working the second transponder on May 21. Other than a little breakthrough of digital mode into the analogue passband reported by Dave Rowan G4CUO, all seems to be functioning very well indeed.

John Branegan GM4IHJ has worked out that US States Maine, Vermont, New York, New Jersey, Maryland, Delaware, Virginia, North and South Carolina, Georgia and Florida are within general range of the UK, with the more westerly states out to the Dakotas, Minnesota, Iowa, Illinois, Kentucky and Tennessee at extreme edge of the footprint. The capture is from North Alaska and Hudson's Bay to the Soviet Arctic, to East and West Africa and the Persian Gulf. A-O-21 has 10 or 11 orbits in UK range daily, each some 109 minutes apart and occupying an orbit window about 18 hours wide. Because of perturbation of the RAAN the window drifts about 7.3 minutes earlier each day.

An eight hour sequencing schedule of planned operation which alternates the modes between transponders 1 and 2, with the -12dB attenuators alternating with the linear passband control going in and out has been sent by Leo Labutin UA3CR. The switching is currently changing at 0000, 0800 and 1600 m.s.k., but is likely to change as progress is made with the command system. Leo points out that when the timer is on, the 145MHz downlink will be off for ten seconds every tenth minute.

I now go off too, satellite fans! Next month we shall try to catch up with FO-20 and the rest of the news!

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HF Bands

Reports to
Paul Essery GW3KFE

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What a month this has been! After completing my last chore, I went off on a brief visit to GM land. When I was half-way there I discovered I'd forgotten the /M antenna. That was remedied with a scrounged piece of welding-rod cut in half, held in place by a matchstick! At GM3JDR my car had to have a jump start, as I'd left all lights on. When I arrived home, the beam was noted to be pointing in a different direction, and the coaxial cable loop for the rotator had disappeared. When that had been rectified, I discovered the real problem was that the rotator had stripped its gear teeth. Even if I had had a rotatable antenna, it wouldn't have made a fat lot of difference, as I've got the impression this had been by and large the worst month ever since I started writing the piece back in 1966! Thus, Finagle's Axiom....Murphy's Law is always too optimistic!

Oddments

The news is that S2/WZ6C is said to be in Bangladesh for four years, but because of the breakers and tail-enders, he will 'not run pile-ups but answer CQ calls'. If you do hook him, cards via W4FRU.

If you come across a 4S6, these are Novice licensees from Sri Lanka.

I've heard that ZD8XX who was also V29A, died suddenly on June 11.

On the DXCC front, Penguin Island has been accepted, effective 15 November 1945. QSLs may be submitted for credit from September 1 next.

Whilst on a recent study-tour of museums in New Zealand, Douglas G3KPO, who is Curator of the wireless museum on the Isle of Wight, visited Ron ZL2APW in Blenheim, and both are shown in Fig. 1. Now retired and spending much of his time in the 'Shack', Ron has an ideal QTH, his house is in the middle of a large grassy field, far from any neighbours. Naturally, antennas run in all directions and whenever the bands are open, Ron puts a strong signal into the UK. On the evening Douglas visited him, Ron switched on the rig on 21MHz, and who did they have a QSO with, but Eric G3IMX, a fellow islander living at Cowes, and also just retired!

The Bands

I've already said my piece regarding band conditions, so let's go straight to 3.5MHz, home of the QRP operators. First GOKRT (Welling) who has 2W output from a Lake DTR3, and reception by Howes; 25 metres of wire up aloft and a counterpoise beneath. Two-way QRP c.w. scored on G3JRL, G3YHO, GW3COI, while Eric's signals were responded to by QRO (relatively!) merchants G4VFX, G3UES, and five other Gs, plus GJ3EML and PA3FTJ. Activity has been reduced by a severe bout of constructionitis(!).

Onto Pat ON7PQ (Kortrijk) now, who sticks 100% to his key, and managed VP2MDH, 4J1FS, UA9CR and UL8GB.

Angie G0HGA (Stevenage) now has a 22m wire for this band, but so far there have been minor problems which have kept the c.w. contacts down to OK5IPA, Y21CW/P, SM7SNF, G4EXQ who was QRP, G3JVC and SP3KBJ.

Top Band

The 1.8MHz band has been very noisy whenever I've listened. Ted G2HKU (Minster, Sheppey) says his s.s.b. sked with ON7BW has been a terrible struggle, while c.w. was the mode for LY2ZO.

One of our s.w.l. D. Sheppard (Earl Shilton) mentions hearing LY1BYK, RB3MM, UB5KEI and RB5VQ.

Thought!

Ted G2HKU added a tailpiece to his letter, remarking that he had just won £20 in a PW competition. The last time this happened was in 1938, when F. J. Camm sent him a book *Wireless Coils, Chokes & Transformers, and How to Make Them*. Ted adds that he will try to have another win before the next 53 years are up!

The 7MHz Band

Let's start on 7MHz with Angie G0HGA (Stevenage) who has keyed with VP2MDH, VP9PCQ/MM, OY/N6NR, OH2AP/OJO, UA9SAN, UL8/UC2WX, HB0/DA1WA, ZB2X, plus the usual crop of Europeans stuff.

Turning to Eric G3LPS (Blackburn), who notes that when he worked 6W1QB there was no pile-up so he asked for comparative reports. The inverted-L gave a 589 report, while the vertical yielded 559. On the other hand 9M2AX was 579 on the vertical the following evening, but all but inaudible

on the wire antenna - which goes to show there's no such thing as a 'best' antenna! Other c.w. stations worked were UJ8JJK, YPOA (QSL to YO Bureau), 9M2AX, 4Z4DX, PJ8MM, PY1CIP/4, CX4SB, 4X4VF, LU5DTN, LU4HLN, HB0/DA1WA, LU6DBH/H, VK6VZ, OH0/SM0AJV, YV4BV, 4X1EL, 4S7RO, LU4FC, LU1UGA, SV9BAI, OH2AP/OJO, UH3Y/UA4HV, YC0UNC, UL8GB, 4K1ADQ, A22GH, VE1DF, ZD8VJ (these two were the only stations audible during magnetic storm QRM), ZD8LII, YC0UNC again, VK6NV, 8P6JR, PP1RR, UT7U/LY1DS, VK6VZ, RA9FF and W0LY1 when the band was just opening to the East Coast Ws - this one turned out to be in W1!

On to ON7PQ. Pat's c.w. list includes LU4KV, VP2MDH, J49CW, 4J1FS, 9V10K, KC6KW, A22GH, LU5EW, CX4SB, Z28CW, LX/SM0NJO, ZD8SE, VU2RJ and DL4MEH/5B4.

WARC Bands

Pat ON7PQ sticks to the key. On 10MHz this resulted in 4J1FS, LX/PA3BUD/P, TK/DL7HZ, OJO/SM0RBO, RZ0Y/UA0WWW, UF6FEI, JG6MQI, T77C, 4U1ITU, CO2VG, 9L1US, KP2A and C31LL. Turning to 18MHz we find FO5DV, AG9A/WHO, 4J1FS, Y88POL, 3A/DJ0MBG, 3C1EA, SV0HS, 9J2B0, LX/PA3BUD/P, ZD8WD, LU9CV, TL8MB, OH2AP/OJO, JY9SR, ZD8LL, OA4AMM, HF0POL, 9M2AX, FH5EJ, 9Q5PL and 9L1US.

As for 24MHz, in between the dead periods AG9A/WHO, IS0/DL6RAI, TL8MB, 4J1FS, ZD8LII, 9M2AX and 3B8CF were booked in. Incidentally Pat finished off his trap dipole for these bands and got it aloft, where it sits two metres above the tribander which is itself at 22 metres. Thanks go to ON4AGX, ON4ADZ and ON4AVA for help in getting the beast up.

Now to Ted G2HKU, who also sticks to keying. On 10MHz I notice UH9YWA, NT2R, N4UB, VV1AO and HE9BYO. For

18MHz he notes K3SEW, EA8AB, PJ2/PA0VDV, and on 24MHz 9M2AX.

Mary GONZA (Kirkby-in-Ashfield) says she managed a GU when all else failed(!) but on 18MHz A92BE, SV8QJ (Lesbos, where the temperature was 33°C!) and UM8MCW.

Onto Don G3NOF (Yeovil) who used 24MHz for QSOs with CE3GEI, J88BS, UG6LQ and 4U1ITU. Andrew G3VWC (Bath) tried a session on the band, and found (c.w.) K8XF/MM in Mid-Atlantic, T77C, 9H3UJ and W6UK (Utah). Andrew notices that conditions to USA have worsened of late, and wonders....'Perhaps this is summer conditions, magnetic storms or have I really got my antenna plugged in?'

Now we turn to 9H1IP (M'Scala, Malta) and his s.s.b. Vince looked on 18MHz to find 8P9BW, HV3SJ, PY0SK and PY0SR (St. Peter and St. Paul Rocks), 9V1RH, ZF1EJ, 4U6ITU, ZC4DG, YS1AG, S15SM, GU/SP5ZK, S79MB, 4J1FS, UG6LQ, YS1RRD, UL8PA, 3A2LZ and T12CCC. As for 24MHz Vince knocked off ZD8DX, C56/DL80H, PY0SR (St. Peter and St. Paul Rocks again), SV5AZR, FK8FR, J37AJ, 4U6ITU, YS1AG, J88BS, FR5DX, N1GNF/TA, HF0POL, ET2A, TZ6VV, YV5DTA, 3A2LZ and V51P.

The 28MHz Band

Despite all the problems on the sun, 28MHz correspondents have in fact managed to make the odd QSO here and there. Angie G0HGA, though was out of luck, as all her dipole managed was the odd EU station and the sounds of the odd beacon.

As for Pat at ON7PQ, he managed to scare up D2ACA, 8P6BX, TL8MB, ZS1ADS and XX9ATM. The plums in G2HKU's c.w. crop were IS0/DL6RAI, ZS6BCR, IS0TDY and LU5UL.

The arch s.s.b. operator just has to be G3NOF, but Don offers D2ACA, ID8/IK8AUC, LU9FHF, OH0/LA0EW, OH0/LA0FW, PP2JF, VP5JM, ZS6DNO, ZS6JUN, 3DA0BK, 5T5ZZ, 5Z4FM, 9L1US and 9U5BZP.

The 21MHz Band

Angie G0HGA has a sloper dipole (14/21MHz) for this band, and she was thus able to raise AA2CQ, WX8Q, KB5OG, all after midnight, plus Ws, LTOA (LU disguised), and LU1UG in the WPX shindig.

The band seems to have appealed to ON7PQ; Pat mentions AG9A/WHO, Z08SE, J49CW, 4J1FS, VP2MDH, 9V1YC, FR5AI/T, OK3CLA/5N0, SU1HV, SV5/DJ2GM/P, KC6KW, D2ACA, TR8/F6AXX, TR8GL, VK2DXI/9M2, Z21HS, FH5EJ, P29PL and VP5P.

Turning now to G2HKU, Ted keyed with PY4OD, YV4ABR, LU1PHC, LU8EKC, HZ1HZ, LU1ICX, PY2GUL, LU6UA, TK/DF4RD, 3A2LF, VU2NBT, UZ9JVV, RZ9UA and NV1U/MM (cargo ship Jean Sykes, WLAH off the coast of Morocco).

In Nottinghamshire GONZA stuck



Fig. 1: Ron ZL2APW (left) with Douglas G3KPO.

Photo by G3KPO.

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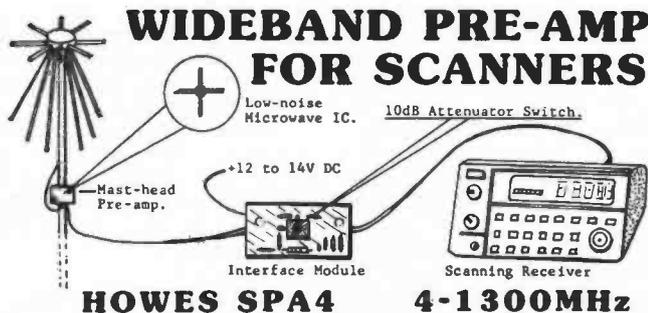
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73 from Dave G4KQH, Technical Manager

Back-Scatter

to s.s.b. for UI8ZI, UF6FIM, 4Z4EC, 4X6VT, VE3GUA, YCOFEO, YCOXIH, YC0SWR, and YB0ZZ, plus YL Sue on SKOYL, at the International YL Convention in Stockholm.

Of course it was s.s.b. for G3NOF. Don noted D2ACA, ET2A, FM4FM, FR5DF, FR5DX, HF0POL, HH2BN, ID8/IK8AUC, JW8LHA, OH0LA0FW, PS5C, SNOJP, VE8CB, VP8CEM, VU2PS, YB0ZZ, YC0BNZ, XQ6ET, XQ6CFX, Z21HJ, ZD7DP, ZD8ACJ, ZD8GT, ZD8XX, 3X1SG, 7Q7LA, 9K11C, 9U5BZ and 9Y4SF.

Most of his activity has been on 21MHz c.w. says Andrew at G3VWC, EX3FKW, 4K2PGO, 4J1FS, 9Y4SD, FY5FO, TI4SU, PJ2/PA0VDV, UH8AAQ, UI8DGN, UA0FDX (Sakhalin), JA7BXS, JH8GYV and Z22WV.

Contest Corner

European DXContest first. The c.w. weekend is August 10-11, and the s.s.b. weekend September 14-15. There are some rule changes for this year. Single-

operator stations are only allowed 30 of the 36 hours of the contest, the six-hours off being taken in one, two or three spells, to be noted in the log. Minimum operating time on a particular band is 15 minutes. Exchange RS(T) plus serial number from 001. Score one point for each QSO and one point for each QTC. Multiplier for non-EU stations to be the ARRL DXCC list of non-EU stations. For the non-EU types the multiplier is the EU countries worked as defined in the WAE country list. Bonus multiplier is found by multiplying your 3.5MHz multiplier by four, on 7MHz by three, and on 14/21/28 by two. QTC traffic points are achieved by non-EU stations reporting a completed QSO from earlier in the contest back to a European station; such QTC to contain time, call and QSO number of the station being reported. Maximum 10 QTC lists to be reported. If more than 100 QTC stations are reported, keep a check list. 3/7 would indicate this is QTC list 3 with seven stations being reported. Claim an

additional point for each station reported back. Score is one point per QSO, plus one point per QTC, times the total multiplier from all bands. There is a club section, s.w.l. section and the usual single-single, single-multiband, and multi-multi sections too. Mailing deadlines September 15 and October 15, addressed to WAEDC Contest Committee, PO Box 1328, D-8950 Kaufbeuren, Federal Republic of Germany.

The same weekend as the EDXC SSB sees also the All Asian SSB Contest, with rules the same as the c.w. even back in June. Logs to arrive at JARL, PO Box 377, Tokyo Central, Japan by October 15.

The 14MHz Band

On 14MHz Angie 6OHGA has her sloping dipole and all contacts were between midnight and 0500Z. KD2FSN, W3NZ, W4DZH, N4XY, WA2SON, K1RM, WB2YQM, W4YSK, W1HMD/4,

W4YSK, W4WJ, K8MFO, K8NW, K4FU, W8JGU, WE3X, W4NWX, W8EGU/8, W4ELO, K4II, K1VLB, AA2CV, N4AR, W5REA/4, W6DU, W7YLO, plus VU2AC, PJ8MM, OH0/SM0AJV, UZ9JWV, VE3HX, HK1R and R6L.

At ON7PQ the tally was 4J1FS, KC6KW, D2ACA, FY5YE, 9V1YC, PJ2AM, DX1HB and 9J2SZ.

Mary GONZA mentions EJ0A, ES1WQ, CN8GM, UQ1GXO, 9H1DE, HC1EEV, UG7GWO, 5U7NU, N1BLF, N2GE and N11WX.

Bringing up the rear as it were we mention G3NOF, ID8/IK8AUC (Dino Is), OH2AP/OJO, ZS10JUN, 4U1ITU and 9M8FH.

Finish

That's the lot from me for this time. Deadline for the next lot is to arrive with me by September 1 and October 1, and the address is at the head of the column. Now to get the antennas back up - just so I can mow the lawn!

Solar Data for May-June 1991

Details of solar activity were omitted from last months column because of the need to give you immediate details of the major auroral openings during the early part of June.

The period from May 3-12 saw the more active side of the sun coming into view with solar flux levels rising every day. Between May 13-19 the active side of the sun was looking our way, and a number of auroral openings were observed during this period in central England. From May 19-23 the solar active side of the sun rotated away, and the more geomagnetic active side came into view. The last few days of May saw a large increase in geomagnetic activity, with a number of good auroral openings being recorded. During the first two weeks of June some of the most remarkable geomagnetic events since March 1989 were recorded. This was caused by solar region 6659, an enormous magnetically complex area which spawned an almost continuous series of major flares, including at least two rated X12+. Flares are classified C, M, or X, in increasing intensity, followed by a number indicating rank within each class. An M1 flare is ten times more intense than a C1 flare. However, the satellite sensors saturate at X12 and flares more intense than this are ranked X12+. The numerous flares gave rise, in central England, to 10 days of auroral openings between 4-14. The geomagnetic A index reached 151 units on June 5, 94 units on June 6, 66 units on June 10 and 95 units on June 13. The period June 17-23 saw the solar quiet side of the sun looking our way but

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

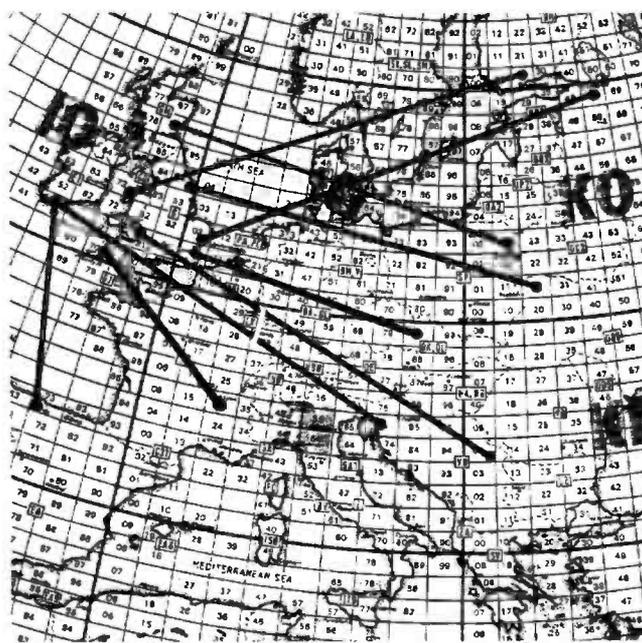


Fig. 1: How the longer distance QSOs from June 5 look on the map.

because of the passage of a number of coronal holes the geomagnetic levels were kept up to substorm level. The last week of June saw very little solar activity apart from a small proton event on June 30 which started a small magnetic storm.

Aurora!

For many v.h.f. operators, the period from June 4-14 won't be forgotten very quickly. I've lost count of all the operators who were heard to say "Oh no! Not another aurora!" Most of you probably got away with it, although I had to do the washing up for a week afterwards! I gave details of the June 5 opening in last month's column, but as a reminder, the day started off with an opening to GM, LA and SM between 0630-0730UTC, followed by a widespread opening, between 1330-2100UTC, in which virtually every country in Europe could be worked from the UK. The opening spread down to northern Spain, across to Italy, over to Yugoslavia and Romania, up through the nearer Russian republics to Finland, Sweden and Norway. The illustration, Fig. 1, shows some of the longer distance contacts made during this opening.

John Lemay G4ZTR (J001) sent in a report, as he wanted to let readers know what can be worked with a modest system, rather than that of the mega-stations. Running 80W into an 11-element Yagi on June 5, he worked a total of 24 stations including HA4XT (JN96), HG1WD and HG1YV (JN87), OK2PZW (JN89), YU2CCY (JN85), YU2VR (JN95) and YU3ZW (JN86).

Ralph Sachs G2CZS (J001) first

heard the event on June 5 whilst listening to the 28MHz band. Signals had a distinctive auroral 'rasp' so he immediately moved up to the 144MHz band and worked a number of stations including F6EAM (JN05) for a new square, DB8KJ (JO30), DF5DP (JO31), G14GVS (IO74) and PA3EXS (JO32).

Tom Cocking EI4DQ and **Charlie Coughlan EI5FK** both report contacting EA1NV (IN73), Charlie worked him at 1840UTC on June 5 and Tom found him at 1755UTC on June 10.

Auroras continued daily, being heard in central England through to June 14, with smaller events occurring on June 17 and 23. I've received a tremendous response from readers regarding these events but unfortunately I cannot report on everything sent in to me. If it's any consolation, I do try to tabulate all the results in the RSGB 'Six Metre and Up DXer' and every relevant letter is passed to the Propagation Studies Committee for evaluation.

Mervyn Rodgers GM0GDL (IO86), worked LA5IH (JP20) during the event on June 8 and on June 10 worked 34 stations in 2 hours, notable contacts including DH4SAN (JN49), DF6IY (JN48) and EI4EY (IO52).

At my QTH, the event on June 10 was quite good, allowing me to work 16 countries, between 1350-1840UTC. The best c.w. contacts including HA4XT (JN96), HG3GR (JN86), HB9BZA (JN37), OE3JPC (JN88), OE3XHF (JN76), SP20FW (JO93), SP7DCS (JO91) and SM1ALH (JO97). I found the aurora on June 13, from 1700-1830UTC, to be quite interesting, as all my DX contacts were made in an eight minute period between 1753-1801UTC. During this time I worked SM7SCJ (JO65), SP20FW (JO93), HG0HO (KN07) and OK1SC (JO70). Did anyone else work anything unusual at these times?

Meteor Scatter

Although the Perseids shower occurs between July 20 to August 23, most operators are particularly active during the period August 8-13. The theoretical peak this year will be on

Annual c.w. ladder

Station	Band (MHz)				Points
	50	70	144	430	
G4ASR	22	2	173	—	197
G4OUT	—	4	91	—	95
G0FYD	10	—	37	—	47
GW4VXX	—	—	11	—	11
GM4CXP	1	—	6	—	7

Number of different stations worked since 1 January 1991

Annual v.h.f./u.h.f. table January to December 1991

Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Counties	Countries									
GBHKM	47	36	—	—	47	12	12	3	10	2	169
GBESB	4	2	14	2	66	7	32	6	8	2	143
G4LDR	23	9	8	2	44	11	32	3	—	—	132
G4ASR	32	32	41	5	10	26	—	—	—	—	114
GBPYP	13	16	1	1	19	9	8	4	—	—	71
GM4CXP	2	1	2	2	22	3	—	—	—	—	32
GW7EVG	—	—	—	—	15	5	—	—	—	—	20

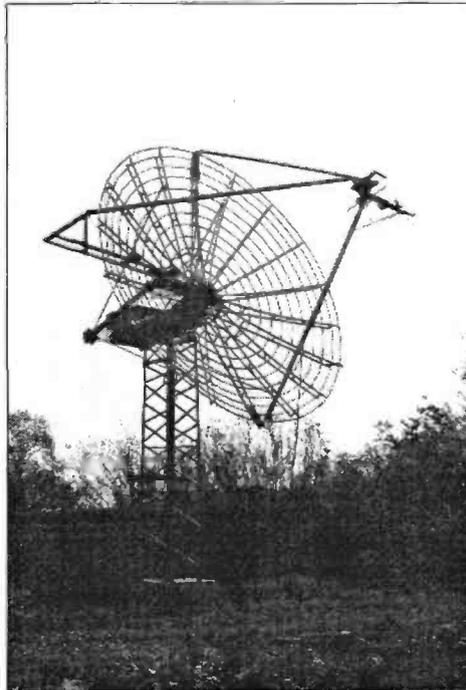


Fig. 2: The OZ7UHF e.m.e. dish.

Monday 12th, and no doubt many operators will be taking a days holiday or alternatively, may be struck down by that rare 24 hour disease called perisiditus! If my boss reads this, I'll have to take it as annual leave! The Perseids shower is circumpolar, which means that it does not set and is therefore usable, in particular directions, throughout the 24 hours. Between 1000 to 1400UTC beam north-east or south-west, 1400 to 2200UTC beam east or west, 2200 to 0200UTC beam south-east or north-west. There is no well defined peak for the north-south path, it generally being good at all times except between 0500-0900UTC and 1700-2100UTC.

Moonbounce

The Copenhagen Engineering College e.m.e. station, OZ7UHF, uses an unusual method of antenna rotation. The 7.5M dish, shown in Fig. 2, is hydraulically powered, enabling it to be moved very rapidly in both azimuth and elevation. The dish is used mainly on 430MHz, but it still exhibits a good performance up to 3GHz. Later this year it will be extended to 9.5m diameter, and a finer mesh will be placed in the centre section to enable it to work on the 10GHz band. The picture, Fig. 3 shows Peter Hall SM0FSK, the Swedish v.h.f. manager (left) and an OZ club member outside the e.m.e. shack.

The 50MHz Band

On June 14, Yugoslavia became yet another European DXCC country to be allowed 50MHz operating privileges. Class A amateurs, the highest class, can operate between 50.0-51.9MHz, on a secondary basis, provided no interference is caused to any other services within the band. Operators are permitted to use A1A, J3E, F1B and F2B with powers up to 10dBW in urban locations and 20dBW outside of these locations. Stations heard during June included YT2AQ, YU2SB, YU2EY, YU3AN, YU3EA, YU3ES, YU3EU, YU3GO, YU3OV, YU3UF and YU3ZM, the SRJ v.h.f. manager.

During June, it was also learnt that additional 50MHz permits have been granted to Romanian amateurs. For the past year, YO2IS has been the only operator with a permit, but now he is joined by YO7VS, YO7VY and YO9HP.

Band conditions were very lively during June, allowing up to four continents to be worked from the UK. Sporadic-E was quite prevalent during the month, apart from the period between June 4-14 when aurora was the predominant propagation mode. Many operators made their first DX contacts via Sp-E and I recorded over 30 European countries that were available via this mode. If you listened very carefully between the S-9+ local European stations you could have found some choice DX stations. A number of stations worked into Asia, contacting 4X11F (KM72) on June 1 and 2, ZC4MK (KM64) on June 2 and 5B4JE (KM64) on June 29. There are still a number of rare European countries left to work and a number of operators were fortunate to work HV3SJ (JN61) around 0830UTC on June 16. Although not as rare, CU3/K6EDX (HM68), provided

many with a new country. He had propagation into the UK on June 6, 12, 16, 19, 21, 22, and 24. Even nearer to home, OY9JD (IP61), was heard working into the UK on a number of occasions. During one opening, between 1930-2000UTC on June 16, the skip distance shortened considerably and many GM stations were worked from central England. Openings into Africa occurred on June 2, 8, 16, 20, 21, 23, 26 and 28, some of the notable call signs being A22BW, CN8ST, V51W, ZS6AXT, ZS6WB, ZS9A, Z23JO, 7Q7JA, 7Q7RM, 9J2HN and 9L1US. What is claimed to be the first signals heard this season, from North America, came in a report from **Ted Collins G4UPS**. At 1745UTC on June 6, he heard VO1NE calling CQ and a few minutes later the beacon VO1ZA was heard peaking 579. It faded out with Ted at 1810UTC although later in the evening, from 2200UTC in an opening lasting one hour, stations in northern England worked VE1MR, VE1XDX, VE1ZZ and VO1QF. Other weaker openings occurred, with W3EP being heard at 1809UTC on June 19 and K2QIE and VE3UD being heard around 2030UTC on June 23. Did any of you hear these North American openings?

The 70MHz Band

The appearance of ZB0W on a number of occasions, and the string of auroras all served to bring an increase in activity to this much under used band.

Paul Newcombe ZB0W (IM76) has kindly forwarded copies of his 70MHz logs, giving details of recent UK contacts, made via Sp-E.

His first contact of the season was with G3UKV (IO82) on June 2 at 1224UTC. This opening continued until 1540UTC, enabling 72 QSOs to be made on s.s.b. and f.m. Some of the notable contacts included EI4AEB (IO63), GJ0FTZ, GJ1TJP and GM3TAL (IO86) for the best DX at 2208km. Mention must also be made of **Steve Carey G4MJW** (JO01) who made his first s.s.b. QSO ever on 70MHz, with ZB0W, at 1340UTC. I hope Steve doesn't think this happens all the time! **Mark Dickinson G0GTI** also gets a mention, as he made the most of the opening by working Gibraltar from three different locations. Apparently, G0GTI is trying to obtain the RSGB Four Metre and Down Award whilst at home, mobile and portable! Paul ZB0W is also trying to gain this award and contacts made during this opening provided five countries and 30 counties. The next opening to the UK occurred on June 15, between 1607-1935UTC, with 37 contacts going down in the log. One of the QSOs was with G4WND/M, who needed ZB from his home location. Turning the car around, he managed to get within 1km of his QTH, but the band conditions changed and ZB0W disappeared into the noise. There was a happy ending to this story, as G4WND

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Back-Scatter

was the first station to respond to CQ calls from ZB0W, during another opening on June 18. This event, between 1648-1930UTC, produced 30 QSOs, the best DX being with GB3PNN (I095). The band was also open the next day, June 19, from 1700-1900UTC, but unusually, although the GB3ANG and GB3REB beacons were both copied at good strength, (up to 599), no contacts were made. A similar opening was observed on June 21, between 1551-1630UTC, with only the GB3CTC and GB3REB beacons being heard. The final opening in June occurred on the 22nd, when nine stations were worked on f.m. between 1411-1512UTC. **Steve Potter G1JHZ** (I082) was one of the lucky stations to make a first contact with Gibraltar. Steve uses a modified Pye Westminster running 28W of f.m. on 70.260MHz and 70.450MHz. He mentions he was getting bursts of French language on 70.450MHz, a point that ZB0W also makes. Paul was getting severe QRM from this network and wonders if anyone knows what allocations other countries have on this frequency band? By the time the last contact had gone down in the log, ZB0W had worked five countries and 45 counties. He is hoping that by the time he leaves Gibraltar in August, he would have worked the required 6+60 for the RSGB award. The only problem is that he still requires ZB on 70MHz!

Gordon Smith GW6TEO (I071) reports that he worked ZB0W on June 2 via Sp-E but missed most of the auras because of work commitments. However, he did manage to catch the event on June 10, working **G18AYZ** (I064), **GW4HBK** (I081), **G4SEU** (I092) and **G8GXP** (I093).

At my QTH, the recent auras allowed s.s.b. contacts to be made with **GM6VXB** (I097) on May 14, **G18AYZ** and **G4WND** (I092) on June 9, **GM4CXP** and **GM4DIJ**, both in I085, on June 10, and **GW4SLZ** (I083) on June 11.

Alan Dimmick RS37241, located in Glasgow, regularly listens to the band. He uses an FR101 receiver with internal converter, a BF981 pre-amplifier and an HB9CV antenna. During the WAB contest on June 9 he heard signals from **G3UKV**, **G4ASR**, **G6HRC/P** and **GB8BN**, the expedition station located on the summit of Ben Nevis.

The 144MHz Band

Conditions during May and June were quite interesting with a variety of propagation modes, such as aurora, ionoscat, meteor scatter and tropo, which enabled many operators to work the DX.

But where was the Sp-E? It was most probable that the upsurge in geomagnetic activity, although producing exciting auras, was the mechanism that disrupted the required E-layer ionisation.

Having said that, it should be noted that stations in Holland and Germany did enjoy a few openings. On June 15

at 1930UTC, **PE1NMP** (J032) worked **EA5GTC** (IM98) and in the same opening **DL1GNM** (JN38) heard **CT1WW**. A few minutes later, between 1947-1949UTC, **DB4VQ** (JN39) heard **EA1EIL**, **EA4CTP** and **EB4DNA**. There was a good Russian opening on June 16 which allowed **DL8LAQ** (J043) to work, between 1824-1925UTC, twelve UA3 stations and hear five more. The next day also produced an opening, with **DB4VQ** working **LZ1KWF** (KN12) and **LZ2CM** (KN13) between 2148-2203UTC. The band was open between 1553-1634UTC on June 22, with **DL1GNM** hearing **EA4**, **EA7** and **ZB0W**. I wonder if anyone in the UK heard anything on the 144MHz band at these times? My propagation log shows a remarkable correlation between these events and what was happening in the UK on the 50MHz band.

Beacon And Repeaters

The **GB3LER** beacon on 144.965MHz presently uses a 10W transmitter into a 6-element Yagi, on a beam heading of 22°. This beacon was originally intended to indicate the presence of auroral type propagation, however it is located too far north for many auroral events. Recently, forms of Sp-E and ionospheric scatter propagation associated with auras have started to be used by radio amateurs. The **GB3LER** site, on the Shetland Islands, is an ideal location for research into both these propagation modes but requires a high power transmitter and a commercial grade antenna system. The RA have recently approved an application to allow the 144MHz beacon to use two 6-element Yagis, beaming at 45 and 135°, each fed with 100W. In addition, permission has also been granted to add two more beacons at **GB3LER**, one on 50.064MHz and the other on 432.965MHz. The 50MHz beacon, which will run 20W into each of two 3-element Yagis, will provide an interesting comparison to the results obtained from the 144MHz beacon. The 430MHz beacon will run 20W into a 12-element Yagi and will provide information on tropospheric propagation and may also show interesting effects during intense auroral events. Beacons such as these are only co-ordinated by the RSGB. They are **NOT** centrally funded and are usually set up and run on an entirely voluntary basis. Unfortunately, projects like these cannot rely on an organisation with local members, such as a repeater group, for funds. **Andy Steven GM4IPK** has procured all of the equipment for the beacons, and although some of it has been provided free of charge, a large proportion has had to be paid for at cost. Andy is quite disheartened by the response from radio amateurs to help with the funding but is determined that the beacon project will succeed. If you wish to contribute towards the **GB3LER** fund, you can contact Andy at 27 Dalsetter Wynd, Dunrossness, Shetland ZE9J9J

or telephone him on (0950) 60312.

What may be the worlds most northerly 50MHz beacon, **LA7SIX** in **JP99LO**, is now active on 50.050MHz. Yes, I know it clashes with **GB3NHQ**! Examples such as this show the need for other societies in IARU to adhere to the standing principal of frequency co-ordination and band planning.

Mike Corbin GUBIRF is now running a personal beacon on 2320.071MHz. Running 0.5W, this beamed transmission can be turned towards the receiving stations direction on request.

DXpedition Update

Further information regarding the scientific expedition to Greenland has been obtained from REF, the French amateur radio society. It's been cancelled! However all is not lost, as **OZ1DJJ** will be active on 50MHz from various squares in Greenland during August and September. Using the call sign **DX3LX**, he will operate from **HP15** between August 21-September 3 and from **GP52** between September 17-26. He will be running 50W into a 5-element Yagi whilst in **HP15**, but only a dipole from the other location.

By the time you read this, the joint Estonian/Swedish expedition, **ES0SM**, to Saaremaa Island (**KO08XL**) will be under way. They intend to start the 24 hour per day operation on August 8 and expect to leave the island on the 18th. The main emphasis will be via meteor scatter on 144.177MHz, transmitting during the first two and a half minute period. A non m.s. operation is planned every day between 1900-2000UTC on 144.177MHz calling CQ in c.w. or s.s.b. In the case of good tropo, aurora or other types of propagation, the meteor scatter operation will be stopped. The equipment will consist of a 3X150 amplifier, 15-element Cue-Dee Yagi and 1dB noise figure mast-head l.n.a. A second station, using a solid state amplifier and 9-element Yagi, and the same call sign, **ES0SM**, may possibly be used simultaneously during the peak of the shower. A 430MHz station, consisting of a solid state amplifier and 21-element **F9FT** Yagi will be available during good tropo or auroral conditions. Schedules can be made by contacting them on 14.345MHz at 1400UTC or 3.640MHz at 1700UTC. If you make a contact, send your QSL card via Lasse Melin **SMOKAK**, Platavagen 18, S-19150 Sollentuna, Sweden. A previous information release however, said that cards should be sent to **ES2WX**, Box 13, Viimsi, 203 006 USSR.

Another expedition that is already active is the trip by the Five Bells group, **G4DHF**, **G4ODA**, **G4PIQ** and **G8JJC**, to the Faroe Islands. The group are well known for their previous expeditions, particularly the excellent trip to Iceland in 1990. This years expedition, from **IP61**, commenced on August 4 and is scheduled to finish on August 15. They

plan to operate via all propagation modes, including e.m.e. as appropriate, on 50.125MHz, 144.028MHz, 144.215MHz, 432.028MHz and 432.215MHz. The equipment for 50MHz will run 20W into a 4-element Yagi. On 144MHz, they will use a 3CX800 p.a. and a group of four 16-element Yagis. On 430MHz, a similar set-up consisting of a 3CX800 p.a. into an array of four 21-element Yagis will be used.

Between August 10-25, Clive O'Hennessey **GW4VVX** will be active on 144MHz from **Laigr** (I078) using the call sign **GB2XS**.

During August, Philip Lancaster **G0ISW** will be on holiday in the Paphos area of Cyprus and is hopeful that he can obtain permission to operate on the 50MHz band. He will be using an Icom **IC505** and Yaesu **FT767**, feeding a variety of antennas. If Philip does get a permit, it is unlikely that anyone will hear him in the UK, as August is not normally one of those months that you can expect to work into Cyprus via multi-hop sporadic-E.

QRZ Contest!

The Swedish Six Metre Group are holding a meteor scatter contest on August 11-12 between 2200-0400UTC. Only m.s. contacts over distances greater than 500km will count and all QSOs must be made within the band 50.150-50.300MHz. Strangely, these band limits do not include the recognised IARU s.s.b. meteor scatter calling frequency on 50.350MHz! Further details of this contest were given in last months column.

The RSGB 430MHz fixed station contest will be held on August 25 between 1600-2000UTC. It has sections for both single and multi-operators.

The first in a series of 144MHz c.w. cumulatives will commence on September 4 between 2030-2300 local time. The other dates are September 20, October 7, October 23 and November 8. Only fixed QTH, single operator stations are allowed to compete.

An IARU co-ordinated 144MHz contest takes place during the weekend of September 7-8. Starting at 1400UTC, it lasts for 24 hours, giving plenty of time to wrinkle out those rare squares.

The ARRL are holding their v.h.f. QSO Party on September 14-16. You never know - 50MHz might be open! If it isn't, you can always listen on 144MHz for the WAB 144MHz QRO contest being held between 0900-1700UTC on September 15. Stations exchange RST, serial number, WAB area and county.

Cumulative microwave contests, for all bands between 3.4GHz and 24GHz, will be held between 0900-2100UTC on August 18, September 15 and October 20.

Scandinavian activity contests will be held on the following dates, 50MHz activity on August 27, 144MHz on September 3, 430MHz on August 13 and

Back-Scatter

September 10 and Microwaves on August 20. All sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few

days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates etc are also required. These can all be returned if necessary.

144MHz QRB Table

Top distances (kms)		
Tropo	3160	GM4YXI
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR



Fig. 3: The OZ7UHF club shack.

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

Israel Radio has won a temporary reprieve from major reductions in its operation. The station was due to have its output curbed by well over half on July 1, but the authorities decided to postpone a decision on Israel's external service for two months, whilst an investigation into its role and reach is carried out. There were sighs of relief all around the station from staff who feared for their jobs.

Radio Sofia in Bulgaria has introduced a new schedule which reduces its output by around 50 hours, and English is one of the languages with less hours. Details of the new schedule are in the Europe news section.

Meanwhile, Radio Exterior de Espana launched a 24-hour-a-day Spanish language World Service on July 1. This new service is carried not only on short wave but also on satellite for listeners in Latin America.

Radio France International plans to start using spare capacity on Hungarian short wave transmitters, to improve reception for listeners in Africa. This has been possible as a result of Radio Budapest's cuts at the end of June. The agreement was due to be concluded with the Hungarian authorities in early July.

A report on Radio Japan's *DX Corner* programme suggests that the short wave service of Radio Kuwait will be back on the air within the next eight months, with full operation two years later. There are no specific details on whether the English service will come back on the air when short wave broadcasts first resume.

Italian Radio, RAI, seems to be in rather a poor state of health at present. A report in the station's magazine says that RAI's external service cannot be heard at all well in many parts of the world and that a plan to re-equip the shortwave transmitting station at Prato Smeraldo, where much of the equip-

ment is now obsolete, was suspended because of lack of funds. The new head of the overseas service plans a reorganisation, which will result in a rationalisation of the 26 languages which RAI transmits now, together with the formulation of a new strategy. This will concentrate on new geographic areas of political and commercial interest such as China and Japan.

If you are in the market for a new short wave receiver, don't rush out to your favourite dealer just yet! There is

news from Sony that the replacement for the ICF-2001D is en route. Known as the ICF-SW 77, the new receiver will offer all the same facilities as the 2001D together with a whole lot of new ones. These include the ability to tap in a station name and page through all the frequencies for that broadcaster (many of which will have been pre-programmed in the factory), saving the need to memorise either tens of frequencies or carry a copy of *PW* round. There are 160 different memory chan-

nels and it is possible to overwrite any of the memories which have been pre-programmed. Stereo sound is available through headphones for f.m. broadcasts. Switchable u.s.b./l.s.b. is provided and the synchronous detector remains in the set. I'm told that the new SW 77 will be on sale in the UK during September, with a smaller version, the SW 55 with many of the same facilities, available in the late autumn.

Panasonic also has a new receiver, to be launched at around the same time as Sony's. The RF-B45 replaces the earlier RF-B40 and includes s.s.b. The design of the whole set is more attractive with a convex keypad area.

More comprehensive details of both the Sony and Panasonic will appear in the coming months in *Short Wave Magazine*.

Europe All times GMT (=UTC)

Radio Sofia's current English schedule:

0300-0315 on 17.825, 15.16 and 11.72MHz

1730-1900 on 17.825, 17.78, 15.33, 11.765, 11.72 and 11.66MHz

1945-2030 on 17.825, 17.78 and 11.765MHz

2145-2400 on 17.825, 15.37, 15.33, 15.11, 11.71 and 11.66MHz

Roy Merrill reports that the 1700 broadcast offers reasonable reception on 11.66 only, although 11.72 improves after 1730.

Iceland now transmits news in English, heard only Monday to Friday at 0730 for fifteen minutes. The frequencies are 9.265, 6.10 and 3.295MHz.

The Italian Radio Relay Service which carries programmes in various languages, including some from United Nations Radio, operates on 9.815MHz Monday to Friday 0700-0900, Monday



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Radio Portugal can be heard with English Mondays to Fridays only:

0230-0300 on 11.765, 9.765, 9.705 and 9.60MHz (Tue to Sat GMT)
1600-1630 on 15.425MHz
1900-1930 on 11.74MHz

From the Soviet Union comes news of a new station operating in Vilnius, Lithuania. Radio Centras is a commercial station which can be heard each Saturday on short wave on 9.71MHz at 0600-0700. Broadcasts are in English and Esperanto and reports can be addressed to Box 1792, Vilnius, Lithuania. Enclose two international reply coupons when writing.

Radio Vilnius with English at 2300 on 11.79 offers clear reception at present.

Roy Merrill says that Radio Kiev is regularly heard in English at 2100 on 9.865 for an hour, in parallel with cluttered 5.96MHz. The station can also be heard in Ukrainian at 1900 on 9.60, following on from a German transmission of Radio Minsk which starts at 1800.

Another new commercial station that can be heard on short wave from the Soviet Union, is Radio Vedo from Volgograd. It is heard in Russian at 1600 on 13.71MHz.

Radio Yugoslavia is probably a station worth keeping an eye on as the country slides towards civil war. English from Belgrade is at:

0000-0045 on 11.735 and 9.62MHz
1200-1230 on 21.60, 17.74 and 17.725MHz
1830-1900 on 15.165 and 6.165MHz
2100-2145 on 11.735 and 5.96MHz

Middle East and Africa

Abu Dhabi in English is on the air at 2200 until 2400 on 13.605MHz with Roy Merrill reporting SIO of 544 or better, although Australia is in the background in Chinese.

ORT Benin Cotonou on 4.87MHz has been quite strongly heard lately, with English news at variable times between 2000 and 2020. CRTV Yaounde on 4.85MHz has been similarly rated recently, up to SIO 533 - with an English programme 2100-2130. There is often good musical entertainment from CRTV Douala on 4.795MHz, in French, from around 2130 up to SIO 343.

Radio Comoros has been rediscovered on short wave, with programmes in French, Arabic and local languages at 0900 on 7.26 changing to 3.33MHz at 1500.

The Voice of Ethiopia can be heard in English 1500-1600 on 9.56 and 7.165MHz.

From Equatorial Guinea comes Africa 2000, in Spanish, on 6.907MHz fading



ing in around 2000 closing at 2130. This station is funded by the Spanish Ministry of Co-operation to promote Spanish culture in Central Africa.

Roy Merrill notes Iraq on 15.605 and 17.95, weakly received from around 1300 until after 2315. The 15.605 channel is marred by a jammer.

The Maltese station, Voice of the Mediterranean, can be heard clearly in English at 0600 until 0700 usually with only light QSB. One of the more interesting programmes has been a series dealing with the history of Malta. The transmitter used is at the DW relay station on the island.

Radio Mogadishu is back on the air on short wave after an absence of almost a year, and was noted on 7.198MHz during the evening.

Roy Merrill says that he regularly hears Voice of Nigeria on 7.255 from around 1800 until 2100 or later. Initially in French, English from 1900-2030 and later a return to French. The channel is partly blocked for considerable periods by Deutsche Welle, with BBC English at 2030.

The FEBA Radio on the Seychelles has a transmission to South Asia on 11.865MHz at 1500 audible from sign-on and often improves but is blocked by VoA in Estonian via Woofferton. Extra frequencies are on the air Wednesday-Saturday on 15.33 and 9.59MHz.

National Unity Radio from Khar-toum operates 1500-1700 on 9.535, in a variety of languages including English and Arabic.

An English service has been launched by the Republic of Yemen Radio in Aden. It is heard daily at 1600 on 7.19 and 5.97MHz.

Asia and the Pacific

Radio Afghanistan has English via the USSR at 1800-1900 on 15.51MHz with SIO to 544. There are two poor parallels on 11.845 and 9.635MHz.

Radio Australia has Thai at 2300-2400 on 13.705 which offers very good reception in parallel with weak signals on 15.38MHz. English is carried on the 13MHz channel from 2100 until 2300.

The frequency of 13.745 in parallel with 9.86MHz can be very variable (just like New Zealand), but sometimes gives good reception to 2030 and later. Indonesian can be heard signing on at 2100 on 9.505MHz co-channel with Alma Ata.

Radio Bangladesh is on the air with just one channel at present, although two are still announced. Try for English at 1230 on 15.20. A further English broadcast is scheduled 1815-1900 with frequencies of 12.03 and 15.255MHz.

Radio Japan is heard with English at 1700 on 15.345 via Sri Lanka with variable signals up to SIO 333. At 1900 it is scheduled via Gabon on 7.14 and on 11.865, 11.85 and 9.64MHz. A further relay via Gabon is noted, with far better reception, at 2300 on 11.735MHz.

Radio New Zealand International on 13.785 has been very variable at 1800, ranging from inaudible to good until fading takes over at 1840. Sometimes it appears only briefly past 1900.

Radio Pakistan's World Service in English signs on at 1700 with an initial announcement in Urdu on 11.57MHz. The broadcast, which starts with a very doleful tune, lasts one hour.

SLBC Sri Lanka can be heard in Hindi and other local languages on 11.80 from around 1515, although RDP tends to block the channel. It has offered reasonably clear reception between 1645 with the close at 1733.

The All-Asia Service in English has been noted on 9.72 after 1700 until close at 1730.

Radio Alma Ata initially noted on 5.96MHz at 2130 under Radio Yugoslavia and Radio Kiev with all three in English! The station is also on 17.73, 9.505, 5.97, 5.96 and 5.035MHz. Reception is difficult and variable, with 5.035 and 5.97 providing best reception. The announcement, noted by Roy Merrill, is "The International Radio Service of Kazakhstan, Soviet Union" and "External Short Wave service of Radio Alma Ata". The announcement goes on to list wavelengths of 59.58, 48.9, 41.49 and 333.3 metres. The station invites listeners' comments and reports to: Radio Alma Ata, 175 Mira Street, Alma Ata, Kazakhstan 480013, USSR.

The Americas

Radio Havana Cuba has English at 2200 for an hour on 11.705 but suffers co-channel QRM from Sweden in Spanish and French throughout.

Radio Rumbos, Venezuela, has appeared very strongly on 9.66MHz after 2145 whilst Radio Nacional da Amazonas on 11.78 becomes very prominent after 2230 on some days.

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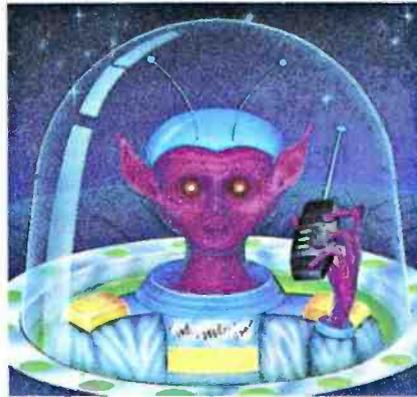
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