VHF SPECIAL ISSUE

Reviewed:
The Icom IC-A1E

Features:
Assembling Your VHF Station
The 10GHz Microwave Scene

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ISSUE 1039
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ON SALE OCTOBER 14

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As well as all the usual attractions, we'll have lots more going on for those less radio orientated so why not bring the whole family out for the day. They can indulge you for couple of hours and you can spend the rest of the day sightseeing in and around Matlock. We'll have some special concessionary tickets on the day for some of the local attractions.

Right! That's the carrot for the family — now we've got a few for you!

1. We'll be catering for every aspect of the radio hobby, with special demonstrations covering a huge range of equipment and accessories.
2. Packet radio techniques run by DANPAC, our local Packet group.
3. Talk-in on S21 and SU21 with G4LOW run by our local radio club.
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Check our workshop

Even the workshop will be open so there's no better time to meet the biggest and best team of engineers in the country and maybe discuss some of your more technical problems with them.

We'll also be showing off our new R&D department where you might just get a glimpse of Project N and for the first time, you'll be able to visit our new receiver production unit at Cromford in the original workshop of Arkwright's Mill.

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ICOM
IC-737 New, Affordable HF Transceiver with Plenty of Features

YT-28A 2 Metre Handheld with Extended Receive
FRG-100 Super, new, all mode receiver

ICOM

Practical Wireless, October 1993
The 'Newsdesk 93' section of PW is now, as usual at this time of year, carrying information on RAE courses. Many aspiring radio amateurs are on the lookout for a course, to take them through the winter and on to the May RAE. Unfortunately, some will find it difficult to locate a suitable course or examination centre.

Regular readers may remember a letter from Mr P. Hyde which was published in the May issue of PW. Mr Hyde, who lives in Taunton, highlighted a problem with the Novice examination. His letter mentioned the considerable distances that candidates had to travel.

In my reply, I said I would be contacting the Minister of Education. This seemed necessary because many of the further education colleges throughout the country, would be directly responsible to the Department of Education. This was coupled with the new 'commercial' outlook to be adopted by colleges.

My letter to the Department of Education pointed out that the RAE and NRAE have many hidden benefits. No one involved in the radio hobby has to be told how many times that an interest in radio has led to a career in one of the many branches of the technology!

As I've already mentioned, many colleges, schools and the network of fast growing 'community colleges' will still offer RAE courses and the examination itself next May. It's just that when compared to the number of centres on offer ten or more years ago, there's a significant decrease.

As I've already mentioned, many clubs are running their own courses, and some are even able to operate as examination centres for the NRAE. And, I think that in the long term, clubs will eventually be where the budding radio amateur will undertake their RAE course, and sit the exams themselves.

Some while ago, there was concern from certain sections of the amateur radio community when the Radio Society of Great Britain tried (and failed) to get the 'franchise' (if that's the correct word) to operate the NRAE. At the time, I wondered if the RSGB should have ever considered such an idea. But, I now realise that for amateur radio to go forward into the future, something must be done to make the necessary examinations more accessible.

The RSGB is definitely not above criticism. The Society makes mistakes, and (like those of magazine editors!), their mistakes are there for all to see. However, the RSGB really does seem to be trying its best to move with the times, and the newly announced Nationwide Public Relations Network has to be an excellent start.

I should say at this point that I am biased. This is because I was a guest on the working party at the University of Warwick last year that proposed the idea in the first place. But, top marks to the RSGB for considering the idea, and I feel sure that with top class professional PR support from headquarters, the RSGB members in the field can do nothing but good for the image of amateur radio to the public and the media.

However, this 'Keylines' is not about public relations it's about becoming a radio amateur. Despite my digression, there is a connection, for I feel that the RSGB members nationwide have proved that they can run training courses. They are already doing so and many are also running exam centres.

Although I do hear some complaints, the RSGB have proved that the hobby can administer and operate the Morse tests. And, I can assure all readers that I'm certain that the radio amateurs could oversee and operate the issue of the licence far more efficiently than the present arm of the Post Office, Subscriptions Services Ltd., do!

So, why shouldn't the RAE be administered by the hobbyists themselves? Potential Doctors are examined by Doctors, and proven pilots test the abilities of others to fly aircraft safely. Why shouldn't we?

The 'Club News' section of PW is full of information from the network of local clubs from all over the country. Personally, I can't see any reason why the RAE could not be overseen by the hobby itself. At one stroke, we could rid the hobby of a growing problem...where to sit the RAE!

Finally, this issue of PW is my last chance to remind readers to send in their nominations for the Practical Wireless 'Elmer' Award. The award, introduced during the PW Jubilee year, was first presented to Dr. Ken Smith G3JIX for his many years' work with young people.

It gave me much pleasure to present the award to Ken Smith G3JIX. The PW team will be sifting through and reading this year's nominations in late September, with the presentation taking place at the 1993 Leicester Show.

So, please send in your nomination soon and if you're not sure how to go about nominating your 'Elmer', please call us at the office and we'll send a photocopy of the relevant 'Keylines'. Don't let years of unselfish help from your 'Elmer' pass un-noticed. Tell us now!

73 DE

Rob Mannon G3XFD

SPECIAL PRIZE COMPETITION CORNER

First Prize SC-2000 HF Mobile Transceiver Worth Over £1800
Second Prize Jones Morse Key worth £65
Third Prize Two Year Subscription To Practical Wireless

You could win the dedicated SC-2000 h.f. mobile transceiver made by SGC in the USA, which is to be reviewed in the November issue of PW. To enter the competition you will have to collect all three of the corner flashes from the competition pages of the October, November and December issues of Practical Wireless and place them on the special competition coupon to be published in December. Then you will have to answer the six questions on the transceiver which will be taken directly from the review and other information published in the magazine. The six questions on the transceiver will be published two at a time. Make a note of your answers, as they will have to be entered on the coupon (photocopies of the coupon itself will be acceptable) to be published in December's issue. Finally, you will have to complete a tie breaker sentence.

Entries received without the three original corner flashes and the final entry coupon will be disqualified. The Editor's decision will be final and no correspondence will be entered into. All winners will be notified by post.

The October Questions (Enter Your Answers On The Special Coupon To Be Published In The December Issue Of Practical Wireless.)

1: What part of the spectrum does the SC-2000 operate VHF, SHF or HF?

2: Where is the SG-2000 transceiver made? South America, the USA or the Far East?
**STAR LETTER**

**QRP Operation**

**Dear Sir**,  
I was very interested in the July 1993 issue of Practical Wireless which featured QRP Operation. It was nice to see almost a whole magazine devoted to the skills of using low power on the amateur bands. However, I was a little disappointed that no mention was made of using QRP on the v.h.f., u.h.f. or microwave bands. Especially as the PW 144MHz QRP Contest was also held during June, when the magazine was available!  
This, I feel, increases the perception that to use QRP you have to be on h.f. As I’m sure you will agree, QRP can be used successfully on the higher bands.  
On many microwave bands many DX contacts have been made using milliwatts. I have even been able to work fairly long distances on 144MHz using 3W and a 9-element Yagi, via Aurora.  
On 50MHz, many stations have to (should?) use under 10W to keep within the permitted e.r.p. levels for the band. And I have recently worked a VE, using c.w. and 5W, who answered my Q call!  
I feel that many newcomers to the hobby are put off v.h.f./u.h.f. by the idea that to do any good you have to run over 100W to multiple beam arrays. It’s nice for those who can use them, but it puts off the new licensee.  
Also, I have noticed a tendency to ‘have the wick wound up’ even for local contacts which, could be completed using lower powers quite easily.  
Finally, if you do repeat the idea of a special magazine for QRP (or even one on v.h.f. and above?) I’m sure that John GBSEQ the v.h.f. Manager of the G-QRP Club could either provide information on the subject or point you in the direction of someone who could. I would even have a go myself if asked!  
Thank you for an interesting magazine, and I think you’re ever likely to cause interference (or EMC) problems!  
**Alex McEwan GM3WJF**

**Dear Sir**  
I was appalled to read the letter from Colin Kendrick G0STW in the July issue of PW. The idea of a bunch of morons playing bandal games such as bingo on the amateur bands is certainly not going to enhance our hobby.  
Imagine the chaos if such activity was extended to the 7 or 14MHz bands. Haven’t we got enough rubbish to contend with already, with contests almost every weekend without this?  
Use the bands by all means, but please, use them for what they were intended. If the Harwich groups cannot find anything better to do than play silly games on the amateur bands, then they should ‘pull the big switch’ and go down to the local bingo hall where they obviously belong!  
**Alex McEwen GM3WJF**

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This, I feel, increases the perception that to use QRP you have to be on h.f. As I’m sure you will agree, QRP can be used successfully on the higher bands.  
On many microwave bands many DX contacts have been made using milliwatts. I have even been able to work fairly long distances on 144MHz using 3W and a 9-element Yagi, via Aurora.  
On 50MHz, many stations have to (should?) use under 10W to keep within the permitted e.r.p. levels for the band. And I have recently worked a VE, using c.w. and 5W, who answered my Q call!  
I feel that many newcomers to the hobby are put off v.h.f./u.h.f. by the idea that to do any good you have to run over 100W to multiple beam arrays. It’s nice for those who can use them, but it puts off the new licensee.  
Also, I have noticed a tendency to ‘have the wick wound up’ even for local contacts which, could be completed using lower powers quite easily.  
Finally, if you do repeat the idea of a special magazine for QRP (or even one on v.h.f. and above?) I’m sure that John GBSEQ the v.h.f. Manager of the G-QRP Club could either provide information on the subject or point you in the direction of someone who could. I would even have a go myself if asked!  
Thank you for an interesting magazine, and I think you’re ever likely to cause interference (or EMC) problems!  
**Alex McEwen GM3WJF**

**Budding Linguists**

**Dear Sir**  
The basic QSOs as printed in PW, may be quite useful to many budding linguists amongst the Amateur Radio Fraternity, Rob, but I would like to point out (with a certain amount of tongue in cheek) that certain key phrases are missing!  
Some fine examples would be:  
* "Please QSY you are too close to my frequency, and ruining my (DX) QSO!"*  
Or another might be:  
* "Thanks OM, you have just taken 10 minutes to tune-up on top of my contact with .... Do you actually have a receiver switched on?"*  
Another good one:  
* "You are running so much power that you are obliterating the band for... kHz (and your signals are very distorted)". Perhaps you would like to add these to the next article!  
There must be quite a few more, too rude to print! Like, "Where did you learn to operate like that? In a piggybay?"  
* "The bands are for all of us to SHARE, not for you to hog!"*  
* "You may think that you own the band, but, I’ve paid my licence fee too!"*  
* "Did you really take an examination to get your licence?"*  
* "Playing Games"*  
J. King G4EMC, Kent  

**Editor’s reply:** Looks as if you have an idea for an alternative phrase book G4EMC. Mind you, with an appropriate call sign like yours, I don’t think you’re ever likely to cause interference (or EMC) problems!
The Day The UK Repeater Network Should Have Closed Down

Dear Sir

On 1st of August 1993, all repeaters in the UK should have closed down!

A letter from the Radiocommunications Agency in March of this year, was sent to all repeater keepers and stated that 'on the 31 March 1993 the approval you have for operating the above mentioned station (GB3SD) will expire, along with the licence for all amateur repeaters granted to the Radio Society of Great Britain which provided you with a franchise'.

The letter goes on to say that in due course a 'notice of variation' will be issued to repeater keepers and that 'in the meantime, you should take this letter as the Secretary of State's approval to continue operating your repeater station from the 1 April 1993 until such time as you are supplied with an appropriate Notice of Variation, or 1 August 1993, whichever is the earlier'.

When by the 26 July 1993 no NOV had arrived, I decided it was time to make some enquiries as to what was going on. I wrote to the RA asking if I should close down the repeater on the 1st August and then decided to contact other local repeater keepers.

No one had heard anything! RSGB Headquarters did not know anything but said that they were having a meeting with the RA and I should phone back later. (When I did at 4.45pm they were still having the meeting). I tried to ring the RA, but no one was available!

With only two working days before close down left, I decided to call my friends at Practical Wireless and Short Wave Magazine. Rob Mannion G3XFD, and Dick Ganderton G8VFH, Editor of Short Wave Magazine, could not have been more helpful.

Within the hour, they had rung me back to say that Dick had made contact with the RA. They had been assured that a letter, extending the approval to operate from the 1st August would be in the post to all repeater keepers within a few days.

An 'on air' meeting of SW repeater keepers that evening decided that we would not switch off our repeaters as long as the letter turned up the following week, even though we would be operating without written authority!

On the morning of Saturday the 31st a letter arrived by first class post from the RA. It was a reply to my letter asking what to do. It said 'the agency is in the final stages of negotiating an agreement with the RSGB for issuing Notices of Variation' and that I would receive a further letter on the subject soon. My question was ignored!

The new repeater licensing system will vary the repeater keepers own licence and make that person responsible for all aspects of its use and operation. The reason given by the RSGB for this change is that a small minority of repeater groups have failed to comply with the proper procedures and that only the RA has the power to enforce the regulations.

A similar NOV system is already in use for some packet radio nodes and BBSs. However, since that procedure is not yet in place, the so-called 'repeater keepers' have not accepted any responsibility beyond that of being the 'contact person' for the repeater on behalf of the Repeater Group.

The RA has a closedown procedure available should it wish to close down one repeater. And in the absence of any guidance from either the RA or the RSGB as to what our group should do, the South Dorset Repeater Group decided to continue to operate GB3SD, at least for the time being.

On the 3rd August another letter arrived from the RA. This was the promised one and gives permission to operate from the 1st August until the 30th November 1993. It says 'you should take this letter as notice from the Secretary of State that your licence is promised one and gives permission to operate from the 1st August until the 30th November 1993. It says 'you should take this letter as notice from the Secretary of State that your licence is

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Cordless Telephone Conversations

Dear Sir

I read with interest your 'Keylines' in the May issue, reference reception of cordless telephone conversations. About four weeks ago I had the second similar occurrence, but in the 3.5MHz band. This was at approximately 3.58MHz at an S-meter reading of 59 plus 40dB.

Having listened only briefly on the second occasion, I was able to find out whom the user was. (I heard his name and looked in the phone book). It turned out that the user only lives a few doors away and I have met him once or twice in the past. As he uses a telephone a lot for business purposes and was discussing business, I thought that I would warn him to be very discreet on a cordless phone.

Apparently he had purchased the offending instrument from British Telecom and said he would be contacting them forthwith. I was thanked for my concern for lack of privacy and that he intended to use an ordinary wired instrument to ensure this.

I have on other occasions heard semi-distinct conversations, but this time both sides of the conversation were perfectly clear. I wonder how many business deals have gone sour due to a wrong belief that telephones are a secure means of communication.

J. Kenneth Downs G8CFI
Lancashire

Comment From Peter Kirby G0TWW

General Manager RSGB:
The RSGB has for some considerable time been in negotiations with the RA regarding the Repeater Network franchise. These negotiations are currently near completion.

The RSGB was fully aware of the requirements to keep all interested parties informed as the August 1 deadline approached. However, the Radiocommunications Agency informed the RSGB that it would be notifying all Repeater Keepers by letter extending the deadline.

It is unfortunate that this action was not taken by the 1 August.

Reasonable Earth

Dear Sir

Now, here's an idea, a recoverable earth. When out portable a reasonable earth is just as important as at the main station. The difficulty is how to plant it and be able to take it away again for use the next time.

My wife has just bought one of those whirly washing lines, as yet another one rusted away! This time though, I don't have to mix a cubic foot of concrete for the ground post. She also bought what she thinks is a soil spike. To you and me though it has 'earth spike' stamped all over it. The difference is that it is recoverable.

Just above where the tube narrows to become the spike a metal pin goes across. This doubles as a stop for the washing line post (or portable mast) and as something for the supplied extractor tool to be hooked round.

This is made by a company called Beldray with whom I have no connection. It cost all of £2.99 and was bought from Wilkinson's (and I've no connection with them either!).

Anthony Jaques G3PTD
Manchester

Editor's reply: A good idea Anthony. We thought it best to show you just what the product is, and the photograph fits the bill. Any other useful suggestions readers?
**Power Update**

Livingston Hire have recently produced a full colour brochure to outline its extensive capabilities in power equipment rental.

The increasing demand for good quality electrical power and the need for better energy management have made power monitoring essential for many organisations.

Livingston Hire's brochure outlines the key factors that affect the quality of power and draws attention to the problems associated with cost effective indution of state-of-the-art power monitoring equipment. Issues such as equipment utilisation, obsolescence and depreciation are discussed within the brochure. There is also an equipment inventory which represents manufacturers such as Dranetz and BMI. For more information contact Graham Harris, Livingston Hire Limited, Livingston House, Queens Road, Teddington, Middlesex TW11 0LR. Tel: 081-943 5151.

**Constructors Club**

Tim Walford G3PCJ of Walford Electronics, has set up The Construction Club aimed at encouraging the home building of amateur radio equipment.

The Construction Club is open to all for a yearly subscription fee of £5. For this members, will receive a quarterly newsletter, *Hot Iron* which contains articles on circuits for amateur radio equipment, construction methods and other snippets relating to home-brew construction. There will also be a Question Corner within *Hot Iron* to answer members, queries and ideas from other constructors are especially welcome.

In addition to *Hot Iron* members will be able to purchase kits from Walford Electronics with the option of spreading the cost by paying in stages. This facility will enable members to pay for each stage of a project as they reach it. Projects such as the PW 'Tiny Tim' simple superhet 3.5MHz s.s.b. transceiver will be particularly suitable for this type of payment method. Any constructors interested in becoming a member of The Constructors Club should send a self addressed envelope to Tim Walford G3PCJ, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ.

**RAE Courses**

**Basildon College RAE course**

- Starting on September 20, the tutor for this course will be Sam G4LJL. For more details contact Basildon College on (0268) 532015, or Sam G4LJL on (0268) 520647.

- **Brentford School for Girls, Clifden Road, Brentford TW8 OPG. Tel: 081-847 8281,** will be running an RAE course starting on September 29 at 7pm and a Morse course commencing on September 27 at 7pm. For enrolment dates contact Brentford College or Frank Coles.

- **G3PCJ on 081-977 5343.**

- **Medway Adult Education Centre, Rochester, Kent commencing on September 27** will be offering a daytime RAE course, 9.30am.

- **12.30pm RAE & Introduction To CW & 1-2pm** Maths For The RAE. Enrol separately for either part. Maths will concentrate on students with little or no maths background to enable them to manipulate the formulae and basic calculations. Course tutor, Ray Petri G90AT. For more information and enrolment details telephone (0634) 845359.

- **Newstead Wood Girls School, Avebury Road, Orpington, Kent** will be running an RAE class on Thursday evenings 7.30-9.30pm. Starting on September 23 it will lead to the May 1994 examination. To enrol for this course contact Bromley Adult Education, Church Lane, Prince's Plain, Bromley, Kent. Tel: 081-462 5185. For more details on the course contact the tutor Alan Betts G0HIQ on (0689) 831123.

- **Northampton Radio Club, Hervey Street, Northampton** are running an RAE course again this year, commencing mid-September. The tutor will be Dave GDMJK. Further details are available from Dave on (0604) 711647.

- **Rede School, Strood, Nr. Rochester, Kent** will be running an RAE course on Tuesday evenings 7-9pm starting on September 28. For enrolment details telephone (0634) 845359.

**Yupiteru MVT-7100 Owners**

Waters & Stanton Electronics are anxious to contact owners of Yupiteru MVT-7100.

- Receivers bearing serial numbers in the following ranges 30201181 to 30201190 and 30201231 to 30201240.

- There may be a problem with these receivers. If anyone owns a Yupiteru MVT-7100 bearing a serial number in the above ranges they please contact Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 immediately so they can arrange a replacement if necessary.

**Ambassador Centurion PSU**

Diplomat Communication Systems Ltd. of Basingstoke have introduced the Ambassador Centurion PSU to their range. The Centurion enables 12V d.c. equipment to be used easily from a mains supply. It is designed to protect important installations against financial implications and the inconvenience of a mains failure.

- The Centurion will provide up to 20A of current and gives an un-interrupted no-break back-up of up to 12 ampere hours. The unit incorporates a switched-mode power supply (SMPS) which has a greater current handling capability and is lighter and cooler than traditional designs.

- Other features included are three colour coded i.e.d.s on the front panel to confirm operational status and a fan option that enables the p.s.u. to be used in confined or warm environments. There is also a 'battery low' warning feature provided by a piezo-electric speaker to protect the user during mains disconnection or failure. For more information on the Ambassador Centurion PSU contact Diplomat Communication Systems Limited, Unit 3, Summerlea Court, Herriard, Basingstoke, Hants RG25 2PN. Tel: (0256) 381656.
Mr P. Ward of Haywards Heath, Sussex has a collection of Practical Wireless magazines ranging from the early 1960s to 1982 that he unfortunately has to dispose of. Mr Ward would like a library, school or radio club to have the magazines providing they can collect them. If you are interested in giving this collection a good home contact Mr Ward on 081-686 5041 Ext. 2582 during working hours.

The QTI Tape Magazine Association have recently moved from Lancaster to new premises. They can now be found at Towers Cottage, Towers Lane, Cockermouth, Cumbria CA13 9ED. Tel: (0900) 823044.

Visually handicapped radio amateurs, through QTI, are able to enjoy a selection of technical articles by listening to audio cassettes. All of the articles are selected from current radio magazines such as, Practical Wireless. This service is available to all handicapped persons for an annual subscription fee of £5.

The association is a registered charity and is always in need of funds to cover running costs, as well as extra volunteers to help run the service.

For further details or if you can help the association in any way please contact Harry Longley at the address above.

VHF Communications

VHF Communications is a quarterly amateur radio magazine which caters for v.h.f./u.h.f. and microwave technology and is the international version of the German Publication UKW-Berichte.

The summer edition includes articles on A Simple Panorama Add-on For Weather Satellite Receivers, A Simple dB-Linear S-Meter For Microwave Applications and Output Wiring Of GaAsFET Amplifiers to name a few.

VHF Communications is available on subscription for £13 or the national equivalent from KM Publications, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF. Individual copies and back issues are available at 0.75 each.

Send in your news, photographs and product information to Donna Vincent at the editorial offices in Broadstone.
Basic Packet Radio
Joe Kasser W3/G3ZCZ

Packet radio allows amateurs to use computers to carry messages across the road, or around the world. Even Novice licencees, using packet radio, can send messages world-wide, without going outside their meagre power limitations within the 430MHz band and Basic Packet Radio by Joe Kasser W3/G3ZCZ can help unveil the mysteries.

One of the most popular programs for controlling a packet radio station is Lan-link, now in version 2.1. It’s a program, also written by Joe Kasser, that runs on an IBM PC/AT or compatible computer. Lan-Link can make light work of the day-to-day running of a packet station. If you don’t happen to have the program, there’s even a free disk available, with the shareware version of Lan-Link. In many ways this is the book of the program.

In having had the hard work taken out of using packet radio, many users lose sight of the overall network and its capabilities. This book sets out to correct this deficiency.

In almost half of this well laid out book, the reader is lead from ‘what is packet radio’, through local area networks (LANs) to using a bulletin board (message holding and forwarding systems). After this there follows an explanation of packet clusters and their advantages. Packet radio is dealt with from the bottom up, before launching into what might be the definitive handbook for Lan-Link.

The final 200 or so pages are a definitive handbook of the Lan-Link program. Explanations have clear examples and, where useful, screen shots of the screen display at the time.

The book contains insight for the new packeteer, and enough technical detail to satisfy the long time user.

G1TEX

Basic Packet Radio is available from the PW Book Service for £19.95 plus £1 P&P (UK), £1.75 P&P (overseas).

WHAT A GOOD IDEA!

Covered Plug

The ubiquitous PL259 plug and its companion SO239 socket are to be found in almost all h.f. equipment. Many h.f. and v.h.f. antennas come with these connections fitted.

These connectors are fine for indoor or short term outdoor use, but they suffer if left outside in all weathers. They are not particularly weather resistant. My suggestion to overcome this problem involves shrouding the connection with a plastics 35mm film canister.

The diagram below illustrates the method. Bore a hole in the base of the canister, just big enough to fit the coaxial cable through. Slide the bottom section down the coaxial cable and fit the plug onto the cable.

Drill another hole in the lid of the canister, to fit the SO239 socket through. Secure the socket and lid as shown in the diagram. After the plug has been screwed home the canister can be pushed home to give a weather proof seal.

Ken Groves G3KIP
Kent

Quick change PL259

Sometimes, when setting up antenna systems and filters, the overall lengths of coaxial cables need to be changed. Normally, this would mean unsoldering the centre connector, shortening and reshaping the end of the coaxial cable. This could be tedious if many changes need to be made.

My suggestion is shown below. Take a length of 1.5mm diameter hard brazing rod and sharpen it to a point about 15mm long. Solder it into the centre connector of the ‘screw-in’ PL259 plug as shown.

To prepare the cable, cut about 15mm of the outer insulation away and screw the cable tightly into the plug. For a more solid join, the braid may be soldered to improve the long-term contact capability. This type of connection should make a good clean join, time after time.

Doug Middleton G0CZG
Dorset
Tell Me That You Want

...the best price.
...the largest selection of new and used equipment to choose from.
...the best part exchange deal.
...the easiest way of paying for it, and the cheapest.

...a full guarantee (see last month's ad)
...to make me sweat and left wondering, how did he get a deal like that?

Come and visit the Lynch Mob at the Granby Halls in Leicester on the 29th & 30th in October and make yourself happy. I'm not going to give all the secrets away before, so I guess you'll have to visit. In the mean time here's a selection of carrots, sorry, wirelesses.

**BARGAIN OFFERS AT LEICESTER**

| Brand new boxed Icom IC-721E dual band handie, list £369, Lynchy's price £399. | Brand new boxed Icom IC-71E miniaturized 2m handie, list £269, Lynchy's price £399. |
| Brand new boxed Icom IC-7200A, the ultimate all-band scanner, list £949, Lynchy's price £399. |

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Practical Wireless, October 1993
Avon
Thornbury & DARC. Wednesdays, 8pm. United Reform Church, Chapel Street, Thornbury. September 22 - Rig Night. A. Hellen GWTV on (0454) 415215.

Bedfordshire
Shefford & DARS. Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. September 8 - Mobile OF Hunt. 23rd - Members Activity Night. 30th - Trunked Mobile Radio by Vinc GB8EZ. October 7 - HF Noise Bridge by Hugh GOLV, 14th - Cooperring. Paul G1G5N on (0462) 706510.

Berkshire

Buckinghamshire

Sussex

Essex

Hampshire
Basingstoke ARS. 1st Mondays, 7.30pm. Forest Ring Community Centre, Woodkirk Way, Basingstoke. October 4 - AGM. Tony Rose GW0FQM on (0248) 506983.

Greater London
Aylesbury & MARS. 2nd Mondays, 8pm. The Three Counties ARC. Every other Tuesday, 8pm. Lisburne Lane, Offerton, Stockport, 7.45pm. Room 14, Dialstone Centre, Stockport RS. 2nd & 4th Wednesdays, 7.30pm. 16 Grand Hotel, 3rd (informal) & 3rd Saturdays, 7.30pm. The Cemetery Hotel, 470 Bury Road, Rochdale, Lancs. September 20 - Construction Competition. Brian on 061 653 8316 or Dave (0706) 32502.

Gwynedd
Dragon ARC. 1st & 3rd Mondays, 7.30pm. Four Cresses Hotel, Main Bridge. September 18/19 - GB2NCT Nations On The Air, 20th - Discussion Evening, 23rd/25th - Special Event Station. October 4 - AGM. Tony Rose GW0FQM on (0248) 506983.

Hertfordshire
Hertford Arc. Thursdays, 8pm. The Three Counties ARC. 1st & 3rd Mondays, 8pm. Community Centre, Victoria Street, Braintree. September 20 - Aspects of VHF/UHF SHF. Operating by Ela GH8KH, October 4 - Widgets 2. J. F. Burton GI4WQQ on GI4WQQ, 8D Coldnailhurst Avenue, Braintree, Essex CM7 5PY.


Norfolk

Norfolk ARC. Wednesdays, 7.30pm. University Arts, South Park Avenue, Norwich. September - 12 Club Station, Town & County Show, 15th Refrigeration by Chris G4LRL, 22nd - On The Air Night, 28th - Pre-Historic Elephant Of West Runton by Dr. Tony Stewart. October 6 - Construction Competition. Dale Simkin on (0603) 37393.

Northants

Nottinghamshire
Mansfield ARC. 2nd Mondays, 7.30pm. Polish Catholic Club, off Windmill Lane, Mansfield. September - 21st - Use Of Repeater Network by Paul Whiting G4YQC on (0203) 311468.

Nottingham ARS. Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. September - 9th - 50MHz ATU Construction by G1WSD & The Current Repeater Situation by G2SP. October 1 - Foxhunt Night/Activity, 30th - Construction/Activity, 30th - Monolithic Microwave Integrated Circuits by Paul Beasall. October 7 - Forum, 14th - Introduction To Satellite Communication by G4UO. Simon GOIEG on (0602) 501733.

South Notts ARC. Highbury Community Centre, Farndon Road, Clifton Estate, Nottingham, or Fairham Community College, Farndon Road, Clifton Estate. September 10 - Talk-on S2/S2 Supported Novice Amateur Radio & Morse Courses by G4RHI, 2E1KB & G2LVS, 14th - RAE & Morse Courses start, 18th - NARA & A Class Morse Courses start, 17th - Construction, 24th - Talk-on in S22 On Air HF & VHF, October 1 - Talk-in on S2/Z/WAB Award Scheme by Kate Wragg G0FZD, 8th - Construction.

Nottingham NG11 9DE.

Scotland
Banff & DARC. 1st & 3rd Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB95 1DL. September 24 - Radio Aurora's by Martin GM6VX. October 1 - Mark G8VHL on (0362) 80261.

Dundee ARS. Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. September 14 - Lecture by MEGS, 21st - Construction Evening. George Miller GM4FSL, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

Paisley ARC. Alternate Wednesdays, 7.30pm. YMCA, 5 New Street, Paisley.

September 29 - The Codeless Licence. Stewart GMT1DG on (0569) 351919.

Somerset
Yeovil ARS. Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. September 9 - 14AMHz DF Event, 18th - A Power Supply Project by G3PJC, 22nd - WW1 Clandestine Radio by G3COR, 30th - Natter Night & Committee Meeting, October 7 - Curious QSO Cards by G4JLJ. 14th Club Quiz with South Dorset Club. Cedric White G4JBL on (0258) 73845.

South Yorkshire
Sheffield ARS. Mondays. 7pm. Firth Park Pavilion, Firth Park Road, Sheffield. September 13 - Construction Night & Operation Of HF Equipment, 14th - Ten Pins, 20th - Organisation Of JOTA Station For October, 27th - Presentation Evening, 28th - Swimming at Ponds

Suffolk
Felixstowe & DARS. September 13 - Amateur Test Equipment by Alan Mella G3NYK, 27th - Ten Pin Bowling, October 11 - The Radio Investigation Service by a member of Suffolk RS. Paul Whiting G4YQC on (0394) 273507.

Leiston ARS. 1st Tuesdays, 8pm. seaside Visitors Centre, Seaside Power Station October 5 - The Use of Computers In Amateur Radio by Paul Whiting G4YQC. Peter Stevens G8J6Q on (0737) 842150.

Surrey
Horsham ARC. Guide Hall, Denne Road, Horsham, West Sussex, 8pm. October 7 - Surplus Equipment Sale. Peter Stevens G8J6Q on (0737) 842150.


The Kingston & DARS. 3rd Tuesdays. 8pm. Alfisteen, 3 Bernylleys Road, Surrey KT5 BR. September 15 - Cross Modulation & Filters by Peter Burton G3ZPB. Ray Fuller on 0193-396 1128.


Warwickshire
Coventry ARS. Fridays, 8pm. Baden Powell House, 121 St. Nicholas Street, Redford, Coventry. September 14 - On The Air Night/Morse Tuition, October 12th - Quiz Night/Morse Tuition. David G1DGR on (0203) 311460.

Mid-Warwickshire ARS. 2nd & 4th Tuesdays. September 14 - Visit to CWR, October 12 - Satellites & Amateur Radio by Brian Slater. Don Darkest GBRH1 on (0926) 244645.
Richard Ayley G6AKG tries out the newly introduced 144, 430 and 1296MHz transceiver from the Icom stables.

Hand-held transceivers have been shrinking over the last few years. Some of them have now shrunk to a size making them an impractical proposition for the less dexterous amongst us.

Fortunately, someone at Icom must have had a similar thought about size, as the A1E bucks the trend as far as physical dimensions are concerned.

The rig is reminiscent in size and weight to the first generation of dual-banders. It has an all-up weight of 585g and is approximately 139x50x6Ornm, excluding the three band helical antenna (supplied), which measures 170mm long.

The first time I saw the A1E I thought, what an ungainly looking rig. But its overweight appearance has some merits.

All the extra surface area has been put to good use, giving far greater access to the top panel controls. It also allows a three band display to be used, which all adds up to a very relaxed and un-cluttered look.

**Brave New Step**

I think Icom have taken a brave new step with this rig. It should be viewed as the first of its generation, as the first three band hand-held.

It's no mean feat putting three separate transceivers in one package. There are 144, 430 and 1296MHz rigs, sharing only the power pack, audio transducer and antenna!

The IC-A1E is easy on the eye, once you get used to its rather bulky appearance. Although, when it's handled, I got the feeling that its ergonomic design was somewhat of an afterthought, as it is far too thick to get a firm grip on.

The case is grey in colour and is made in two sections. The front is of high impact plastics and the back shell is in die-cast alloy doubling as a heat sink.

The top panel of the rig is well laid out consisting of a BNC antenna socket and external power/charging socket. There's also an external speaker/microphone socket with an additional second band audio output.

On the front half of the top panel are three separate concentric type controls, one for each band. Each inner control is a rotary click stop device.

The controls provide a means of selecting and altering virtually every user parameter. These include repeater offset, step sizes, battery save ratio, etc., on each transceiver. The exception is the audio gain, which is adjusted by a conventional potentiometer via the outer ring of each control.

**Selected Independently**

The squelch for each band is selected independently, from one of four preset levels via each band's rotary selector. This feature uses a dedicated function button making it very accessible.

Squelch settings are also memorised along with each frequency. Each of the transceiver's transmitter output power is selected by a similar route, as is the operating frequency and also the 26 memories per band. Frequency setting is still accessible by direct input on the numeric keypad.

The antenna socket is set a good way back from the rotary controls. This shows that Icom have made good use of the extra surface area provided by the inclusion of an extra band.

**Side Panels**

The side panels of the rig are very sparsely populated for such a sophisticated piece of equipment. The left-hand side of the rig has three rubber buttons, one large one for p.t.t. operation and the two smaller ones controlling the second level of the key-pad functions and squelch adjustment, as already mentioned.

An anchor point for the supplied carrying strap is located at the top right hand side of the rig. The p.t.t. is very positive in action. It takes very little pressure to depress the p.t.t. This is unlike my findings on most other modern hand-helds reviewed using membrane type switches.

**The Display**

The i.c.d. display is a good size. It shows the operational status and frequency of all three transceivers individually.

The maximum viewing angle of the display is exceptional, as is the time delayed night illumination. This also extends to the key-pad.

All the important information on the display is easy to see. Even when the rig is running, most of its options I found clearer than most hand-held displays. This is yet another dividend paid by having a larger overall package.

The contrast of the display can also be selected from one of four levels. However, I found the default condition more than adequate.

A bargraph display is assigned to each band. Each display has the primary use of showing signal strength on receive and power output on transmit.

The displays also have a secondary role, showing when required, the squelch level setting. They also display the low power TX output, of which there are three levels for 144 and 430MHz bands.

A single three coloured i.c.d. is provided. This shows red on TX, green on RX and orange if a second band RX squelch is lifted while in TX mode.

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Well Spaced

The rest of the front panel is turned over to a well spaced alpha numeric key-pad, that also carries the speaker/microphone grill.

The only feature of the rig not to have benefitted in a larger package is the speaker. This is a rather weedy affair, which is pushed well into distortion when the rig is used in a modern pedestrian environment.

However, this criticism could be made of most of the modern 'handies' and I for one always use an earpiece and external microphone when walking in town.

The last and most important control on the front panel is the Power button which is well recessed. It also has a delayed toggle action, making it very difficult to operate accidentally.

Well Written Manual

The Icom IC-Δ1E is not a radio you just pick up and use. The complexity of the rig is more than compensated for with a well written and compiled manual, which makes great use of pictorial examples of operation and display feedback.

There is a very useful chapter marked 'Basic Operation'. And after studying this in conjunction with playing with the rig for 10 minutes, I had mastered the rig.

Even several days after, I was able to pick the rig up, glance at the 'Quick Reference' card and was soon on the air. This fact is due almost entirely to the logical way Icom provide access to the function for all three transceivers.

Scanning

Reading through the manual, I counted four ways to make the IC-Δ1E scan. Firstly, you can scan any programmed band segment.

Another option is to scan the entire band allocation. Then there are 23 memories to scan, together, or a selection using the skip function to pass unwanted memory locations.

There's a priority channel watch mode which enables you to monitor for traffic on any selected memory, plus the v.f.o. setting for that band.

There are 26 memories assigned to each band but one is used to store a calling frequency. It's recalled with a single button entry and another two are used for storing band scan limits.

There are two search modes that can be selected. It will either wait for five seconds on each occupied channel and then move on, or hold the occupied channel until the squelch closes for more than two seconds.

Nice feature

One nice feature that caught my attention was the built-in clock/timer which enables you to automatically switch the rig off after a programmed interval and then switch itself back on, accompanied by a beep alarm, at a set time. Rather useful perhaps when staying away from home, back-packing or camping!

The transceiver has a DTMF encoder and decoder with four memories, allowing group paging with other similarly equipped Icom handies. However, you still have to fork out some extra cash if you want the CTCSS function.

Crossband Double Duplex

The IC-Δ1E will allow you to work crossband double duplex, as you'll have bands at your disposal. However, it will not, like some modern dual-banders allow in-band full duplex operation. In-band full duplex requires the 430MHz receiver section to tune down to 144MHz.

I must mention that the rig provided usable performance out of band on receive. This was on 140MHz to 170MHz on v.h.f. with similar performance on u.h.f.

Out of band reception on the 1.2GHz is also possible. But due to lack of regular local traffic above 1GHz, it is difficult to establish the extent and performance.

Current Consumption

The manufacturers quote an average current consumption figure of 68mA at 12V input with the battery save facility selected. This is just acceptable with the supplied 700mA NiCad pack. You can save more current (approx. 24mA per band) by just selecting one single band out of the three.

While on the subject of power, I had some reservations about running anything over 1W at 1.2GHz near my eyes. Evidently, Icom agree, as they have limited the output to 1W (low 200mW). The two other bands have the more usual 5W out for 13.5V in.

One thing I definitely did not like about this rig was the odd type power socket used. The socket used, is just like a tiny size Belling Lee coaxial type. Although it has appeared on other Icom rigs.

Why can't manufacturers settle on the most practical configuration, instead of generating yet another type?

Good Account

The IC-Δ1E gave a good account of itself on air. The 144MHz receiver met my own personal benchmark as it was perfectly happy in the presence of our local QRM. This is a wide area pager installation on approximately 153MHz and line of sight with my QTH.

The response to the QRM is a very encouraging result. This is because as 90% of all the rigs I've reviewed have objected in one way or another to this QRO adjacent signal.

A sked had to be arranged for a contact on 1296MHz. This may say something about the usefulness of this extra band (in the wilds of Dorset), still, it does provide reasonably private point to point communications.

One useful feature I have yet to mention is the RIT function on 1.2GHz. This is a must when trying to work stations using a transverter, which in some cases do have a habit of drifting in frequency.

I got the feeling that the performance of the rubber duck antenna on this band hadn't been optimised. My discone antenna (working well outside its rated bandwidth), fed with 7m of old UR67 feeder, provided an extra S-point over a partially obstructed path of approximately 3km compared to the rubber duck.

The IC-Δ1E did not appeal to me personally. And the usefulness of the extra band outside our big cities is to be questioned when the price is taken into account.

But, as I've already said, it's a nice change to have a hand-held which is of a size, and has controls for the bigger fingers! The well written manual, logical controls and ease of operation are all down to Icom's careful design.

My thanks for the loan of the IC-Δ1E go to Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741741. They can supply the IC-Δ1E for £759 inc. VAT.

Brief (shortened) Manufacturer's Specification

<table>
<thead>
<tr>
<th>Frequency Coverage:</th>
<th>European version 144-146, 430-440MHz and 1.24-1.3GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode:</td>
<td>Frequency modulation</td>
</tr>
<tr>
<td>Antenna impedance</td>
<td>50kΩ</td>
</tr>
<tr>
<td>Tuning Steps:</td>
<td>144/430MHz</td>
</tr>
<tr>
<td>1.2GHz:</td>
<td>5, 10, 12.5, 20, 25, 30 &amp; 50kHz</td>
</tr>
<tr>
<td>Dial select steps:</td>
<td>10, 20, 25 &amp; 50kHz</td>
</tr>
<tr>
<td>Number of memories:</td>
<td>78 (Scan edge and call channels included)</td>
</tr>
<tr>
<td>External power:</td>
<td>Transmit 13.5V d.c. Input (Min): 144MHz Max. 1.9A</td>
</tr>
<tr>
<td>Current Drain (typical):</td>
<td>430MHz Max. 1.9A (700mA) &amp; 1.2GHz Max. 1.1A</td>
</tr>
<tr>
<td>Receive:</td>
<td>12.5V d.c. Input with Power Save (Average): 144MHz</td>
</tr>
<tr>
<td>Transmit:</td>
<td>12.5V d.c. Input at Max. Audio: 144MHz 180mA, 430MHz</td>
</tr>
</tbody>
</table>

Practical Wireless, October 1993
One problem when using a voltmeter is that meters load the circuit under test. This analogue design by Bob Price GW3ECH, gets around that problem. It also has a variable audio tone making it useful for the visually impaired.

There are times when you need the high input impedance of a digital voltmeter, and times when an analogue voltmeter is more useful. Digital voltmeters (d.v.m.) are superb for giving a reading to many decimal places of accuracy and have a very high input impedance, not loading the circuit under test. But when they are presented with a varying input level the flickering of the digits can make taking the reading difficult. Analogue voltmeters with a simple meter movement make the task of reading varying values much easier. However, a meter movement has quite a high loading drain on the circuit, making accurate readings a somewhat hit or miss affair at times.

I decided to combine the two systems by using a voltage follower circuit to reduce the loading of the circuit under test. This current booster circuit drives the analogue meter, without additional loading on the circuit.

I designed the circuit to be powered from batteries. To minimise the chance of leaving it on and killing rather expensive batteries, I fitted a simple timer circuit to switch the system off after a delay so minimising the power drain.

I found it difficult at times to watch two test probes and a meter display. I had an idea. I used an audio oscillator, that had a frequency which rises, or falls, in sympathy with the input voltage. This would be of help to anyone whose eyesight is not what it might be under all lighting conditions.

The Circuit

I've explained the background, so let's take a look at the circuit. A passive resistor divider circuit provides the range switching. The chain of resistors R1-4 and R25 (or R26), provide a constant 12MΩ input impedance. The ranges covered are 0.5, 1, 10 and 100 Volts.

The resistive input chain has a total resistance of 12MΩ, 1MΩ in the input probe and 11MΩ in the range chain. The values used in this chain will depend on the ranges required.

I have suggested ranges and resistor values. However, I shall leave it up to the reader to make changes, as desired, in this section.

The input is taken from the resistor chain through a low-pass filter (R5/C1) to the input of the first section of the op-amp i.c. This is the only section of the i.c. that has any overload protection (Zener diodes, D1 and D2).

The i.c., a quad f.e.t. op-amp integrated circuit, has a second section providing a low impedance supply centre tap. This centre tap becomes the reference point for the
meter and for the resistor chain. It is also the reference point for the voltage follower that determines the audio oscillator frequency.

The third section of the op-amp is used as a simple timer. To switch the unit on, flick switch S1, so that C2 is shorted out by resistor R19.

Power is also applied, via S1a, to the rest of the circuit. As the voltage on the inverting input of IC1c is now below the voltage on the non-inverting input, the output of IC1c is high forcing Tr1 into conduction.

Releasing switch S1 allows it to return to the centre-off position, but power is still supplied to the circuit through transistor Tr1. Capacitor C2 starts to charge through R18 towards +9V. During this period that the voltage on C2 remains below the 50% threshold (about 17-20 minutes) the output of IC1c holds Tr1 and Tr2 in conduction, and the unit stays on.

When the voltage on C2 rises above the 50% level the output of IC1c goes low, removing the drive from Tr1 and Tr2. Transistor Tr1 now turns off, disconnecting the supply, thus achieving auto-off.

An immediate 'off' may be made by flicking S1 in the other direction when C2 is quickly charged to full voltage. This turns off Tr1 and Tr2.

The audio output comes from a piezoelectric sounder driven by a voltage controlled oscillator, Tr3/Tr4. They are controlled by the voltage output of op-amp one amplified by IC1d. The tone rises with increasing positive voltage at the probe input, and falls for increasing negative voltage.

Because the op-amp responds linearly to positive or negative voltages, provision has been made for meter reversal. Battery check is provided in the circuit enclosed but I have modified my original circuit of the input switching.

In the 'battery' position of the switch S2, it is necessary to short the probe inner and outer (with the d.c. probe connected) to enable the battery voltage to be read. This will provide a simple continuity check, with tone if required. As it is a high impedance circuit, the unit is unable to differentiate between a closed circuit and a relatively high resistance.

The resistor chain values shown, may be used as a starting point, and will suit the ranges shown. The only calibration required is an adjustment of R6. This adjustment may be done using the internal battery check position of the switch and a fresh 9V battery. (The meter reads half battery voltage i.e. 4.5V). Alternatively an external known voltage can be used.

Radio Frequency Voltages

With this simple meter, and the addition of the a.c. probe shown in Fig. 2b, it is possible to measure radio frequency voltages up to about 500MHz. The a.c. probe is conventional in design, it has a maximum input of 100 volts.

If higher voltage ranges are provided, a number of diodes can be connected in series with equalising resistors across them, but this will lower the input resistance and reduce the maximum frequency. The circuit as shown, is usable up to about 500MHz.

Battery Powered

The battery drain is about 16mA when active, and negligible when 'off' and the unit may be powered from ordinary PP3 battery. But if an alkaline or lithium battery is used the battery should last a long time, assisted of course by the auto-off circuit.

The circuit design is, as far as I know, completely original. But I may of course have 're-invented' somebody's wheel!
In the third part of the ‘Tiny TIM’ project, Tim Walford G3PCJ describes the building and setting up of the receiver.

Our apologies go to readers for the non-appearance of Part 3 of the ‘Tiny TIM’ in the September issue of PW. This was directly due to the Editor (rather inconveniently!) going off to hospital. Sorry about that! G3XFD

The PW production prototype Tiny TIM as built by Tex Swann G1TEX and tested on air by G3XFD. The front panel uses p.c.b. material (see text).

The Tiny TIM
3.5MHz SSB Transceiver Part 3

In this section, I’ll assume you have purchased a ready drilled main p.c.b. This a continuous ground plane of copper (0 volts or earth) on the top or component side, with the tracks beneath.

The rig’s front panel also uses copper clad p.c.b. board. It has the labels, etc., printed on the front with a continuous ground plane on the back. The back of the front panel will be soldered (at a later stage) to the front edge of the main p.c.b.

So, let’s start assembling the receiver. Don’t forget, that when you’re inserting components, be careful not to push them too far into the board. The leads, if pushed too far, may make contact with the ground plane at the edge of the isolation holes, and shouldered components, such as integrated circuits need particular care.

It can be difficult to solder some parts to the ground plane, particularly where an earth connection is required. To help, you will find that an earthy track leads to a component that can be soldered to the ground plane easily (such as resistors and disc ceramics).

You should only solder both sides of the board where this is possible. The illustration featuring the p.c.b., shows by means of crossed circle symbols where you should solder on the top as well as the bottom.

The p.c.b. has provision for Veropins to be inserted at the test points. You may also place ICs 1 to 4 in sockets if you wish.

Testing By Stages

I recommend that you build and test by stages. You should always switch off when adding and soldering components.

Start with the +8V regulator IC5 and its resistors R12 and 14 and decoupling capacitors C21, 9 and 22.

Now connect your supply to the +V+, being very careful about the polarity. Then use a voltmeter to check that +8V is available on the +8V pad, with respect to 0V/earth.

The next stage is to assemble the audio amplifier stage around IC6. Bolt the i.c. direct to the p.c.b. without any insulating washer.

Now fit R11, 15, 16 to 20, C11, 12, 20, 23 to 26. When you’ve completed this, connect up your loudspeaker temporarily.

You can now switch the unit on. As you do so, there may be a slight ‘thump’ in the speaker (this is normal). It’s now time to carry out the ‘finger’ test. Applying your finger to the amplifier input at R15/pin 1 of IC6, should produce a loud hum if all is well.

Next, switch off and install the product detector IC3. Then fit C17, the capacitors C14, 15, 13, 16, 18 and 19. Finally, there’s the ceramic resonator XL1 to be fitted.

Checking The Oscillator

If you have a means of checking the oscillator is working, test it with a high impedance probe at test point 4. And if you can measure the frequency, adjust C17 so that it is 453.5kHz, otherwise leave it at mid position.

There’s little that you can test easily in the next part until you have the v.f.o. fitted. This requires the front panel, so you might as well install this part while it is easier.

So, it’s best to install both transmission gates IC2 and 4, the filter FL1, the resistors R9 and 10 and C10, 31 and 32. You can also fit the bandpass filter T1 and L2, C27, 28, 29 and 30.

Although the filter can be peaked up with a signal generator, it’s quite easy to do on received signals. So, it’s perhaps best left until later.

Now you can fit the first mixer chip, IC1, and all of the v.f.o. components. This stage comprises Tr1,
DI and 2. L1, R3, 5, 6, 7, and C1, 2, 4, 5a, 5b, 6, 7, and 8.

Front Panel

Now it's time to fit the front panel as described earlier. Drill out the holes in the front panel p.c.b. material for the various controls and sockets.

The heading photograph on page 22 and Fig.3 illustrate the mounting method. Once assembled, you can solder the front panel to the main p.c.b.

You can now install the front panel controls. Start by mounting the controls R1, 4 and 13 and the loudspeaker jack socket.

The next job is to solder connecting wires from the variable controls to the appropriate p.c.b. pads. Don't forget to make holes for the microphone connections and the Tune control switch.

By now, there should not be any receiver components left, if all is well with my instructions and your construction! So, if all is well, it's time to switch.

Fig. 1: (Top)
The p.c.b. track layout of the Tiny TIM project.

Fig. 2: (Bottom)
Component overlay and groundplane diagram.
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the receiver on, to set up the v.f.o. coverage. Fit the large tuning knob so that the cursor mark is opposite 3.8MHz at the top (fully clockwise position).

Using a high impedance probe on your frequency meter, and connect it to test point 2. First set the fine tuning control to mid position and then put the coarse control to fully clockwise for the 3.8MHz mark. Then adjust the v.f.o. coil for a frequency of 4.255MHz.

Now turn the coarse control anticlockwise to the 3.6MHz mark and then adjust R2 for 4.055MHz. There will be some interaction between these two, so it's best to repeat the adjustments.

Next, you can peak up the r.f. filter, as you should be able to receive signals with the antenna connected to the receiver input pad on the p.c.b. Choose a steady transmission near 3.7MHz and adjust the cores of L2 and 3 for maximum loudness. And again, you should repeat each adjustment in turn.

If you don’t have a frequency meter or counter, you might be able to listen to the oscillators on a general coverage receiver. Otherwise, you’ll have to adjust the carrier oscillator by C17 by listening to many signals and adjusting it until you obtain the most natural sound for most of them!

**Setting Up The VFO**

If you don’t have a digital frequency counter or a calibrated receiver, then you can set up the v.f.o. by ear and by hand. Setting the v.f.o. can be done successfully by listening to stations on the band. You can use RSGB news, known RTTY stations or any known frequency transmissions. Then adjust the L1 and R2 until the amateur (European) phone transmissions just fill the tuning range.

If you have a crystal marker generator this can also be used. But be careful when changing from 1MHz or 500kHz markers to 100kHz once since you might skip 3.9 or 3.6MHz!

It might be best to set the v.f.o. initially to 4.455MHz and using the 4MHz marker (core of L1 well out). You should then work down carefully with the core of L1 to 3.8MHz.

You should now have a working receiver. The next stage is the final completion and setting up of the transmitter.

---

**Tiny TIM 3.5MHz s.s.b. TX/RX**

**Audio**

- Mic.
- Tune
- On

**Fine Tune**

- Frequency (KHz)

**Coarse**

- 3700
- 3750
- 3660
- 3800

**Practical Wireless**

---
Assembling An Effective VHF/UHF Station

David Butler G4ASR, who writes the ‘VHF Report’ column, has taken time out to tell you how you might improve your v.h.f. station.

One of the great attractions of v.h.f. operation is that there are so many different activities to try. You can operate from your home, in the car or portable when hill-topping. You can chat with stations in your immediate locality, or contact stations further afield.

Will you be using voice (f.m. or s.s.b.), Morse or data communications, such as packet radio? How about repeaters or satellites? The choice of these, and exotic propagation modes you may not have heard of, is yours. How are you going to make the choice?

Unfortunately there’s no one simple answer to that question. Trying all the modes will take many years. Perhaps a visit to the shack of a local v.h.f. operator, to learn from their experiences and mistakes will help.

Even if you do know the path you wish to follow, other problems will soon become apparent. How do you fit the transceiver, amplifier, power meter and pre-amplifier together correctly? What antenna should you use? Does a pre-amplifier make any real difference?

What you now need to know is how all these individual modules interact. High performance in one unit will not be of use if it doesn’t match the rest of the system. This is what transforms a collection of black boxes, accessories, cables and antennas into an effective station.

CHOICE OF RIG

Where do you start? Your favourite mode of operation will govern your choice of main rig. I’m not going to tell you which one it should be, however, what I will do is to give you some guidance. Then it’s up to you.

The choice is really quite simple. You will either want a single or a multi-mode rig (“mode” indicating the type of transmission, such as s.s.b., f.m., c.w. etc.). Most likely the single mode (mainly exp.m.r.) rigs will be f.m., but there are a.m. or even s.s.b. ones available.

Transceivers for f.m. are very popular, they may be put to speech or packet radio use. The sets designed for amateur radio need no modifications initially, whereas exp.m.r. sets invariably do. Surplus (exp.m.r.) equipment can get you operational on the v.h.f. bands fairly quickly and they do possess a number of advantages. They’re designed to be used by a wide range of operators in varying environments.

Rugged construction of exp.m.r. equipment means you can drop it without worry and it will probably keep working. Most of this equipment has to be built to a high technical performance and reliability. Spectral purity of the transmitted signal is very good and the equipment is designed to run 24 hours a day without a break. By looking around you should find equipment suitable for the 50, 70, 144 and 430MHz bands. You may even find p.m.r. rigs working around the 2.5MHz region suitable for conversion to the 28MHz band.

Most equipment is relatively easy to alter and in some instances may not need any modification at all. Commercial operators regularly upgrade their communications equipment to keep up with the times.

Surplus p.m.r. equipment is usually sold as electronic scrap so it may be obtained very cheaply. However, it’s always a case of buyer beware and the following should be borne in mind. Is the equipment working on a frequency range close to an amateur band?

What transmission mode does it use, a.m. or f.m.? There’s little a.m. used on the v.h.f. bands with the exception of 70/260MHz where there is still a little activity.

What is the i.f. filter’s bandwidth? Is it 50, 25 or 12.5kHz? The latter are preferable (50kHz bandwidth indicating it might be unsuitable for use in today’s crowded (f) band conditions).

To widen your horizons you’ll probably want to obtain a multi-mode rig, covering all the popular amateur radio transmission modes, f.m., c.w. and s.s.b. and maybe even a.m. The choice of multi-mode radios is many and any preference is purely your decision.

However, before you part with your hard earned cash let’s think about some of the requirements you need from your transceiver. All parameters are important but sensitivity and strong-signal handling capability (dynamic range), are especially so.

SENSITIVITY LIMITS

Galactic and man-made noise arriving at the antenna effectively limits the maximum usable sensitivity in terrestrial communication. On the 50 and 70MHz bands, man-made noise often exceeds the background noise by 10dB or more.

Receiver noise figures to aim for on these two bands are 12 and 10dB respectively. At 144MHz the sky noise is less and a receiver noise figure of 2.5dB is adequate. At 430MHz, the noise levels are very much lower although noise radiated from the ground provides a limiting factor.

For terrestrial communications there’s really no point in striving for an overall noise figure of much less than 1.5dB on the 430MHz band. However, for some applications such as satellite or moonbounce

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communication (when the antennas are elevated) it's worth using a low noise amplifier (LNA) to reduce the overall receive noise figure.

**STRONG SIGNALS**

It's no good making the receiver ultrasonic if it goes completely dead when a local station transmits. A number of problems arise if it cannot handle strong signals, the main ones being intermodulation, gain compression and reciprocal mixing.

A receiver front-end needs to have the capacity to respond to a small wanted signal in the presence of a number of strong unwanted signals. This ability is sometimes called the spurious-free dynamic range (SFDR).

Most manufacturers of HF transceivers have recognised our requirements for sensitivity, strong-signal performance and selectivity. Regrettably this is not true of VHF equipment.

Receiver noise figures between 5-10dB (at 144MHz) are not unusual and in some instances are considerably worse. Unfortunately you won't find out what the overall noise figure is from reading the specifications, because it's never given!

Normally the specification is given in microvolts (µV) for a signal to noise ratio of so many dB. For example one 144MHz transceiver quotes “better than 0.5µV for 10dB S/N”. Making the most favourable assumptions this translates to a noise figure of 11dB.

Now you see how little the manufacturers are offering! More effort is put into the 100 memories, scanning, voice synthesizers, computer control, tone squelch and displays that say “Hello”!

Very few VHF transceivers have a dynamic range in excess of 100dB, switchable filters, variable bandwidth, i.f. shift, notch filtering, adjustable noise blankers, full break-in (c.w.). All this is found on a modern HF radio, so if you already have one of these perhaps you should consider using a transverter.

A good transverter would allow a high quality HF rig to operate on the VHF/UHF bands. This retains the performance and features of the driving HF transceiver.

OTHER OPTIONS

If you don't want to use a transverter, there are other options to pep up your receiver performance. You could fit a complete replacement front-end board into your existing radio or you could connect a low-noise amplifier (LNA) ahead of the receiver.

There are many advantages of fitting a replacement front-end. Not only should the sensitivity increase to practical levels, but the strong-signal handling capability can also be dramatically improved. In some cases there is a remarkable improvement in selectivity too.

Many people don't consider it practical to rebuild, or fit a new front-end to their VHF receiver. Then the use of an LNA becomes an attractive alternative.

Pre-amplifiers can provide a number of advantages. The receiver sensitivity may be improved, provided there's sufficient gain in the pre-amplifier. It's possible for out-of-band signals to be reduced if the pre-amplifier has a narrow passband. You can eliminate the effects of feeder losses if the

** THE ANTENNA **

We now turn to the most important link in the system, the antenna. There are many antennas to choose from, but there are a few fundamental things to remember.

Do you want local communications or to chase DX? Do you want omni-directional coverage or to use a beam antenna?

Nowadays f.m. based traffic (voice and digital) uses vertical antenna polarisation. The DX transmission modes of SSB and C.W. use horizontal antenna polarisation. If you want local communications (possibly for a net) then you'll probably need omni-directional coverage. Simple non-directive vertical antennas are very popular for this mode.

For serious VHF work a directional antenna is a necessity. Many types of Yagi antennas are available, some very good and some I wouldn't give the time of day to! Before I discuss some aspects of antenna technology there's one important point I should make.

If you look at the claimed gains of antennas with 10 to 18 elements, the difference between the poorest and the very best available, may only be 3-4dB. If you're interested in working DX when the

A mast-head pre-amplifier can improve the incoming signal, but ideally it should be very low noise.

The 144MHz band is available through an up-transverter from 28MHz. Piper Communications can supply this version from SSSB Electronics.

A selection of replacement sections are available from MuTek Electronics.
conditions are 'up', a few dB in antenna gain makes little difference.
So maybe the most important criteria is not necessarily ultimate gain, but quality of engineering. A very long boom antenna is great, but no good if it bends in half during the first breath of wind. So really, it's up to you to evaluate your operating habits and choose your antenna accordingly.

Note however, that the longer the antenna, the sharper the directivity of the array becomes. The possibility of missing DX stations away from the main antenna lobe becomes increasingly likely. So you might consider trading off some gain for an increase in beamwidth.

If you really do want a very long Yagi you've got to back it up with a very good rotator.

At v.h.f./u.h.f. low-loss connections and switching is a necessity. This fine example from EME can be supplied by Piper Communications.

THE FEEDLINE

The main improvements to be made to any station will always be with the antenna and feedline. The feeder losses will affect both transmit and receive signal power, so be prepared to spend money on the main cable run and look after it well.

Use stiff, low-loss 50Ω hardline such as Heliax or Cellflex, with shorter flexible cables in the shack, and to the rotator. All connectors must be of the highest quality. The use of N-type plugs and sockets is recommended as their losses are very low.

On this particular theme it is worth mentioning that any modules in the r.f. chain should have the lowest loss possible. Before you buy a power meter or external coaxial relay check the specifications. Don't waste valuable power in heat!

LINEARS?

Turning now to amplifiers. Note that I say amplifiers and not linears, for most of the linears are definitely not linear!

I'm not saying that solid-state amplifiers can't be linear. It's just that many 'modern' amplifiers are made to a price rather than pursuing technical excellence. A 'linear' is usually connected to the output of a transceiver without any thought about driving it correctly.

A few years ago the RSGB VHF Committee ran a campaign to promote awareness in the use of linear amplifiers. A simple test setup was arranged consisting of a variable r.f. power source driving the amplifier under test.

The input drive level and output power were measured and plotted on a graph. In theory a straight line should be produced. For example if a drive level of 2W gives an output of 15W then 4W should give 30W and 6W should produce 60W.

There comes a point where the amplifier starts to saturate and proportionally less output is produced. From the graph plotted, when the output deviated from the straight line by 1dB (the 1dB compression point) shows the level where further drive will cause unacceptable performance.

Virtually every single amplifier, that was tested, saturated well before their stated maximum input level was reached. One amplifier rated for 2W drive compressed at 0.4W input!

Amplifiers designed for f.m. operation, are biased in Class C, and are definitely not linear in operation. The amplifier really must be fed with 13.8V to help maintain linearity.

It's surprising how quickly linearity deteriorates when running from 12V or less. Mountain-toppers beware!

SUMMING UP

Modifications making the biggest improvement should be done first. This should provide welcome encouragement especially if you're a beginner.

Changes to the antenna system, feedline, making the receiver more sensitive and increasing your transmit power will easily improve your overall system performance.

More changes will bring rewards, but each of the improvement will be less significant. You may also find that some of the changes will be difficult to justify financially!

A list of secondary improvements might be: improve the antenna system again, double the number of antennas or go for more elements. You could buy a bigger rotator for those larger antennas, or you may even consider elevation control as well. Perhaps at this stage you should invest in a telescopic tilt-over tower, enabling those expensive antennas to be lowered when it gets very windy.

When you change the feeder, every bit lost in the feeder system means less power on transmit, and a decrease in the overall system sensitivity. Finally, increase your output power to 400W but only if you know how to handle it properly!

PW

FURTHER READING


An antenna, such as this 17-ele Cushcraft example, can help both the transmit and received signals.
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73 from Dave G4KQH, Technical Manager.
Assessing A Satellite Dish For Microwave Use

With the ever increasing interest in the microwave bands, Gareth Jones GW4KJW has a computer program to help you evaluate those cheap second-hand dishes that you see at rallies.

Many second-hand satellite TV items are now more widely available, and to some extent cheaper than they have ever been before. For example the growing market in second-hand satellite TV bits and pieces can be seen at many rallies. Not just the receivers, but dishes and ancillaries as well.

Many of the available dishes are of the 'off-set' type and of elliptical shape, rather than the circular ('prime-focus') type more familiar for amateur use.

These reflectors, of either shape, can be used effectively for amateur radio use on the microwave bands. But just how effective are they likely to be? To help answer this question I wrote a small computer program.

So you've almost finished that 10GHz transceiver, perhaps a modified PW Exe transceiver you've been building on typically cold, wet, summer evenings in the shack. Note: this weather description only applies to readers resident in the UK!

If you are thinking of buying a second-hand, or for that matter new, satellite dish to go with your project, you'll probably find it useful to have some idea of how the dish will perform, and what the gain is likely to be.

The program will, when the relevant information, measurements, etc., has been entered, take all of the hard work out of the calculations involved. It can provide you with estimated gain - against isotropic or dipole references, beamwidth - alignment accuracy at the 3dB signal loss points and, in the case of the 'Prime-focus' type of dish, focal length.

The program is not just restricted to the 10GHz band. It works for all amateur allocated microwave bands.

The program is written in standard Microsoft BASIC. It should run with little or no modification on the majority of computers that have a similar version of the BASIC programming language.

The program is liberally sprinkled with comments. These are in the lines with the 'REM' statement in them.

Any text in the program lines after the REM statement is for the human operator's benefit. The computer ignores it. These comments should explain various parts of the program, and should help if you are converting it to run on a machine running non-standard BASIC, such as Sinclair, Commodore, Apple or a BBC computer.

Space doesn't allow me to list the whole program so the complete listing is available FREE from the editorial office. The program has only a few dozen short lines of BASIC code and will need to be typed in.

Save the program and then run it to check your typing. When you have the program running correctly on your computer you can, if you wish, delete the REM explanation lines and save the new copy. Deleting these statements doesn't increase the speed by much, so you may feel it unnecessary to delete them.

For a copy of the listing of the program send a medium sized s.s.a.e. to the editorial address marked Dish Computer Listing and a complete listing written in Microsoft GW-BASIC will be returned to you.

PW

Practical Wireless, October 1993
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Radio Personality -
Jack Hum G5UM

Jack Hum G5UM was and is (despite the premature obituary in PW in April 1993!) one of the foremost v.h.f./u.h.f. amateur radio pioneers in the UK. It seems to be a fitting tribute to feature Jack as our 'Radio Personality' in our v.h.f. themed issue.

Fig. 1: ‘Uncle Mike’, Jack Hum G5UM and wife Grace in a celebratory mood, on the occasion of his 60 years on the air.

Licensed in 1927, Jack Hum G5UM, was active initially on 1.8 and later on 3.5MHz. His QRA (the term QTH came later) was in a North London suburb, with gas mains only.

Because there was no mains supply, power had to be from dry batteries for h.t. and an accumulator for the valve filaments. This was charged once a week at the local garage, to activate the crystal oscillator and p.a. transmitter’s 6V valves.

In those years of the late 1920s, Jack and Louis Varney 5RV, co-operated in some experiments with oscillating crystals. After all, if detector valves could be made to oscillate why not detector crystals?

The experiments produced no immediately positive result. But both 5RV and G5UM wondered in later years if they had hit upon the transistor without realising it!

At least ‘oscillating crystals’ made a convincing ‘line of experiment’ to the licensing authority (the GPO). Without a line of experiment they would not grant you a transmitting licence.

And, so came into being the two self-evident calligns of 5RV and G5UM. The ‘G’ prefix, incidentally, was permitted later on.

Blessings of Mains

Later, it was announced that the suburb was designated to enjoy the blessings of 240V d.c. mains. The day was then set when they would reach his home at Eastwood Road, Muswell Hill.

That day, before he left for his job on a radio trade paper in Fleet Street, Jack asked his mother to insist that the d.c. mains be negative earthed when the installation man arrived. But, when G5UM got home that night, he discovered to his dismay that the mains were positive earthed. Thereafter all operation was with a hefty blocking capacitor between rig and d.c. mains.

In the mid 1930s came rumours of mysterious goings-on by the BBC at Alexandra Palace in North London, on the esoteric wavelength of 7 metres. At much the same time burgeoning v.h.f. activity by the amateur movement became evident on 5 metres and the even more difficult frequency around 2.5 metres.

Valve techniques were the norm then, for transistors were almost a quarter of a century away. To make valves work at these very high frequencies they were ‘de-base’d’.

De-basing a valve meant that their lossy bases were gingerly removed and the lead-out wires connected directly to the frequency determining circuits. Self-excited oscillators, modulated using a carbon microphone, coupled with super-regenerative receivers (‘rush boxes’) were the normal equipment.

Power output from a single self-generating valve was microscopic. Communication from a hilltop to another became the usual practice and operation on v.h.f. from home sites was rare.

Coastal Command Radar

A brief four years later, G5UM plunged into RAF Coastal Command’s airborne radar. There he found a very different world.

Jack says that “The advances that had been made by secret development work in industry to produce on a quantity basis transmitter-receivers operating on hitherto ‘impossible’ frequencies around 200MHz made much pre-war experiment look, well, amateurish”!

The wonder valve in those equipments was the EF50 r.f. pentode. You didn’t need to ‘de-base’ it to make it work as it had no base. Today, imagination is needed to realise that r.f. amplification, mixing plus signals and time-base generation were all performed by the EF50.

All EF50 Receiver

After the war, fascinated by the potentialities of the EF50, Jack designed the famous ‘All EF50 TRF Receiver’. This used a simple three valve circuit of r.f. stage, regenerative detector and an audio amplifier working into headphones.

After its publication in Short Wave Magazine in August 1946, it was widely built by readers. It was also copied by sundry other journals around the world, often with no acknowledgement of the source.

To build the EF50 receiver was a lot cheaper than buying one of the ex-service communications receivers which were on the surplus market. After all, the EF50 cost sixpence (2.5p!), the rest of the bits were in the junk box, but an ex-service receiver cost £10, or two weeks’ wages.

After the War

Gradually, after the Second World War, the amateur movement received its original frequency.

Practical Wireless, October 1993
allocations back, slightly amended. Of these, and in a v.h.f. context, the 144MHz band was the most important.

Looking back, there were probably several thousand operators who swiftly equipped themselves for 144MHz. They used home-built valve rigs.

In those days, there were no repeaters and few variable drive sources. There were no s.s.b. or f.m. transmissions but much c.w. and a.m. phone intermixed. It was quite normal for telephony users to talk to telephony operators.

Virtually all operators used crystal control (‘rockbound’). This meant the operator having to tune from one end of the 432MHz to the other.

Then came an ingenious suggestion from the late Austin Forsyth G6FO, editor of Short Wave Magazine. “Divide the realm into geographic-frequency segments so that the operators need to tune only to the segments into which they wished to communicate”. Thus was born the first VHF Bandplan.

The G6FO idea immediately caught on and was duly recognised and accepted by the national society. And in the subsequent years, it has been honed to its present degree of efficiency and acceptability.

THINKING HF ORIENTATED

During the late 1950s, the RSGB’s thinking was h.f. band orientated. Suddenly, as the result of an annual council election it found itself with half a dozen new council members keen to proselytise the pleasures of v.h.f. and u.h.f. Among them was G5UM.

From this new thinking, there sprang many initiatives. These included metro wave contests, and a new VHF National Field Day complemented the traditional HF National Field Day which was introduced in 1933.

A v.h.f. feature was started in the RSGB’s Bulletin magazine and proficiency awards were introduced. Also introduced was the annual VHF Convention.

In all of these enterprises G5UM found himself increasingly involved. He was a Committee Secretary, writer of the v.h.f. feature and v.h.f./u.h.f. Awards Manager. However, in the 1970s, the onset of heart problems compelled him to pass on these duties to worthy successors.

Both ‘Uncle Mike’ and his wife Grace took particular pleasure when in 1974 he was created a Vice President of the RSGB. This was in recognition for services to v.h.f.

Another amateur upon whom the honour was bestowed at the same time was G2AOX for service to satellite working. It was also awarded to G4KD in recognition of a wealth of amateur radio social services he had organised over many years for members in London.

EAST OF LEICESTER

So, what’s the equipment used by G5UM at his home at Houghton on the Hill, six miles east of Leicester like nowadays?

In reply to the question Jack says “They are moderately modern. There’s a TS-700 for 144MHz, an FT-780 and a Multi U11 for 430MHz, a modified Pye Westminster” for 70MHz f.m. and an IC-505 for 50MHz. Vertical and horizontal antennas are available for all bands.

In answer to my question whether or not he still had s.s.b. on 70MHz Jack replied: “No, not any more. The home-built 70MHz phasing rig built many years ago - it was all valved - failed to match the on-air performance of the more contemporary, generally commercial, transceivers everyone else used. So, it was cannibalised”.

But, another ancient artefact of the home construction days apparently remains in active service. It is a valved c.w. only 70MHz transmitter with outboard VXO (using on EF180, the successor to the EF50) and a home-built transistor m.o.s.f.e.t. converter whose output feeds a BC348 receiver used as a 5MHz i.f. strip, and half a century old!

There’s still a 144MHz transceiver incorporating a G2DD converter (Short Wave Magazine design of 1951) putting its i.f. to a built-in BC454 Command receiver. It is kept purely as a museum piece! I made it and I still love it, said Jack”.

“Yet” Jack continued, “the rig with the G2DD converter still provides some tactile pleasure when switched on and twiddled. And its output, meter, a flashing bulb, still indicates r.f. output from the QVQ03/10 even after 42 years of life!”

MANY CHANGES IN HIS TIME

Jack says that people say to him that ‘you must have seen many changes in your time’. And in reply Jack says he has indeed seen many changes, and most of them for the betterment of amateur radio.

The improvements include v.h.f. and u.h.f. repeaters, packet radio and beacons on all the metre wave bands, plus a host of other things. However, some changes seem to him to be for the worse.

On the subject of changes for the worst, Jack comments on the ‘electronic graffiti’ arising from repeater abuse to the inane conversations on simplex frequencies. He feels that these things diminish the greatest hobby in the world, and give ‘Higher Authority’ reason to think that the bands where idiocies occur could be turned to more professional (and profitable) use.

But, ever optimistic, Jack didn’t want to end on a pessimistic note. Encouraging us all he says “relax from the pleasures of life go into your shack and indulge in a little radiotherapy. It’ll do you the world of good!”.

Finally, I feel sure that all our readers would like to wish Jack G5UM the very best wishes. We’re all looking forward to seeing him celebrate 70 years ‘on the air’.

G3XF

Fig. 4: Circuit diagram of the famous G5HUM receiver design, using all EF50 valves, published in Short Wave Magazine in 1946.

Fig. 3: Down under with ‘UM. Jack G5UM visiting former next door neighbour Gordon Bracewell VK3XX (formerly G3EGK) who now lives in Melbourne, Australia.
John Fell GOAPI says that of all the amateur bands in current use, the 10GHz (3cm) allocation has seen some of the most dramatic improvements, in all respects during the last 18 months. John says that amateur experimentation is alive and well in the microwave regions!

Fig. 1: The 300mW 10GHz narrowband beacon GB3SCX. Located on a ten storey office block in central Bournemouth, has been heard on Merseyside.

The introduction of reproduceable equipment designs, using techniques directly related to the current state of DBS satellite systems has thoroughly dispelled the widely held belief that 10GHz propagation is limited to line of site paths. But, let’s first take a brief look at the history of events on 10GHz.

Up until the late 1970s, traditional amateur 10GHz equipment consisted of 5 - 10mW of r.f. This was generated by a Gunn diode, probably feeding into a small parabolic dish or horn antenna.

Receiver systems used the same source of r.f. for the local oscillator. This was mixed on a Schottky diode to produce a low frequency wideband f.m. i.f., typically at 30 or 100MHz.

Such systems were virtually line of site limited. So, by and large, this meant hill top portable operation to similarly equipped stations. Ranges of 150km were considered good for such paths and extensions to this involved careful planning and ‘over water’ super-refractive duct paths, or visits to mountain tops.

Clearly, the ultimate attainable DX was limited. So it was no surprise that the world DX record was held by non-UK stations with access to ‘serious’ heights.

What was needed to improve the DX was a fundamental change to the equipment. To achieve this, members of the then RSGB Microwave Committee produced a low noise, high stability crystal oscillator/multiplier board. This, after varactor diode multiplication and filtering, was capable of producing local oscillator input at 10GHz.

In 1979 Mike Walters G3JVL, Julian Gannaway G3YGF was in almost daily contact from Oxford University to G3JVI at Hayling Island. This was over a fully obstructed 160km path, extending this with portable outings to as far away as the Mull of Galloway.

Published a design for an image recovery mixer. It utilised the high stability local oscillator signal, frequency filtering and a mixer diode. This linear waveguide based transverter allowed an i.f. at 144MHz and for the first time true narrow bandwidth capability.

No longer were microwave enthusiasts dealing with f.m. bandwidths that could support stereo broadcast links. True c.w. and s.s.b became available.

The c.w. and s.s.b. allowed an extension of receiver sensitivity of more than 40dB. Paths that gave up with only a minor divergence from the optical began to be worked on a routine basis.

A few well placed pioneers were able to obtain ex-commercial microwave link travelling wave tube amplifiers. And 2 to 3mW of drive from the transverter resulted in 10W of r.f. When added to the improvement in receiver sensitivity, this increased the DX potential even further.

With the developments I’ve mentioned, Julian Gannaway G3YGF was in almost daily contact from Oxford University to G3JVI at Hayling Island. This was over a fully obstructed 160km path, extending this with portable outings to as far away as the Mull of Galloway.

Fig. 2: The G3YGF/P Land Rover mounted dish, with G4JNT/P tripod mounted.
COMMERCIAL ACTIVITY

As the 1980s drew on, much commercial activity was devoted to the up and coming Direct Broadcasting Satellite TV industry. The availability of Gallium Arsenide, GaAsfet devices at sensible prices promoted amateur experimentation.

Even the early narrowband systems were ultimately limited by the noise figures of their mixer diode (typically 8 - 10dB). So, the early GaAsfets with noise figures of 2-3dB once again improved the receiver performance.

Local oscillator devices from satellite TV Low Noise Blocks (LNBs) were normally running at 10mW. They were found to be capable of use as r.f. amplifiers at up to 50mW plus in amateur hands! So the scene was set for the start of the current phase of amateur 10GHz development.

In August 1990 Sam Jewell G4DDK published a design for a 2.0-2.6GHz oscillator/multiplier. This has been widely used for most of the higher microwave bands as a direct signal source or basic oscillator. Also during 1990, Dr. Charles Suckling G3WDG published details of a surface mount p.c.b. based microwave stripline multiplier/amplifier. This used readily available low cost GaAsfets, which when fed by the G4DDK 0004 oscillator produced approximately 50mW of stable low noise 10GHz r.f.

By choosing the appropriate crystal frequency, this board module could cover any frequency within the 10-10.5GHz part of the spectrum. And, in conjunction with a simple modulator keying circuit this device allowed a ready means to construct a simple f.m. or c.w. narrowband transmitter or beacon.

Kits of parts for the G3WDG design, complete with fully detailed construction notes were introduced by the Microwave Committee Component Service. Wide interest in this readily reproducable design followed.

The wide interest lead to the construction of several new 10GHz narrowband beacons in the UK. Amongst these, Andy Talbot G4JNT and I built GB3SCX, which has been operational continuously since March 1992.

RECEIVE DOWN CONVERTER

Having provided a suitable transmitter, Charles G3WDG turned next to a receive down converter with an i.f. at 1.44MHz. Once again, this allowed reception of 10GHz narrowband or any modes available on the 1.44MHz receiver.

The full advantages of receivers equipped with c.w. filtering added further to the receiver system capability. These compact modular designs produced a notable increase in equipment from non-portable (home station) locations. Until this time only a few amateurs had this capability which acted as a considerable brake to regular experimental observations.

Having stimulated things thus far, a 50-100mW linear transmitter up-converter was introduced. This allowed a typical 144-146MHz transceiver to produce output over approximately 2MHz segment of the 10GHz band.

Combining the local oscillator with the receive down converter and the transmitter module, meant that all the elements necessary for a linear transverter were to hand. Within several months many amateurs in the UK and beyond had constructed systems based on this technology.

The traditional wide band f.m. contacts which had formed the vast bulk of activity gave way to s.s.b. and c.w. My own system produced a contact of 279km on my first portable outing. The first contact in this session qualifying for the RSGB 150km award!

ADDITIONAL MODULES

Additional constructional modules have followed, with the introduction of a range of power GaAsfet e.t. amplifiers. The largest currently available is capable of just over 1W of r.f. from a 12V d.c. supply.

Low noise pre-amplifiers are also available. These include a h.e.m.t. based device that results in a system noise figure (when optimised) of under 1dB.

In conjunction with a 3m parabolic dish antenna, a complete system capable of moonbounce (e.m.e.) reception is attainable. Just add a 25W travelling wave tube amplifier and power supply, and you can start to listen for your own signals coming back from the moon. This is not speculation, it's being done now!

MOONBOUNCE QSO

Many people will have heard about the first UK moonbounce QSO made by G3WDG and his wife Petra G4KGC. This happened when they contacted WA7CJO in Phoenix, Arizona on 31 January this year.

Since then, SM, DL, 14 and others have followed. The first 10GHz VK - UK e.m.e. could well occur this year.

Meanwhile back on Earth, having obtained, or built your own (yes there are one or two black box ready built systems - at a price), what can you expect to work? There is still no substitute for a clear unobstructed take off, be it sea level or hill top and 100mW plus stations so located will, under normal conditions, experience the best results routinely working 200-300km.

However, the 10GHz band has more than a few surprises on the propagation front. Heavy rain for instance, which is normally the bain of all portable operations, can produce outstanding conditions.

To take full advantage you need to point upwards into the most dense rain cell and track its movement across the sky. Rainfall radar plots, as seen on the BBC weather forecasts, provide a wealth of DX information!
Fig. 5: The G3WDG 001 multiplier/amplifier, 2.66GHz in - 10GHz out.

Fig. 6: A single stage h.e.m.t. and two stage GaAsf.e.t pre-amplifier.

Fig. 7: Shown operating in the June 1993 10GHz cumulative contest is G4RFR/P, using a 1.6m offset fed elliptical parabolic antenna. This system is fully rotatable and can be elevated. It hears good solar noise levels.

Signals propagated via the rain drops (the larger the better) have an auroral note. Rapidly moving clouds produce Doppler shift with c.w. frequency shifting in proportion to cloud velocity.

**REFLECTED SIGNALS**

If you get bored of talking on 10GHz, just listening to reflected signals can allow you to investigate where the weather is and how soon it will be with you! I have experienced reception of signals at virtually all angles from the direct path even at 180° with peaks at S9+.

Even high mountains can be surmounted via the reflection mechanism. Reflections from solid objects in the sky produce rather rapid bursts of enhanced signal. The results of r.f. encountering a Boeing 747 jet at altitude are interesting to say the least! You need a strong S-meter needle and if you are near a flight path, it’s even a predictable mechanism.

Ducting occurs at all frequencies from low v.h.f. up to micro-wavelengths. If you think about it, the incidence of a duct that’s physically large enough to support, for instance 70MHz, with a 4m wavelength must occur less often than the relatively tiny dimensions needed for a 10GHz signal with its 3cm wavelength.

**DAILY OBSERVATIONS**

Daily fixed station observations of the increasing numbers of normal and personal beacons, are revealing the true incidence levels of anomalous conditions. The current UK 10GHz terrestrial DX record was achieved by G4FCD as the result of such conditions. The G4FCD achievement came literally within weeks of the equipment being constructed and as a direct result of being at the right place at the right time. From Oxford into Scandinavia, a distance of 1039Km using just over 100mW at this end.

If you live in a r.f. black hole don’t lose heart! The RSGB Microwave Committee organise a series of Cumulative activity days throughout the winter and summer seasons. This year G4JNT and I have been operating as a team using the callsign G4RFR/P, callsign of the Flight Refuelling ARS from a site some 270m a.s.l. in Dorset. Our best cumulative session this season has produced 30 contacts. The best DX being two separate contacts to near Paris at approximately 420km.

**WEALTH OF HELP**

The really good thing about experimentation on the microwave bands, is that there exists a wealth of help and advice. This comes from fellow enthusiasts, both true amateurs and professionals alike.

Each year, several Microwave Roundtable venues are set up. They allow free access to good quality test equipment and plentiful advice on constructional and operating topics.

A recommended source of technical topics and activity news is the Microwave Newsletter, edited by G3PHO and G8AGN, available from RSGB HQ. For a comprehensive source of theoretical and constructional information I can also thoroughly recommend reading the Microwave Handbook, currently in three volumes. This work covers all amateur bands from 1.3GHz to lightwaves.

For further details/prices of kits and components available from the Microwave Committee Components Service, send a stamped addressed envelope to: Petra Suckling at 314A Newton Road, Rushden, Northants NN10 0SY.

I hope this article may inspire you to investigate our microwave bands. The more activity, the greater the potential for expanding our understanding, which is surely what our licence is all about.

**PW**

Practical Wireless, October 1993
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AR2000 - this popular receiver continues and remains a firm favourite with listeners and enthusiasts. There has to be a compromise in hand-held design when compared to base units such as the AR3000A receiver. However when compared to other wide range hand-held monitors on the market, the AR2000 provides the very best balance between sensitivity and strong signal handling. The AR2000 has a very wide frequency coverage from 500 kHz to 1300 MHz (1.3 GHz) with no gaps (reduced sensitivity below approx. 2 MHz - all modes). The modes available are AM (Amplitude Modulation), FM (Narrow Band Frequency Modulation - N.B.F.M.) and WFM (Wide Band Frequency Modulation). Any available mode may be selected at any frequency within the receiver's coverage. For your convenience the search banks have been preprogrammed at the factory to largely suit the UK band plan, this allows you to switch on the AR2000 and immediately enjoy hours of no fuss listening. Of course the AR2000 is supplied with an operating manual showing examples of programming etc. There are 1000 memories arranged in 10 banks of 100 channels, there are also 10 additional programmable search banks. Supplierd with: High Capacity NiCad batteries, AC charger, DC lead, DA900 VHF-UHF aerial, soft case with carry strap, belt hook, earphone and operating manual. Suggested Retail Price £309.00 inc VAT. (UK Carriage free)

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Please phone or send a large S.A.E. (34p) for full details - thank you.
VHF Operation - It Needn’t Cost An Arm And A Leg

Tex Swann G1TEX suggests some ideas for getting going above h.f. cheaply.

I’ve heard it said that amateur radio is becoming less of a hobby for two reasons. The first, is that electronics is seen with the ‘chuck-a-chip-at-it’ as the answer to all problems. The second reason comes partly from the first, users are becoming sated with bells and whistles. This year’s model has a tambourine, and triangle, but beware, our engineers are working on a full orchestra in next year’s model!

With £2500 to spend anyone can start a hobby. But merely throwing money at an interest doesn’t maintain the pastime. A hobby needs to spur us on to other things, not just deeper into the bank manager’s profits.

There’s no need to pay an arm and a leg to get going on v.h.f./u.h.f. I, for one, am not prepared to pay an arm and a leg for my hobbies. A good second-hand v.h.f. or u.h.f. transceiver is normally cheaper than a new one, and may work just as well.

Some of the older ‘Handles’ make more than adequate main f.m. rigs. An older multi-mode may do as much as you really need to. To help you further, where PW or SWM has reviewed a transceiver, reprints are available through our Book Service.

Surplus ex-p.m.r. equipment can offer a reasonably inexpensive starting point in terms of quality. There’s enough equipment out there to get a whole generation on the air for a very small amount.

Firms like Garex Electronics have items that need a minimum of extra work to get going on the v.h.f. bands such as the items shown in Fig. 1, 2 and 4. The valved chassis, with a suitable high voltage p.s.u. [*] is capable of boosting a 1W transmitter up to 25-30W peak r.f. power.

Voltage converters are available to power valved amplifiers. The article ‘Mobile And Portable Operation On A Shoestring’ appearing in PW June 1992 giving more information.

Garex Electronics also have 10-15W transistorised p.a. strips, suitable for 50-52MHz. The cost, only slightly more than that of the transistors, makes it difficult to build it yourself for less.

The picture, Fig. 3, shows a v.h.f. antenna tuner unit I made that cost me less than £7.50. It is effective on 144 and 70MHz, though less so on 50MHz. On 50MHz, spurious second-harmonic signals must be kept to a low level. The 100-104MHz trap shown in Fig. 5 cost me just 50p on a ‘junk’ stall, because no-one knew what to do with it.

Keep your eyes open for real bargains, like the v.h.f. handy shown in Fig. 6, I paid £2 for it. It seems to be capable of being tuned onto the 144MHz band, and has six crystal controlled channels. Even with the cost of crystals it is a very cheap way onto the band.

My overall strategy has been to get one good multi-mode rig and use transverters to get onto other bands. Practical Wireless has in the past, produced excellent designs for converters.

The original PW Meon used a 28MHz transceiver driver to produce signals on the 144MHz bands. A nice little set, but if you find one on the market it should have the two battery holders with it.
Fig. 8: I've seen some of these FDK Multi-750XX rigs at rallies complete with the 430MHz adapter. They make a good, if somewhat unusual, start to a multi-mode base or mobile station.

50MHz band. This was rapidly followed by a 144MHz drive version, that allowed the many amateurs with 1-3W v.h.f. multi-modes to get on the then new allocation.

Recently we have featured a 70MHz version of the Meon that has a 14.5MHz drive input. Though we haven't produced transverters for other bands yet, there are some commercial ones out there waiting for good homes. For example there are still some Microwave Modules 430MHz band transverters around. Pushing out about 10W of r.f., they are still very effective.

Mainline Electronics have a variety of kits available for the home constructor. Based on published projects, they include r.f. power amplifiers of over 100W on various bands, and transverters for the 1296MHz band.

With a 144MHz drive the project from Mainline, using tiny i.c.s, needs practically no tuning or setting up. The bare two-board systems produces 10-20mW of power, which can be very effective with the right antenna.

Cirkit not only sell a variety of amateur radio transceivers, they also produce many cheap kits to get you going building up your own station. Synthesisers, pre-amps, converters, transverters, p.a.s and transceiver boards are all to be found in their catalogue.

Waters and Stanton can supply a range of Ramsey kits for radio amateurs. This range includes a six channel synthesized 144MHz transceiver, and receivers that will cover the lower v.h.f. bands. You could even build your own complete packet radio station from these kits.

HOME-BREW PROJECT

We now come to the idea of a total home-brew (or more likely homemade) project. Why not try one of the PW v.h.f. projects that we've produced?

Output from Beavers or Badgers could be sent to antennas made to PW designs. Perhaps you'd like to try adapt a PW designed p.a. to another band. Several readers have modified the PW Meon-4's p.a. to work on 50MHz, instead of the original 70MHz.

Badger Boards can supply almost the complete range of p.c.b.s for PW projects even some of the older ones. Our reprint service can supply copies of the full articles that show you how to construct these and other projects.

John Birkett, the well known surplus component dealer, can be found at most rallies selling parts he keeps finding in the depths of his warehouses. I've picked up power f.e.t.s from his stock, for few pounds that can produce 50W of r.f. at 144MHz.

They're almost bomb-proof, and just right for that p.a. you've been promising yourself.

ADAPT-A-BIT

Sometimes it is easier to adapt a suitable section of commercial equipment to make up your rigs. Recently at a local rally I found two stall holders selling the transmitter strips from v.h.f. distress beacons for less than £2 each. An unusual shape in each case but it would make a nice talking point.

The 70MHz tuner shown in Fig. 2 has a wideband 10.7MHz output. Use a tuneable second (converting down to 455kHz a.m. or f.m.) if to listen to the whole of the 70MHz band.

Couple that with the low powered f.m. transmitter board of Figs. 1, and you have a start on the 70MHz band.

At v.h.f. and above, good quality coaxial cable is a must. Don't skimp on it. At rallies I've seen Westlake Electronics selling 'Westflex' cable and it looks very good value for money. Nevada Communications stock an imported 10D-FB cable that would appear to be excellent for the higher bands.

You can get on the v.h.f. bands cheaply. Have a go, you won't regret it!

** Note Rigs and amplifiers that work with valves, usually have very high, and thus dangerous voltages present and care should be taken when working with them.

Fig. 9: The ubiquitous Yaesu series of portable multi-mode transceivers all look similar. This second series 50MHz FT-690R11 model along with the FT-290 and the FT-790 versions still command a fairly high price on the second-hand market. But one of these and a variety of transverters may be all you need!
Antennas for v.h.f. and u.h.f. use are small compared to h.f. antennas. They have fewer of the mechanical construction problems associated with h.f. beam antennas.

Actual construction methods will depend on various factors. If it’s an antenna for experimental purposes, then you may need to change the element lengths and spacings easily. An antenna for portable use may need to be dismantled and reassembled quickly and conveniently but accurately.

For a given size, the Yagi antenna can produce good gain, provided the dimensions are correct for the band in use. Many commercial designs use special fittings, not normally available to the home constructor. What follows are a number of improvisation ideas that should be useful.

**Simplest Technique**

The simplest antenna idea is to use stiff copper wire elements fixed (with small wire staples), to a square wooden boom. I used 2.5mm of hard drawn copper wire for the elements. Constructed this way, an antenna can perform just as efficiently as a more solidly constructed commercial model. If such an antenna is to be used permanently outdoors, the boom should be treated with a wood preservative.

A 3-element beam constructed using the wooden boom technique is shown in Fig. 1. The computed gain for this antenna can be greater than 8dBi over the range 144 to 146MHz (see Antenna Workshop PW May 1993). The calculated plot of the antenna is shown in Fig. 2.

Aluminium, combining good conductivity and strength with low weight, is used for most commercial antennas. For home constructed v.h.f. antennas, copper wire and tubing are probably more suitable materials. Copper tubing is available in various diameters relatively cheaply. A 2m length of 15mm new tubing should cost about £3-4. A similar length of 22mm tube is about £6.

Tubing is also available in 8 and 10mm diameters, it’s normally coiled and not easy to straighten. These sizes are useful for making adaptors from one diameter to another. My local hardware shop also sells 1m lengths of 4 and 6mm diameter brass tubing.

If all the antenna parts are made from copper, they may be soldered together without the need for special fittings. Of the various ways of fixing copper wire elements to a copper tube boom, the obvious method is to drill holes in the boom technique is shown in Fig. 1. The computed gain for this antenna can be greater than 8dBi over the range 144 to 146MHz (see Antenna Workshop PW May 1993). The calculated plot of the antenna is shown in Fig. 2.

The difficulty with the drilling method is completing the holes accurately. If using this method, remember to take the diameter of the boom into account when determining the element length. Soldering the elements to a groove filed in the top surface of the boom, as shown in Fig. 3b, is my preferred method.

To construct an antenna so that the element spacing may be varied, I’d prefer to use other methods. Look at the drawing of Fig. 3c. The elements are fixed using plastics pipe bracket.

The element is secured with a screw inserted in the hole normally used for the bracket fixing screw. The bracket, with...
the captive element, can then be clipped on to the boom.

Shown in Fig. 3d, is another fixing method. Here a copper tab is soldered to the element, and then this is clipped to the boom using a Jubilee clip. There is another fixing method that allows the element length as well as its spacing to be adjusted.

Take the insert from a large screw connector (the ‘chocolate’ block type) and solder it to a copper tab. The element halves overlaps as shown, allowing the overall length of each element to be adjusted.

Variable length elements can be made from hard drawn copper wire and brass tubing. Let’s take say, 250mm of tubing, and make up the rest of the element length using copper wire.

The copper wire should just fit into the tubing, and may be soldered to form the optimum length. To change the length afterwards, heat the join and slide the wire in or out, of the tubing.

**Tips On Soldering**

I’ll include a few tips on soldering, because the techniques of soldering antenna elements are a little different to general electronics soldering. Getting enough heat on to the part to be soldered is the main problem.

A copper element is a huge heat sink. An ordinary 25 or even 50W soldering iron is not suitable.

There are several solutions to soldering copper tubing. These include; using a large 60-100W soldering iron; using a large copper iron, heated on a gas stove, or by a small gas blowtorch.

You could use a small blowtorch directly on the part to be soldered. Personally I normally use a gas blowtorch and finish off with a large soldering iron.

Before soldering antenna parts, they must be clean. Rub the areas to be soldered with wire wool, sandpaper or emery cloth before applying a coating of flux to the surfaces to be joined. Next heat the surfaces indirectly, then apply the solder. The items are the correct temperature when the solder runs freely. Ensure the elements are correctly aligned before the joint cools.

**System Matching**

My usual method for matching the feed line to the antenna, is to use either a folded driven element, or a Gamma match. Using a folded dipole is the simplest technique but this has the disadvantage that the matching is difficult to adjust.

The only adjustment available is to vary the element length. If the correct feed impedance is not achieved using this adjustment then the element spacings have to be altered and this will alter the driven element length re-adjusted.

Using a Gamma matching method, a match can be achieved almost regardless of antenna spacing or element length. Remember to waterproof this area if the antenna is for permanent outdoor use.

I find the best way of overcoming this problem of waterproofing, is to use a fixed capacitor. Use a variable capacitor to match the antenna, replacing this capacitor with a fixed capacitor of the variable’s value. If you don’t have any equipment for measuring capacitance then estimate it. For example a half meshed 50pF variable capacitor would be around 25pF.

I hope to discuss methods of setting up matching networks, such as the Gamma match, in the second part of the discussion on impedance. That’s the lot for now, enjoy building your v.h.f. antennas!

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**Revco Portable 144MHz Antenna**

Situations often arise where the antenna on a hand-held rig just isn’t good enough. An external vertical antenna, though good, isn’t easy to carry around, and this defeats the advantage of a hand-held. You’d also have to find somewhere to clamp your portable antenna.

The portable antenna from Revco is a very neat 144MHz portable antenna (it folds up including feeder). The antenna, a Slim Jim type is constructed from 300L1 balanced feedline. A loop is provided to hang the antenna up on a support.

The matching (base) section is built on a p.c.b strip and enclosed in a plastics tube. Provision has been made, for this section to be easily dismantled to allow feeder replacement if necessary.

I carried out a few tests with the antenna fixed in the loft, and again with the antenna tied to an apple tree in the back garden. Using an FT-290R on high power, I could access all the repeaters about two or three S points up on the rig’s own antenna.

The bandwidth of the antenna is rather broad. Mounted so that the antenna was free of obstructions, the resonant frequency was a bit high. The lowest s.w.r occurred at 147.7MHz, but in the presence of obstructions the resonance curve shifted down in frequency.

My thanks go to Garex Electronics, Station Yard, South Brent, South Devon TQ10 9AL. Tel: (0364) 72770 or FAX: (0364) 72007 for the loan of the antenna, which they can supply for £14.95 plus £1 P&P (UK), £1.75 P&P (overseas).

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G6XBH G1RAS G8UUS
Instructor Morse Professional

Instructor Morse is a very sophisticated Morse teaching package that's designed to run on an IBM PC or compatible computer system. Not only can it provide a wide range of basic test facilities, but the operator can access all the main parameters of the package.

The operator can also set up specialist training sessions. There is even provision for automatic marking when receiving tests via the keyboard. These comprehensive features mean the Instructor Morse is equally at home as a professional group trainer as it is with individual users.

**Single Disk**

The review package was supplied on a single 3.5in disk with a security Dongle and comprehensive instruction manual. Before installation could begin the security the Dongle had to be connected to the printer port of the computer.

For those not familiar with the use of a Dongle I'll explain. It's a plug-in device that's individually encoded and linked with the software package.

When the program is run, it checks to see that the appropriate Dongle is connected to the computer. Although comparatively expensive, it's a very effective software protection technique.

The dongle supplied with Instructor Morse comprised an in-line male-female twenty-five way D connector. This allows it to fit between your printer lead and the computer.

**Installation Very Simple**

Software installation was very simple thanks to the use of an INSTALL batch file. This transferred all the relevant files to the default sub directory IMORSE.

You are offered the option to change this to any other if necessary. During the review I had a few initial problems running the program on my ageing Amstrad PC2806.

After taking advantage of Software Design's excellent technical support, the problem was soon traced to my non-standard sound card. It's worth noting that Instructor Morse only supports genuine Sound Blaster Pro boards.

Many of the cheaper 'compatibles' will not work. However, the majority of the program's features will work successfully with the computer's internal speaker. The sound board is only required if you want to make full use of the simulation modes.

The manual comprised 39 A4 pages, spirally bound. The detail in the manual was very good indeed and there were explanations and examples of all aspects of the program.

My only complaint was that it took quite a while to work out how the various program components fitted together. This could probably be eased with a command flow chart or hierarchy table.

**Attractive Features**

One of the attractive features of Instructor Morse, was the way in which the operator had full access to the definition of each character. This access is achieved through two file types called character and speed files.

The character files contain information that aligns dot/dash patterns to the various alphabet elements. Although the supplied files are set-up for the standard Latin alphabet, you can create your own files for any number of different alphabets.

You can also use this to build codes for specialist procedural signals. The tables within the character file are built-up using a six digit number to represent each character.

Moving from left to right, the digits alternatively represent dots and dashes. As an example, the letter V (---) comprises three dots and one dash and so would be represented by the number 310000. It's a very simple, but effective system.

Associated with each character is an optional profile definition. This enables the relative lengths of each element of each character to be individually varied.

Now you're probably wondering why anyone would want to tinker with the standard construction of the Morse code. It is actually a very powerful feature that takes Morse tuition into the real world.

Anyone who's listened around the bands will know that for every station sending good Morse, there's another using poor Morse. In order to prepare students to operate in this environment, it would be useful to practice under real conditions. It's rather like learning to write.

You start with block capitals and graduate to long-hand. The profile definition option in Instructor Morse allows the operator to individually manipulate the style of every character and so create very realistic stylised Morse.

Although this level of skill is not required to pass a Morse examination, it will inevitably be required if the code is to be put into practice. The manipulation is achieved by changing the elemental definitions for each character.

This is perhaps best illustrated with an example. The letter V (---) is often sent with an elongated dash so let's see how we can generate the same effect. Here is the correct elemental table for the letter V:

<table>
<thead>
<tr>
<th>dot</th>
<th>gap</th>
<th>dot</th>
<th>gap</th>
<th>dot</th>
<th>gap</th>
<th>dash</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

You will note that each element is assigned the same standard code. This code is used by the SPEED file (I'll cover that later) to generate the character. It's the SPEED file that defines the multiplication factor to be applied to the basic code above.

For example, a dot would be sent using the elemental code whilst a dash would have a multiplication factor of three. So back with our original example we need to increase the length of the V dash which is done by increasing the elemental code, say to 45.

This would make the dash in the letter V one and a half times the length of any other dash. There's nothing quite like practical examples to work with and the program comes with a Manual Character file that contains some typical stylised Morse that can be used as a good starting point.

Directly associated with the Character files is the Speed Definition file. This specifies the overall element relationships at different speed settings.

With this file you can adjust the various spacings to suit different Morse styles. This is particularly relevant for the slower speeds.

If you generate slow Morse with the correct timings you tend to lose the vital rhythm. The solution is to use what's known as Farnsworth spacing where the slow overall speed is achieved by increasing the inter character spacing but keeping the character speed at around 12w.p.m. or higher.

The speed file gives the operator the facility to alter both this spacing and the dot/dash length.

**Extensive Features**

Given the extensive features associated with character definition, it's no surprise to find that Instructor Morse has a wide range of test facilities. Not only can you develop your conventional hand received Morse but you can learn to receive direct to a keyboard.

Mike Richards
G4WNC takes a look at what must be one of the most comprehensive Morse tutors available.
Typical screen display of Instructor Morse program as reviewed by Mike Richards G4WNC.

It's this latter feature that gives the package particular appeal to the military and commercial establishments. The monitor feedback shown on the tests is found via the 'Predefined Test menu.'

In addition to sending random groups of any combination of letters, numbers and punctuation, you can access special profile tests. These provide a very advanced learning system that can tailor the test in line with your measured weaknesses.

The system works by taking the results of each typed test and building a file of the most common errors. Clearly this only works if you are receiving tests via the keyboard, but nevertheless, it's a very powerful learning aid.

There are also a number of special tests designed to expand the application of the program. If you want to concentrate on a few specific character combinations, you can use the 'Predefined Test option to build individual tests.'

Closely related to the 'Predefined Test was the fill option.' This enabled the operator to specify a number of problem characters that could be automatically inserted into one of the other test types.

To help with the development of high speed reception, Instructor Morse included a 'Speed test.' This worked by continually repeating a short phrase. By running this at high speed you soon start to pick-up the new rhythm.

To aid the introduction of new students there was a novel 'Audio/Visual test mode.' This operated from either pre-defined or random tests and displayed each character in graphical format taking up most of the screen.

Sophisticated Simulation

Just to complete the options of this comprehensive package there are a range of sophisticated QSO simulation options. This amazing feature gave the operator all the tools to create realistic QSOs that could really test the student.

The operator has complete control over the simulation including the addition of styled Morse along with realistic noise and fading effects. To make the most of this you would need to fit a SoundBlaster Pro sound board in your computer.

To support the wide range of features there were a number of utilities. Included within this was access to the configuration file which defined the initial set-up parameters of the program.

Professional users will be pleased to hear that the program can be password protected so that students have a restricted level of access. This restricted access protects the system from modification by the student.

Summing Up

In summing up, I must say that Instructor Morse is certainly the most comprehensive tutor system that I have encountered. It doesn't surprise me to learn that the system is in use by the Army, Navy and Air Force for advanced wireless telegraphy training.

For the amateur, Instructor Morse has applications not only in achieving test standard but for on-going development. I can add my whole-hearted recommendation for this excellent package. The program can be purchased in a number of configurations and the prices are shown below (all include P&P and VAT):

Product Inclusive price
Base Level System (BLS) £59.34
BLS plus Simulation (SIM) £88.71
BLS plus Keyboard reception (KBR) £89.89
BLS plus Sound Card £76.96
BLS plus SIM + KBR £119.26
BLS plus SIM + SC £106.34
BLS plus KBR + SC £107.51
BLS plus SIM + KBR + SC £136.88

Please note that a separate SoundBlaster Pro card is required to support the sound card option. Instructor Morse can be obtained from Software Design Ltd., Elgin House, 42 Westgate, Seyford, Lincolnshire NG34 7PN.

My thanks to Software Design Ltd for the loan of the review copy.

PW

If you're travelling long distances to rallies, it could be worth 'phoning the contact number to check all is well, before setting off.
Short Wave Listening
Then and Now – A Personal View

In an age of ever expanding information technology and evermore efficient and powerful transmitters, it seems that there’s less and less room for what used to be called ‘the shortwave listener’. Now a days the term appears to embrace anyone who listens to a radio and/or watches a display/printout for any purpose other than for pure entertainment!

For many in the 50 plus age bracket, any references to the past are likely to evoke misty-eyed nostalgia for the, alas long gone ‘good old days’. Transmitters were fewer with a lot lower power, and generally created less clutter. At the same time widespread electrification had yet to arrive, with its well known static and interference creating properties. The art of SWing then still involved a certain ‘mystique’. Most equipment was largely ‘home-brew’ or modified ex-WD stock - in the shape of an R1155 or a BC453 type set.

Set Of Coils
In the ‘good old days’ there were also a range of sets in use. Ownership of an HRO with a full set of coils, or an SX28 or an AR77, immediately generated great envy amongst friends! In general, the pace of shortwave broadcasting, in those days, was pretty sedate.

Today, the bands above 5MHz are packed with high power transmissions beamed to all corners of the globe. Many stations are in competition as countries try to ‘out-shout’ the opposition. In this process many lesser, but often more interesting stations, are totally submerged.

The predominant languages these day appear to be Russian, East European and increasingly, Arabic. However this does tend to make it more interesting at identification time!

Inexpensive Equipment
Luckily, for those interested, there are still plenty of the smaller fry broadcasters left around the world. Many can, conditions permitting, be heard in the UK using relatively inexpensive equipment and simple antenna systems. With simple antennas I mean a length of wire three metres above the ground for the 2.2 to 2.5MHz band, or Windhock in Nambia along with others from southern Africa in the 90m band. All of these stations have been heard in the mid to late evenings.

There are now whole areas of communications in which ears are ‘surplus to requirements’ for example, FAX, press, weather and numerous others types of transmissions. In some fields, people are no longer required because a synthesised voice is cheaper and more efficient. Followers of these specialisation’s are certainly enthusiasts but I think they hardly qualify as s.w. ‘listeners’.

Hear Real People
Fortunately, there are still many areas where you can hear real people carrying on their routine, but important, everyday tasks. These include h.f./v.h.f. air traffic control or in the field of coastal marine operations.

No view of the subject would be complete without reference to a favourite receiver or a ‘magic moment’. And amongst my many happy recollections are those of a much prized CR100, with its wooden roller/paper strip dial and superior selectivity - not to mention the sheer weight! An even more prized - and even heavier - AR88 receiver was acquired in the late 60’s to be followed quickly by an AR77.

Both the AR88 and AR77 sets finally expired in 1988. This was when the AR77 mains transformer quietly ceased to ‘transform’ and the AR88 wafer switches finally ceased to respond to switch cleaner.

The gap has been ably filled with a Kenwood R5000, with updated filtering and a v.h.f. tuner. It may not have the character of the older sets, but I believe it represents just about the best all round performer currently available anywhere. Having said that, the AR77 had few competitors when it came to m.w. DXing or sorting out the Sunday pile-up on 7MHz - the slow motion bandspread and crystal filter made it all seem so easy!

The AR88 was probably the ‘friendliest’ receiver I ever owned, but pride of place has to go to a 1930s ‘BTH 1 Valve SW Converter’ which arrived as a gift in the mid 1940s. When the convertor was plugged into a 5-valved ‘Cossor Melody Maker’, of 1930s’ vintage, it became my passport to the world of shortwave radio. This fired me with an enthusiasm which may have occasionally become dormant, but it remains undiminished.

Magic Moments
As for the ‘magic moment’, I recall my initial sorties into shortwave being filled with exciting incidents. But those apart, my ‘moment’ came on my birthday in June 1988, when for the very first time in more than 40 years of listening I heard the Radio New Zealand Bellbird call, via the old 7.5kW transmitter on 12.045MHz. That I felt was a very definite case for verification!

Finally, there is the inevitable question, is it just that things are different now a days or were they really ‘the good old days’? I think I prefer to believe they were ‘the good old days’.

Roy Merrall, short wave listener, gives his personal view on short wave listening.
This month I've received a steady supply of letters regarding items purchased at rallies. They normally start: 'I've managed to pick up a bargain at the local rally'. Very often the item acquired is a system unit, sometimes with a monitor and maybe a keyboard, sometimes with drives, often without. These usually have a name such as, WANG or COMPUCOR or whatever.

Usually there's no manual or software. Now for the punch line, (which always follows). Where can I get some software for this machine...? I only want to use it for amateur radio work?'

If the writer has included a stamp I'll reply the best I can. For those who haven't supplied a stamp, or haven't yet asked, here are my views.

**Likely Scrap**

I'll be as kind as I can, but quite honestly, what you've paid for is most likely to be SCRAP! Now I don't mean to offend, and in your case I could be wrong. So I'll explain what I mean.

Many years ago, when desktop computers were still rare, very expensive and before the advent of the IBM compatible PC that we all know and 'love' today, many companies had computers 'designed' for their own use. These would be made by any one of a number of manufacturers (such as WANG). From the outside (and often from the inside) they'd look identical. Nearly all the computers mentioned used the Zilog Z80 chip as the main processor, or c.p.u. They would normally run CP/M (an early form of DOS) as the operating system. This is where the problems start. The operating software was usually written for THAT computer and specifically for that company's own needs. This means you are unlikely to get the system going with anyone else's software.

Let's look at what you could have. If the unit has a power supply this may be of some use. If there's any floppy drives in the case they also could be used. If the case looks alright it's possible you can remove the main circuit board and, with a bit of ingenuity, fit a 'standard' XT (8086) or AT (80286/386) motherboard in it's place.

You'll need to make sure that you have enough height in the case for various cards to 'plug in', such as video, drive controller, Serial and Parallel ports, etc. Any cards that were fitted originally will probably be of no use to the 'upgrade'. It's possible that any floppy drives fitted will work OK, and if a hard disk was fitted this may work. It is likely to be an MFM (Modified Frequency Modulation) drive, but without any data you're going to have a lot of trial and error to contend with. If a monitor came with your system this won't work with the new upgrade, but the keyboard might.

Now don't get the wrong impression, these suggestions are to help those 'out of pocket' unfortunates recoup some of their money. One vital point to note is, if you have no idea of what you're looking at then either ask a friend that does, or leave it alone.

**Dumb Terminals**

Another type of machine that is often seen at rallies, and can be of use in the shack, is a Dumb Terminal. These come in the form of a metal cased monitor, with keyboard attached (see Fig. 1). On the back you'll find a Serial (RS232) socket. You can plug a TNC into this socket, and you're on the air.

All the commands and text are typed directly at the keyboard, but there's no way of installing software, or saving anything (that's why they're called 'dumb'). However, as these are advertised for between £5 - £15 they could be the ideal way of setting up a low cost packet station.

I hope this information has been/will be of use to some of you. Why not write or saving anything (that's why they're called 'dumb'). However, as these are advertised for between £5 - £15 they could be the ideal way of setting up a low cost packet station.

I hope this information has been/will be of use to some of you. Why not write and let me know?

**New Zealand Amstrad**

I received a very nice letter from Alex ZL4TGJ in New Zealand. Alex has an Amstrad CPC 6128 and would like to put it to use in the shack. What he needs is software (or information about where to get some) for amateur radio use.

Alex would like to use the 6128 on packet, but also requires a TNC or modem plus software. If you can enlighten him, please drop him a line, he'd be pleased to hear from you. The address is as follows: Mr Alex Pettigrew ZL4TGJ, 384 McQuarrie St, Invercargill, New Zealand.

That's it for this issue. Next month I'll be looking at a new computer book for beginners. As always, I look forward to hearing from you. 73 de Peter, GOGSZ @ GB7LDI, or: 2 Mayes Close, Norwich NR5 9AR. Tel/Fax: (0603) 748338.

Fig. 1: A Dumb Terminal.

Fig. 2: A PC look-a-like.

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Welcome to ‘Valve & Vintage’. And, as usual I’m starting off with your letters.

The first letter this time is from Yorkshire, and it mentions the first receiver built by Victor Walkley (Huddersfield) in the 1930s. Victor’s receiver had one triode valve, a Cosor 210HF, which he later changed to an Osram HL2.

A few years later, Victor was among those people who heard a live Joe Louis fight direct from the USA on the short wave broadcast bands.

Victor remembers visiting London and the Caledonian markets in the 1930s. Here he saw “magnificent crystal sets with huge Ebonite panels and control knobs of similar size, coils and condensers, valves and 0-V-0 receivers, all for the price of a few coppers”.

You’ll upset my readers saying that Victor! But honestly folks, this was the case in government surplus and general second-hand shops right up to the late 1950s. Radio goodies were sold cheaply, before any of us fully realised the historical value of radio equipment.

However, this is the 1990s with entirely new technologies and the ‘old’ valve gear is much sought after and, not always by wireless enthusiasts. For example, military vehicle collectors and museums, who are restoring armoured-cars, radio trucks and tanks, are usually looking for ‘19’ and ‘38’ sets and their accessories.

Ron Ham welcomes you once again into the warm atmosphere of the PW wireless ‘shop’. Just watch out for those 2V accumulators on charge in the corner!

**Churchill Tank**

I found a book entitled *Churchill Tank*, HMSO, ISBN 0 11 290404 1 in the reference section of Chichester library. This gives a great deal of technical information about the tank.

The book has sketches on pages, 59, 60, 128 and 131 showing the WS-19 in position. Below, it shows a WS-38 in what looks like a special housing for the set and its battery box. I think this is the WS-38 type AFV.

**Loud Speakers**

Now, let’s look at loudspeakers. In the early days, it was most likely that the sound output from a bread-board set in the mid 1920s and early 1930s would have come from a moving-iron or a horn loud speaker.

The moving-iron speaker had a paper-cone. It was usually mounted inside an ornamental cabinet. Horn loudspeakers had their sound units, like an overgrown earphone, inserted into the base of what resembled a large ear trumpet.

There were also novelty loudspeakers, like the coloured china parrot in Fig. 1, which appealed to some people. This particular speaker was a wedding present to a couple in 1929, and was given to the Amberley Chalk Pits Museum when the owners died.

Now, take another look at Fig. 1 and you will see that the bird is perched on a rock which in turn is mounted on a gunmetal? (a form of bronze) base. The rock itself is an inverted basin and the sound unit, as used on the horns, is mounted on cros-bars at the top of the base plate.

The sound output from the parrot speaker is sent upwards from the unit. It’s then reflected back down by the glazed walls of the inner basin and out under the feet.

Amplifying sound using the method in the parrot speaker was not uncommon. I found this out after interviewing a variety of early listeners.

Many people told me how they laid the headphones from their crystal set in a pudding basin. This enabled other members of the family to listen-in. I mentioned this while giving a talk on the workings of a crystal set, when, an ex-armoured car driver from the desert campaign in the Second World War spoke up. He told me how they used to cut a petrol tin in half and laid the headset, from a WS-19, inside the bottom part so that all the crew could hear the news.

**Heavy Accumulators**

Alan Hobden (Ninfield, Sussex) told me that during his service life in England and India, he used two very heavy duty 6V accumulators, in wooden cases, to run the WS-19. Alan wrote: “I don’t think it would have been ‘on’ to use the vehicle battery in case it was discharged in radio use and then being unable to restart the engine”.

Alan says that he’s personally discharged batteries on Schemes (a Second World War expression for army exercises) of 48 hours or more. And, of course, he would have been stranded.

I also spoke to another ex-signallman, who told me that these hefty batteries were called ‘Dags’. This was because they were made by Dagenite, and the men who did a round of changing them for freshly charged accumulators were called ‘Dagbashers’.

**Military Receiver**

Can anyone identify the military communications receiver shown in Fig. 2? The set was given to Henk Meerman (Aerdenhout, Holland), and he says that it works and looks “very British”.

You’re quite right Henk, the receiver is British. In 1976, I had one and its matching transmitter. Both had a green metal lid that was fixed by screws to the outer edge of the case (top and bottom in Fig. 2).

I put the pair on display with other Second World War ‘special operations’ sets such as the B2 and MCRI. The whole assembly was recognised by an elderly lady who had used clandestine radio in
occupied Europe during the war.
As far as I know, none of the British sets that were made for this work had a maker’s name for security reasons. The receiver owned by Henk, looks original, except for the power socket on the lower right. Henk should be able to get some more information from a military museum, or from old-timers at his local radio club.

Incidentally, I live near to the Royal Air Force Association’s (RAFA) home ‘Sussex Down’. Every year, the Royal Dutch Air Force send a plane over to ‘bomb’ it with an Edam cheese!

This year, the RDAF ‘bomb’, dropped by parachute, was bang on target in the grounds. Of course the local press were present to see the event, which is all part of the close relationship that exists between the RAF and former members of the Dutch resistance.

Royal Navy
Another famous set from the Second World War, used mainly by the Royal Navy, is the Marconi CR100. Fig. 3. This particular set, built in 1941 was used after the war by the late Ron Scutt.

In recent years, his son, Peter took the CR100 out of storage. He asked specialist restorer Cyril Owen of 28, Chartfield Rd, Reigate, Surrey RH2 7J2 to renovate it.

Cyril Owen restored it, and “the set is now performing as new”, says Peter. He added that Cyril had completely stripped it down, gave it a repaint and replaced suspect components and a few valves and realigned the receiver.

At this point I must include a reminder to any of you who now intend to contact Cyril for advice. Please don’t forget to enclose an s.a.e.

Should any of you find a CR100 in original condition, it’s almost sure that all the coupling, decoupling capacitors and many resistors will need renewing. Also, check the dial drive cords, because, if these are sloppy the tuning will be spotty on all ranges.

The audio output was distorted on one CR100 that I had in for repair. This was caused by a leaky grid coupling capacitor to the output valve.

It was an easy enough job, but where was the faulty capacitor?

After a search among the wiring I found the (paper) capacitor underneath its own metal screen on the base of the chassis.

Front Panel

The photograph Fig. 3, shows the clarity and simplicity of the front panel layout and controls on the CR100. For instance there are h.f. (front-end) and l.f. (audio) gain controls on the middle left and bottom right of the panel.

The antenna trimmer and b.f.o. pitch controls are on the right of the main tuning (centre) knob. While the a.v.c. on/off switch is to the lower right of the tuner.

To my mind, the CR100 has two important features that were no doubt designed with the Navy’s operators in mind. One of these is for c.w. reception, which was so essential at that time for ships at sea.

On the CR100’s front panel, there’s a five position pass-band selector (on bottom left). This can narrow the receiver’s selectivity from 6kHz to 100Hz. Having used a CR100, I know that this selector coupled with careful b.f.o. adjustment and the ultra slow motion dial makes the receiver a joy to use on a Morse code signal. The other major feature is the main tuning arrangement.

Firstly, each time one of the six wave-bands on a CR100 is selected by the wave-change switch (lower left of centre), a drum is rotated. This carries the calibration of the required range into position.

The photograph, shows the drum behind the upper oblong dial glass on Range 5 (4 to 11MHz). When the pointer on this dial (far left) is moved by the main tuning knob (centre) a dual logging scale is rotated in the centre of the panel.

Military Wireless ARS

“John Taylor-Cram, of the Military Vehicle Trust has started the M.W.A.R.S.,” so wrote Jim Cookson G4XWD (Kidderminster) on July 10. The annual subscription for the Military Wireless Amateur Radio Society is £5 which includes a newsletter every two months.

Members and non-members meet around 0830GMT, on a Saturday morning net between 3.605 and 3.620MHz, to test old military equipment. So far, Jim has used and had good two-way results with such sets as C11, C12, C13, TCS12, WS-19 and a ZCI MKII.

Jim tells me that G3LEO (N.Yorks) has used a WS-19 and “a very potent T1154”. Readers who are interested, can contact Jim on (0562) 823674. He also has a good library of wartime equipment and is prepared to help readers with photocopies on a swop or similar basis.

Parts And Information

“Are there other people, like myself, who restore old sets but have difficulty in obtaining parts and information?”, writes Pat Taylor (Ewell, Surrey). Pat is a keen restorer and collector of Second World War radio equipment, and is currently working on an ex-RAF R1132A.

Firstly Pat, I suggest you try our advertisers, or one of the armed forces museums for a manual. Secondly, keep an eye open at junk sales for scrap sets which you can later cannibalise for original bits.

Finally, (and this applies to all readers of ‘Valve & Vintage’) I’ll be pleased to put your request for help in this column. However, I must have permission to publish your address, so that any replies can come directly to you.

That’s it for this time. I must close up the ‘shop’ once again, but don’t forget you can always write to me at: ‘Faraday’, Greyfriars, Storrington, West Sussex RH20 4HE.

PW
Paul Essery GW3KFE takes his monthly look at the h.f. bands, starting off with some advice on DX operating.

I’ll start this month with some advice on DX operating. If a DX station is say S7 on your meter then you are laying down a roughly similar signal at their end. If they have a linear and you are barefoot, translate that into an S5 signal from you to them. This is because both antennas are involved in both directions. Now, S5 in heavy QRM is a known factor, so you begin to have a ‘yardstick’ to determine whether or not this is worthwhile. If it isn’t, or if they aren’t taking Europeans, don’t add to the rumpus. Just wait until they are workable.

Always remember if you can hear them, they can hear you on a clear channel; ergo either you are under the QRN or they don’t want you to work you! Talking of scores, don’t forget the momentous changes going on in Europe. There must be over a score of ‘new ones’ about, what with the break-up of the old USSR into 15 new republics, Czechoslovakia and Yugoslavia likewise. All are ‘local’ but all are new countries!

News And Conditions

Now for some news and conditions. At the moment, although Rome is being lumped together as their callsigns again, says The OY6A and 7Q7XX. On the other hand, the DXCC desk say they have not received any documentation relative to 3V8AS - so I must assume that this was a piratical operation even though QSLs have not received VU7SFI/API, and ZXOF. On the 7MHz bands. Still on 7MHz and despite his recent illness, G2HKU has managed the odd QSO on his G5RV and Omni-v. The QSO with HK1XX at 0600 was a good SB and with W2EWD at 0600 with no QRN or fading.

The second contact, W2EWD was using an old Heathkit 1861 and receiving with an SX101. At 79 he has been licensed for 60 years.

The 10, 14 And 18MHz Bands

On 10MHz 2EOACN used the DXO transmitter at 400mW and a Sudden receiver for his one contact with SM7FG. John comments that the novice bit of this band is cluttered with s.s.b., FAX and packet. Come on folks, let’s give the Novices a chance!

For his contribution G2HKU was pleased with VP2EXX/HI7, 4LOG, and a S6 and with W2EWD at 0500 with no QRN or fading.

The 3.5 And 7MHz Bands

Now it’s up to the 3.5 and 7MHz bands. On 3.5MHz 2EOACN remarks about the nice contacts with F2WW in particular, not to mention 65LO.

On 7MHz I’ll start with Eric G0KRT in Worcester Park. He uses the Lake DTR7 into the top half of a W3EDP antenna fed against a quarter-wave counterpoise. Eric remarks on the number of people who give an RS and then ask for a repeat of the call. Alas the lids never learn!

The little DTR7 rig gave Eric G2IVHC, HA5KF/F1, OK1DMS, and EA3GAS/F7 when G0KRT was not at the Open University summer school. Still on 7MHz and despite his recent illness, G2HKU has managed the odd QSO on his G5RV and Omni-v. The QSO with HK1XX at 0600 was a good SB and with W2EWD at 0600 with no QRN or fading.

Leighton Smart GW0LBI at his QRP Station.

Leighton Smart GW0LBI in Trelewis also noted the Sporadic-E on the 28MHz band, and managed to put his QRP out to S51J, F1PNP/QRP, DJ3HJ, and HB9KNV. The second letter from him adds F5TS, E6ACK and DL2X/P/QRP.

Names And Thanks

No space this time to do more than just mention names and say thanks for all the information you send in, to Robin Guppy (Wescliff-on-Sea), Geoff Crawley (Iceland), Simon Griggs (Chelmsford), Gerald Bramwell (Swinton) - and of course to DXNs. The DX Bulletin, The Canadian Amateur from CARE Thanks to you all. Without you, there would be no column. Deadlines: Middle of the month, as usual, and to the usual address. 'Bye for now!'
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Please mention practical Wireless when replying to advertisements
This month Pat Gowen G3IOR has news of latest OSCAR-13 and ARSENE moves to the S with s.h.f. downlink bands, and provides the latest MIR information.

The OSCAR-13 satellite is currently spinning at 25r.p.m. This produces some change of amplitude at this rate when the spacecraft is not beaming at the user. At times, due to a poor sun angle and a marginal power output, the low voltage alarm trips. When this happens, the beacon will go off and the transponder will automatically switch to a mode receiver is in perfect condition. In conjunction with the provision of a transponder apparatus or enough power may go with it. For those with its popular 144MHz greater blow, is that mode J, may be used for small parts of the orbit.

Changing Mode

The transmitter section of the OSCAR-13's L mode, 1280 to 435MHz transponder, appears to have stopped working for good. No cause has been established. The transponder a.g.c. and power output telemetry both read correctly. But the transmitter temperature indicates an off condition. The unit has exciter power, but possibly not p.a. power. It is not such a serious loss, as the mode never really worked well. The mode took a great deal of power from both the users and the battery. It took more than B and S modes combined, and it could only be used for small parts of the orbit.

What may be a far greater blow, is that mode J, with its popular 144MHz uplink and 435MHz downlink may go with it. For those without allocations, apparatus or enough power for the 435MHz to 145MHz mode, the J mode was a Godsend.

Fortunately, OSCAR-13's S mode receiver is in perfect condition. In conjunction with S mode it's providing telemetry and a greatly superior command link than B mode does. As a result, the satellite controller James Miller G3RJH reports the provisional transponder schedule from now until October 9 this year is as follows:

Mode B: MA 0 to MA 60.
Mode BS: MA 60 to MA 120
Mode S: MA 120 to MA 145

(This mode has the S mode transponder on, but the B mode transponder off).

Mode S: MA 145 to MA 150

(This mode has the S mode beacon on only).

Mode BS: MA 150 to MA 210.
Mode B will be on from MA 210 to MA 256. The omnidirectional antennas will be used between MA 230 and MA 40. Finally, OSCAR-13 will be moved to an attitude of 210/0 on October 25.

Using S Mode

James G3RUH has recently promoted the virtues of S mode in a very practical article. This was published in the AMSAT-UK and AMSAT-DL's newsletters.

Ed Krome KA9LNV writes in the AMSAT Journal on building the 'Down East Microwave' pre-amplifier and converter kits which are available. Getting on the S mode is not so difficult as you might think.

As G3RJH says: "it's worth reiterating that a 600mm dish with a 'noisy' 1.8dB noise figure down-converter is adequate for AO-13 mode S reception, as (barely) is a 16 turn helia with a low noise 0.6dB noise figure device.

This performance equates to a Gain/Temperature ratio of G/T of 0.5 K-1, or equivalently a sun noise increase of about 1dB. These antennas are physically small, and will even work indoors".

James concludes: "This opportunity to sample S mode reception has never been bettered in amateur satellite history. Try it!"

Higher Frequency

Another good reason for going to the higher frequency satellite bands is shown by Fig. 1. It's a population density chart of the 145 to 146MHz and 435 to 438MHz space band allocations prepared by Freddy ON6UG.

Fig. 1: Population density chart of the 145 to 146MHz and 435 to 438MHz space band allocations prepared by Freddy ON6UG.

For future satellites. Even the current satellites are competing!

ARSENE Beacon

Despite a fully functional launch sequence, the first hearings of the Mode B ARSENE beacon showed a very poor signal. I could only just hear it on an ultra-low noise receiver with my 2 x 13-element right hand circularly polarised trained Yagi antenna.

When ARSENE was successfully orientated and boosted to its intended far higher orbit, the 145.975MHz signal disappeared completely! It can only be assumed that the severe launch vibrations must have damaged the p.a. or detached the antenna or both.

The French command team soon switched the transponder to S mode, where although signals were at least 12dB weaker than those of OSCAR-13's S mode, signals were useable.

Masaji JH1AOY, was the first to report successful results. His mode S antenna was that used for OSCAR-13, with a home-brew 2m diameter parabolic dish, plus a 2.5 turn helia antenna. The helicopter antenna then feeds a commercially available 20dB gain h.e.m.t.

(high electron mobility transistor) preamplifier. This goes to another commercial h.e.m.t. down converter to take the 2446.54MHz down to 144MHz, and finally to his FT-726. After linking to himself, JH1AOY called CQ for one hour on the 435 100MHz uplink, but no one responded to him.

Other stations known to be active include Shirou JA3GCT using an 80-element twin loop array. There's also Toshimori JR4BRS with a helia, Tango JR8XPV with a loop Yagi, Shyuji JAE7EC using a 1.8m dish, Robert DD4YR with a 1.2m dish, Georges F6HLG and F6CBC both with 3m dishes, Butch WBKAG and I6PNN.

Masaji says that the trick of the trade is to find the 2464.47MHz beacon. You should then make the required correction to find the downlink frequency.

The uplink power needed should not exceed 500W to 1KW e.i.r.p., as there is a strong a.g.c. into the u.h.f. receiver.

That's all from the world of amateur radio in orbit for this month. See you next time.
David Butler G4ASR says he's got news of tremendous July Sp-E openings and that the 50MHz had fleeting openings to North America. David reports that on the 144MHz band there were also openings into the African continent!

Opening Commened

At my QTH (IO8I) the 144MHz opening commenced at 1755UTC, lasting until 1805UTC. During that time I managed to make two s.s.b. contacts with the Canary Islands (IL18) at a distance of 2900 kilometres. Single-hop QSOs were also made with stations in Portugal (1M58) and Spain (IN52). Interestingly, during this time the only stations I could hear on the 50MHz band were located exactly the same squares and countries.

Later in the evening, between 2035-2055UTC, the 144MHz band opened up again. I managed to make more contacts with stations in Portugal. I also heard CN8ST but he was very weak.

The Moroccan operator CN8ST (IM63) had a great time, working stations situated in E1, G, D1, CM and GW. He was using a Trio TR-9100 last there by GM0BQM. So it was fitting that Tari's famous contact was with GM0BQM!

Mike Robertson GM0BQMP (IO8I) made the most of the opening by operating from a local hilltop. Apart from the contact just mentioned, he also made a total of nine contacts with stations in Portugal.

Although many stations made contacts with Morocco, some did better than others. Both GM4QRE/G and GM4JLJG managed to work CN8AS, CN8NH and CN8ST.

Brian Jones G8ASSO (IO8I) observed packet radio signals on 144.650MHz from CS1CRE and CTIASP. Only a couple of transmissions were received, but they did include text.

Hong Kong

Now it's over to Hong Kong where Graham Dhuey GM8HHI has been domiciled for the past year. Active as VS8HYT, on June 6 he made

Report

David Butler G4ASR

Last month I reported about all that superb DX that was worked via Sp-E on the 144MHz band during June. However, one opening just missed the PW deadline.

The June opening occurred on the 27th at 1620UTC. Stations in Cornwall, Devon and South Wales worked into Morocco, Africa.

Some good, but brief DX contacts were made with CN8NH (IM63) and CN8ST. At the same time, stations in Cornwall managed to work into the Canary Islands.

Sp-E activity during the month of July declined from those in June. It still occurred nearly every day on the 50MHz band, but only managed to reach up to the 144MHz band on July 8, 16 and 18.

First Recorded

The first recorded 144MHz opening of the month on July 8 was quite interesting. The main propagation was to south-east as Fig. 1, shows.

However, a more unusual path to the north-east also existed. Most stations missed this one, but Jim Smith G0OOF (IO90) didn't.

Between 1643-1719UTC Jim worked SMSAQJ (JO99), SMSMIX (JO78), SPB87T (KO10). He also worked SP9BIJ (JO90), HG6NJD (JN88) and S56HCE (JN75).

Another station to notice the Sp-E propagation to Sweden was Dirk Ernesti DDL3DL (JO31). At 1716UTC he heard the Oestersund (central Sweden) aircraft beacon, OS0D, on 115.400MHz (JP73).

Unfortunately, nothing else was heard on higher frequencies. Did anyone else catch this northern opening?

I missed the path to Sweden but I didn't miss the opening! Between 1955-1742UTC I made s.s.b. contacts with 4 x HA, 2 x OK, 1 x OM, 4 x SP and 4 x YU stations.

I also had a c.w. QSO with RB5WU (K020). He runs 100W and 2 x 4-element Yagis. Unfortunately he was on 144.300MHz the s.s.b. calling frequency!

Apologies to the G7 who told me off, but sometimes you don't have any choice. And if he's reading this now I would like to point out that the area between 144.150-144.500MHz is allocated to s.s.b. and c.w.

Vince Shirley G0CRC (IO8I) first time across the opening at 1711UTC. He then went on to work 5 x YU, 7CSB (JN71) and LZ2FO (KN18). Vince uses an Icom IC-251E with MuTek front-end board, 250W and a 18-element Yagi.

Gavin Stirling GM7LVJ (IO85) in Edinburgh reports that the opening, at 1718UTC, was very brief at his QTH. It only lasted a few minutes, but he worked KG8BY (JN61).

Gavin's station consists of a Trio TR-711E, Nag amplifier running 250W, a mast-head pre-amplifier and an OZ5HF 9-element SI, the QSB was quite rapid. Colin suggests that this may be because of some high altitude level are correlated with polarisation changes through the E-layer region.

Mark Holloway G4YRY (IO80) says he's been regularly monitoring Band II f.m. broadcasts as an early indicator of Sp-E openings. He finds it useful to listen for stations in the range 100-108MHz.

Stations are identified and Mark notes the skip distances. Signal strength and sudden changes in level are correlated with openings on the 144MHz band.

Mark reports that he heard broadcast stations from Tenerife on July 10, 17 and 18. The signals on July 18 were such that he guessed the 144MHz band might open later in the day. On this occasion he was correct and he went on to make s.s.b. QSOs with EABAGA, EBBALZ and EBBATV between 1822-2055UTC.

Central Europe

The Sporadic-E clouds must have been dotted all around Central Europe, as the first contact between Algeria and the Czech Republic was also made on July 8. Seghir 7X2DS (JM16) was particularly pleased as it was his first ever Sp-E contact.

Seghir used a Trio TR-9000 transceiver, 10W and a 10-element Yagi. He successfully made a s.s.b. QSO with OK2KZJ (JN89) at 1620UTC.

I've only received two reports about an opening on July 16, so I guess it was a short affair. Around 1730UTC, the stations of 50UZ (IO82) and G0KUN (IO90) both reported working into Hungary.

The next Sp-E opening on the 144MHz band occurred on July 18. It was excellent and many stations around the UK reported working into the African continent. The map, Fig. 2, will help you visualise the distances involved. During the afternoon around 1600UTC, Colin Morris G0CZU (IO82) heard a weak Spanish speaking station on 144.200MHz (JP73). There was an 'echo' (8) in the call sign and he guessed that it was EA4 as there was no sign of tropo to Spain.

At 1728UTC the same weak signal appeared again and a difficult contact with EBBATV (IL18) resulted. Colin then went on to make two more s.s.b. QSOs with EA8 at a distance of nearly 3000 kilometres.

A total of four contacts with Portugal and Spain were also made. Colin noted that when the signals were weak, around S1, the QSO was quite stable.

However, when the signals got stronger the QSB was very deep and rapid. Colin suggests that this may be because of polarisation changes through the E-layer region.

Wireless, October 1993
the first 144MHz Sp-E contacts from VS6 to Korea (HL).

Graham first noticed activity on packet radio at 0132UTC. But it took an hour or so before a Korean station answered his call on f.m.

A total of five HL stations were worked on f.m. He also heard some Japanese stations on s.s.b., but was unable to attract their attention.

Another opening occurred on June 14 between 0132-0144UTC and more f.m. contacts were made with HL stations. On July 11 Graham finally cracked the JA path. Between 0312-0341UTC he made s.s.b. GSOs with eleven JA stations.

Early This Year

Finally, I'm going to sum up this summer's Sp-E openings on the 144MHz band. The season started early this year with an opening on May 12 to all call areas in Greece.

During June the band was open on 7 days. On June 8, between 0905-0925UTC, propagation was to the Czech Republic and Slovakia.

Around 1100UTC the band extended to Greece again. An excellent opening occurred between 1515-1915UTC on June 10.

Contacts were made over large parts of central and eastern Europe and the Mediterranean area. Early birds caught the opening between 0930-0940UTC on June 11.

The band was open to countries in the Yugoslavia/Italy area. It was a similar situation on June 12 when contacts could be made between 0900-0945UTC.

Another good opening took place on June 13.

Between 0945-1045UTC stations were worked in central and south-eastern Europe.

Later in the morning, around 1114UTC, there was a brief opening to Italy. The next recorded day of Sp-E activity was on June 20 from 0715-0815UTC.

Initial contacts were into Greece, followed by the more usual Yugoslavia/Italy area. The last event in June took place on the 27th around 1620UTC. It was quite brief but allowed stations in south-west England to work into Morocco and the Canary Islands.

The month of July provided openings on the three days which I've just described. So in total, I make that something like 14 openings during 11 days in May, June and July. Not a bad Sp-E season really!

Auroral Propagation

It is normally expected that auroral propagation during the months of June and July will be insignificant. Judging by the number of reports I've received this fact has been proved!

An opening occurred on June 10 between 2225-2345UTC, but apart from the station of G3MCS (IO93) working G4IFX (IP62) on the 50MHz band, all other reports were of hearing the UK beacons.

A weak aurora was detected by G4IFX (IO93) on June 9 at 2222UTC, but nothing was worked. Even less was noted during July.

Events were detected on July 2 and 7, but you had to be in Scotland or northern England to hear them. Over the next few years auroral activity will decline whereas Sp-E activity should increase. We shall see

The 50MHz Band

Conditions on the 50MHz band during July were dominated almost entirely by Sp-E propagation. Within Europe, the wealth of stations available was very similar to that which I recorded in last month's column.

Any new stations were DXpeditions or special operations. These included EV5DX (K035) and EV5M (K042) both of which were operated by DLSBAAC.

Rolf DK2ZF operated as UA2FDKZ (K004) from the U2ZFWA club station on the 50MHz and 70MHz (crossband) bands. He also found time to operate from locator square KO14 with the subkye different call sign UA2DZKZ.

Other expeditions noted during July included LAB8L/TF, DJ0/G/HSV and TK/F/SEMT. The San Marino club station 178A obtained permission to operate on s.s.b. and was heard doing a brisk trade. Previous operations have been exclusively on c.w.

The station of OD5SK in the Lebanon popped up on July 14 at 1340UTC and created some excitement. The OD5SK and SB4CY beacons were audible at the same time. No real African DX was reported, but the continent of Africa was available in the guise of CT3FT, EB8ACW and various C8N stations.

A number of multi-hop Sp-E openings to North America from the UK were recorded during June. They occurred on June 5, 11, 12, 14 and 25 and were covered in last month's column.

It was hoped that the North American path would be better during July, but only a few brief openings were noticed. The first was on July 7 when VE1IFZ heard the GB3BUX beacon at 1833UTC for about one minute.

During the following evening, July 8 at 2222UTC, the Canadian station managed to contact G0JHC (IO83) on c.w. but very little else was worked. It looked more hopeful on July 15, when stations in Belgium heard some W4s around 1940UTC but it soon fizzled out.

Well that's it. Help make my life easier by sending reports (and photographs) to me at Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP or via packet radio @ GB7MAD or the DX Cluster system.

END
At UA6LU may be found:
on the h.f.-port - a TS-130S with DFC-230, MFJ-1278 + WA8DOED Firmware, homemade KT-34XG 6 ele. Yagi. On the v.h.f.-port - IC-25A, SAATI (kit) TN2 + DED Firmware, vertical antenna. Complete the system is a PC/XT computer, 21Mb HD. BBS software is F6FBB V.5.14d.

The weakest link in our BBS system is the very old and slow computers (clock frequency only 4.77MHz) without hardware clocks. We have to set the time/date each morning, and power failures cause untold problems. The transceiver at UA6LU is not very stable and can't autoQSY. Boris has to retune his rig several times during the day for good forwarding.

The number of users is growing daily, despite difficulties in obtaining equipment. Most users have home-brew or modified commercial transceivers. Few of them can afford commercial TNCs, the majority using Baycom modems and software. We have a lot of problems with our clone XT machines, because of incorrect serial ports. All Russian XT clones use an Intel 8251 I.C. instead of the (original) 8250. We have to modify the port if we want to go on packet.

Different serial port addresses confuse many terminal programs, only Baycom works effectively with our computers.

The most distant user, located in the city of Taganrog (about 75km from Rostov), is the club station RZ6LZB. We think this is the first packet v.h.f. link between two different cities in Russia. Some users of UA6LU have access on h.f. as some don't have a local v.h.f. node. Local users in Rostov have the ability to access the ZS6WGH DX packet cluster via the gateway of UA6LU and ZS6AI-2 Node.

Lots of personal mail from Europe goes South Africa, Asia and Oceania, is forwarded through our BBS. We have very good routes to Australia, New Zealand and Asia via ZS6AI and ZS6BF. Lots of personal mail also goes from South Africa to Europe from Mike ZS6AI. Rachid ZB8FP forwards personal messages from Asia and Oceania to Europe if he has a problem with his link to PA0SCH.

If you have any old (even non working) equipment you no longer need, (v.h.f. transceivers, TNCs, modems or modem i.c.s such as TCM-3105, AM7911, XR2206, XR2211, computer parts etc) PLEASE don't throw them out! Rostov amateurs are skilled in repairing such equipment and will put it to very good use. This can only improve world-wide packet links. If you have any such gear that is no longer needed, please write to either: Michael Bondarev, P.O. Box 416, Rostov-on-Don, 344007, Russia, or to Boris Larionov, P.O. Box 2330, Rostov-on-Don, 344038, Russia.

If you can help in any way, why not drop Misha or Boris a packet message. I am sure they would love to hear from you. But space has caught up with me again! 73 and happy packeting de Roger, G3LDI @ GB7LDI, QTHR or tel: (0508) 70278.
Peter Shore takes his monthly look at the broadcast bands and brings you some interesting news on a new receiver from Grundig.

Recently there haven't been many new receivers introduced for the dedicated short wave listener. But the German-based Grundig company changed all that at the Internationale Funkausstellung in Berlin at the end of August. At this huge consumer electronics fair, Grundig launched the new Yacht Boy 500 receiver, retailing at about DM500 (£200 or thereabouts).

The Yacht Boy 500 is a smaller version of the Satellite 700 and features stereo f.m. with Radio Data System (RDS). It has a ROM table of memories and full coverage of medium, long and short wave bands.

I hope that I will be able to get my hands on a sample within the next few weeks, and bring the results of the tests to you here in JW before too long.

Collecting QSL Cards

If you enjoy collecting QSL cards with comprehensive verification details, then Radio Japan is right up your street. Reports have to be submitted to the station's verification secretary, Mr Kunitoshi Hishikawa, at NHK Radio Japan, Tokyo 150-85, Japan.

Radio Japan is on the air direct from Japan at 0500 on 21.61, 17.825, 17.81, 17.765 and 15.23; at 0700 on 17.86, 17.81, 17.765 and 15.17MHz; at 0700 on 17.86, 17.81 and 17.765MHz; and at 2300 on 17.81, 15.43, 15.195 and 11.815MHz; and at 2300 on 17.81, 15.43, 15.195 and 11.815MHz and via the UK relays of the BBC at Skelton at 0700 on 6.025 and 5.97MHz, and at 2300 on 6.125 and 6.05MHz.

Deutschlandfunk put out its final transmissions on the last day of June. Germany's Europe-wide broadcaster was then merged with Deutsche Welle, the overseas service. Whilst the times and frequencies remain the same under the new regime, identifications are now 'Deutsche Welle-English for Europe' in the English service. Radio Sweden's weekly Mediascan programme has reported that Lithuanian station Radiocentras has been transmitting Morse-code tests since mid-July. Using SKW, the Morse tests are in upper sideband and beamed at 250°.

Reception reports are welcome, with two International Reply Coupons, to PO Box 1782, Vilnius, Lithuania. Reception is good in Stockholm, says programmer presenter, George Wood.

Satellite News

I'll move on now from old fashioned Morse right up-to-date with satellite news. World Radio Network (WRN), which I have mentioned before in this column, has started to relay US National Public Radio on Eutelsat II-FI at 13° East. Programmes that can be heard are 'Morning Edition', between 1300 and 1400UTC and 'All Things Considered' between 2130 and 2330UTC.

Some readers may recall that 'All Things Considered' used to be carried on AFRTS, the American Armed Forces broadcaster, on short wave. At the moment the service can be heard on transponder 32H at 11.545GHz and the audio subcarrier at 7.74MHz. Meanwhile, World Radio Network will move to Astra in September, presumably on an audio subcarrier on the new 1C satellite. The WRN station is keeping things quiet for the moment, but I'll bring you details as soon as they are known.

Virgin 1215 AM is now on Astra, using the audio subcarriers at 7.38 and 7.56MHz on the Sky News transponder. There are also three Spanish language radio stations on transponder 3B, the audio subcarriers at 7.38, 7.56 and 7.74MHz.

The final short wave transmission of Trans World Radio in Bonaire in the Netherlands Antilles was heard on June 30. In future TWR will be relying on m.w. for local audiences, and may move to satellite, too. Radio Netherlands began broadcasting to Dutch troops with the UN peacekeeping force in Bosnia in July. Each Sunday the Flavo transmitters carry a 55 minute long Dutch language programme on 9.59 and 11.73MHz at 0830UTC.

Red Cross Broadcasting

With so much devastation continuing in the former Yugoslavia, and in Somalia, it is worth remembering to tune to the Red Cross Broadcasting Service in Geneva. You'll learn much about the work that the international humanitarian organisation is doing in the field.

The RCBS uses the facilities of the Swiss PTT to transmit their programmes (the same transmitters used by Swiss Radio International), and use just one frequency, 7.21MHz. Programmes are broadcast once a month, with English heard on the last Sunday of the month at 1100 for half-an-hour, repeated the following day at 1700. There has been a frequency move in the tropics. It appears that Radio Madagascar is now on 3.359MHz (give or take a few Hertz), having moved from 3.22MHz. The station is noted in the early evening, with closedown at 1900UTC.

The financial troubles of Albania have resulted in Radio Tirana cutting back some of its transmissions. One of the two half-hourly English language broadcasts has been cut in half.

The station is now on the air at 1430 to 1500 on 7.155 and 9.76MHz, and at 2215 to 2315 on 7.165 and 11.815MHz and on medium wave 1395kHz.

That's all for this month. Until we meet again in four weeks time, good listening!

Peter Shore takes his monthly look at the broadcast bands and brings you some interesting news on a new receiver from Grundig.
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Brand new £295.00

new price in excess of £1100.
A new ready-to-run product for amateur television is always welcome news, especially when it’s a reasonably high power transmitter for the 1270MHz band. There is something of a gap between the relatively low output levels around four or five watts and the high power (up to 150W) that you can achieve with, say, a couple of 2C39 tubes. The TX103 from TVT Communications, delivers a solid 20W and represents quite a reasonable compromise, especially as it’s all in one compact package and (of course) solid state (the number of watts you need at 13.8V is not stated!).

The TX103 marks a return to the ATV scene for TVT Communications, who produced some solid transmitters for 430MHz back in the early 1980s. Their designer works principally on commercial equipment these days, but he couldn’t resist applying his skills and today’s components to amateur television. I have not had an opportunity to test it myself but judging by the build quality, it should perform as well as it looks.

So what’s the specification? 13.6V d.c. supply; 20W r.f. output; three frequencies built-in; p.l.l. frequency control; pre-emphasis to CCIR 405.1; built-in subcarrier sound; adjustable video deviation; adjustable audio deviation; rated for continuous operation; temperature controlled cooling fan; size: 115 x 115 x 250mm, built into a high-quality enclosure.

The transmitter is comprised of an exciter and a built-in power amplifier. This is the first time such a self-contained assembly has been available in the UK for amateur use. It can be used as either a base or portable station.

Video input level is nominally 1V peak-to-peak into 75Ω but a front panel control is provided for manual adjustment.

Frequency control is accomplished by a crystal referenced phase locked loop (p.l.l.) and ensures that the unit will always be ‘on frequency’. The transmitter is standard with three frequencies, 1249MHz (RT2 input), 1270MHz (RT1 input) and 1295MHz (simplex). These are selected by a front panel switch to give the user all the commonly used UK repeater and simplex frequencies. Other frequencies are available to special order.

The transmitter has a built-in 6MHz audio subcarrier system with a front panel deviation control. The input level can be set for an electret condenser microphone, or audio of a higher level (power is supplied via the microphone socket to power electret microphone inserts).

The exciter includes a voltage regulator to ensure that power supply variation has no effect on either the radio or the audio subcarrier frequency. The exciter regulator produces a ±10V internal rail and will regulate with an input supply as low as 10.3V. Input d.c. power is applied directly to the Mitsubishi Power Amplifier Module to ensure there is no voltage drop and thus produce maximum r.f. output.

The manufacturers, TVT Communications, say the philosophy behind the design of the transmitter was to produce a unit that could be used anywhere, produce a high r.f. output power and be of sturdy construction as well as reliable. TVT think this goal has been achieved and I think they are right. The price reflects the specification, £399.95, although reductions have been seen at some rallies.

KM Publications, 5 Ware Orchard, Barby, Rugby, Warwick CV3 2BU. Tel: (0788) 891095, FAX: (0788) 891883 are the exclusive distributors.

Radar can make quite a mess of pictures on 1270MHz. On this picture from Germany it shows up as small, dark horizontal lines.

Cleveland
Callsign
John Thompson hails from Cleveland. His callsign is G3NWU but he might also answer to G6ACUT. This was the legend on the screen when he was last active on amateur television.

Based in Hartlepool, John is now returning to the fold and is keen to get going on ATV, using the latest technologies and the microwave bands. So far he is undecided whether to start on 1.2, 2.3 or 10GHz and is making comparative checks on band occupancy in his neck of the woods.

This is a good idea, as in some areas 1270MHz may well be pretty busy with packet traffic or radar ‘interference’.

John writes: “I have been doing listening tests on 10GHz narrow band, using a converted satellite TV LNB with SMA output connector to a German receiver made by SSB-Elektronik fixed in a box at the rear of a 600mm offset dish, mounted on its side on the chimney. The site here is only 40m above sea level, 1km from the beach, so I can test low-level ducts and sea paths.

The methods of propagation I am trying are forward scatter from rain storms and aircraft scatter along the main air traffic ‘lanes’ running north/south. Tests have been carried out with G3JVL in Hampshire, G3GJR in Exeter, G3ZFR in Dunstable, G1B6JX in Belfast and GM4I3SM at the Black Hill television transmitter site between Glasgow and Edinburgh.

The best results have been with G3JVL at 450km, on 172° true. Each test carried out at 2, 4, 6 and 8pm has worked but only a few of the 10pm tests were successful, when heavy rain scatter was available. The last two weeks have passed with about 90 per cent pass rate on c.w. If anyone fancies any tests please ring me and book a time on (0429) 274842.

“I am now looking for a constant radio signal as a propagation indicator of rain showers, perhaps some weather radar from the Met Office or the Civil Aviation Authority. Any ideas on frequencies and sites of suitable signals would be welcome. I wonder if Lawrence G3ILD is still active in Darlington - he used to be my regular ATV partner?”

Thanks for that John, good luck with getting back on ATV using the latest technology.

That’s all I’ve got room for this time, as usual your letters are always welcome to me at: 71 Falcutt Way, Northampton, NN2 8PH.
The PW Shopping Arcade
Welcome to the Practical Wireless 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let you eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other PW Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading PW1!

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2: We cannot give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.
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 problem adequately, with as much detail as you can possibly supply.
5: Only one problem per letter please.

Back Numbers

Limited stocks of many issues of PW for past years are available at £2.00 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of 85p per article or part of article.
Over the years, PW has reviewed many items of radio related equipment. A list of all the available reviews and their cost can be obtained from the Editorial Offices at Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW for a stamped self-addressed envelope.

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PW can provide a choice of binders for readers' use. Plain blue binders are available, each holding 12 issues of any A4 format magazine. Alternatively, blue binders embossed with the PW logo in silver can be supplied. The price for either type of binder is £5.50 each (£1 P&P for one, £2 for two or more). Send all orders to PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

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Components for PW projects are usually readily available from component suppliers. For unusual or specialised components, a source or sources will be quoted.
Each constructional project is given a rating to guide readers as to the complexity.
Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron.
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Practical Wireless, October 1993

For Sale

**AR-1500 scanner, £225, six months old w.f.m., f.m. and s.s.b. complete with case and 3in and 2in gauges, as new.** Mike FY0GZD. Tel: (0462) 343248.

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**Racal RA-117E receiver. RA63 144MHz carrier, ready for a scanner, or w.h.y.** Tel: 803345650 or (0926) 451216 evenings.

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**Edydyn model number EC10, EC15, 1001, Edydyn and loud speakers, and any other types, any condition considered for cash. Collection possible, also any Edydyn literature, advertisements or manuals.** Peter Lepino, Surrey. Tel: (0374) 128170 or (0027) 454381.

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**KW E-ZEE match, good price paid for unit in GWO.** CW4BUS GTHR. Tel: Weynford 0266 73595A.

**Manual for AS6 AT machine original or copy, will pay plus postage.** J. H. McBride, 52 St Peters Avenue, Shelley, Orag, Essex OCM 0BU. Tel: (0277) 362937.

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**SEM or KW to match or KW107/KW110 or other good a.t.u.** Tel: Devonshire (0396) 215 anytime.

**Kenwood TS-940S (boxed) base station h.f. general coverage transceiver.** With fitted filters for a Kenwood TS-790E dual band multi-mode or a TS-711E 144MHz multi-mode and TS-811E 430MHz multi-mode (matched pair). Mr B. Williams, Yorks, Tel: (0724) 880955.

**New Crotchet 3313 dual beam 25MV scope, require small 3in scope.** Tel. Dover (0304) 822943.

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