

THE UK'S BEST SELLING MAGAZINE FOR AMATEUR RADIO ENTHUSIASTS

OCTOBER 1993 £1.90

practical Wireless

VHF SPECIAL ISSUE

Reviewed:

The Icom IC- Δ 1E

Features:

**Assembling Your
VHF Station**

**The 10GHz Microwave
Scene**



**Plus... Valve & Vintage, Bits & Bytes,
Competition, And Lots More!**

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We aim to give the best prices on all major brands and we will endeavour to match any competitors genuine offer. So why not pop into your nearest SMC shop. There's never been a better time than now to get a great deal.

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- * 5 Watt output at 13.8V DC
- * Multi-function keypad
- * 20 memory channels
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- * 6 selectable tuning steps 5 - 50 KHz
- * High sensitivity
- * Battery save facility

LOW PRICE

Rexon Technology are the communicating division of a large Taiwanese company. They employ about 140 dedicated employees including engineering and R&D staff. "sounds like some well known Japanese companies of approximately 10-15 years ago". See review in November HRT.

Quotations from H.R.T. Review.

"superb receiver sensitivity"
"outstanding audio quality"
"Excellent value"

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ICW21ET SAVE £30 was £479 now only £449

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SAVE £329 was £2979 now only £2650

KENWOOD HF TRANSCEIVERS



TS 950SDX
TS 850S
TS 850S AT
TS 450S
TS 140S
TS 50S

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OCTOBER 1993 (ON SALE SEPTEMBER 9)
VOL. 69 NO. 10
ISSUE 1039

NEXT ISSUE (NOVEMBER)
ON SALE OCTOBER 14

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Our thanks go to The British Telecom Satellite Earth Station, Madley Communications Centre, Hereford (Photo by P. Nethersole) for supplying the front cover shot.

COMING NEXT MONTH

Join us as we explore the world of long distance radio communication in our DX Special. Also your free pull-out guide to the 1993 Leicester Amateur Radio Show and the introduction of our new Novice Page.

DON'T MISS IT!

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, Windsor House, 1270 London Road, Norbury, London SW16 4DH. Tel: 081-679 1899, Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £21, EUROPE £23, OVERSEAS (by ASP) £25, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659930. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is Published monthly for \$45 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, UK Second Class postage paid at Middlesex, N.J. Postmaster: Send USA address changes to *Practical Wireless*, c/o Permit to post at Hackensack pending. The USPS (United States Postal Service) number for *Practical Wireless* is: 007075.

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£995

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Kenwood Radio

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- Windom (80-10mtrs) Full size 200W... £59.95
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- Windom (40-10mtrs) 1/2 size 200W... £49.95
- Balun 1:1 1kW... £29.95
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Alinco DJ-F4E - A popular novice band radio on 70cms. Simple to operate handheld with 40 memories and 5 Watts output... **£280**

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 ★ Covers 1-1300 MHz
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 ★ Extra bright leds
 ★ Automatic clean dropout... **£199**

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 ★ Extra bright leds
 ★ 4GHz bar graph for signal strength
 ★ High speed - 6 fast gate times... **£269**

KENPRO RADIO

KT-44 - 70 cms handheld. Thumb wheel frequency control. Full 10MHz! Ideal novice or repeater user. c/w NiCad, beltclip & charger... **£169.00**

KT-22 - Popular 2M version of the KT-44 with simple NO FUSS operation. Ideal standby handheld or for use on Packet... **£169.00**

NEW HAND-HELDS

ALAN CT-145 - Fully featured 2M handheld with options for DTMF & CTCSS Paging. 5 watts output is available when powered from external 12V DC supply. Now with extended receive - 130-169MHz. Excellent reliability & performance... **£199.00**

ALAN CT-450 - Fully featured 70cms H/held with facilities and options similar to the CT145... **£225.00**

VECTRONICS

Canadian made high quality ATU's
HT1 500
 1.8-30MHz
 1500 watt cw, 3000 watt [pep]. Easily matches all types of antenna's coax, long wire and balanced inputs (with a 4:1 balun included)
 ★ Peak and average power reading meters
 ★ 3 way antenna switching
 ★ Heavy duty roller coaster for continuous coverage
 ★ Slow motion variable capacitor control... **£399**

OUTBACKER

Outstanding new mobile antennas from Australia. A commercial design proven in the Outback for 22 years. If you are going mobile, this new antenna is all you need. The Outbacker covers from 160 thru' to 10m including all VVARC bands, without the need for an ATU. Lookout for the reviews which will be coming shortly. We have been running around with these antennas and the new Kenwood TS50 for the last few weeks, working everything in sight. The antenna is constructed of fibreglass with copper helical windings covered with a coating of urethane for strength, durability and protection. Tap points for each amateur band are clearly engraved on the antenna.

- OUTBACKER** 1.7m long, 300w, 80 thru' 10m... **£189.95**
- OUTBACKER (T)** As above but including top band... **£219.00**
- OUTBACKER JUNIOR** 1.2m long, 100w, 80 thru' 10m... **£179.95**
- PERTH** 2.1m long, 300w, 80 thru' 10m... **£199.95**
- Perth (T)** As above but including top band, 100w... **£235.00**
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LOWE ELECTRONICS



YES, the original "open day" is back! Make a note in your diaries, PIMs, Filofaxes, Psion Organisers, scraps of paper or the back of an envelope! Wherever you keep important information, don't forget 25th September. Yes, it is a Saturday!

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 sight-seeing 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.
- 4** Free car boot sale space to sell your own gear.
- 5** Bargain basement full of odds and ends.
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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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Something else new for this year is the short-wave room with the world's finest receivers complete with our now famous Modemaster decoding software and Multiscan control programmes on continuous live demonstration, together with a full range of antennas, headphones and other accessories.

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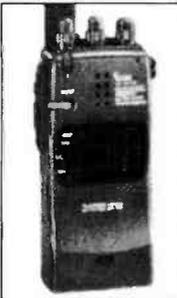


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The 'Newsdesk 93' section of *PW* is now, as is usual at this time of year, carrying information on RAE courses. Many aspiring radio amateurs are on the lookout for a course, to take them through the winter and on to the May RAE. Unfortunately, some 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 examinations. 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!

Despite my comments drawing the attention of the Department of Education to the benefits of amateur radio, their reply was polite but unsympathetic. The Department of Education spokesman said in his reply to me, that the decision whether to run a course or offer an examination centre depended on decisions taken locally. It was also pointed out to me that economics will play an even more important part.

It seems that in future, courses are

going to be far more expensive. Colleges will have to pay their way and prove their ability to produce profits. Many 'minority interest' activities could be affected as they prove to be unlikely money spinners.

So, as radio amateurs are innovators by their very nature, many are already helping to fill the gap left by Colleges and the host of 'New' universities that have suddenly appeared from the ashes of polytechnics.

Don't misunderstand me, I realise that many colleges, schools and the network of fast growing 'community colleges' will still offer RAE courses and the examination itself left 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 even 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 year's 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 Mannion G3XFD

Keylines

SPECIAL PRIZE COMPETITION CORNER

First Prize SG-2000 HF Mobile Transceiver Worth Over £1800

Second Prize Jones Morse Key worth £65

Third Prize Two Year Subscription To *Practical Wireless*



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 SG-2000 operate VHF, SHF or HF?

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

You could win the dedicated SG-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.



Receiving You



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



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 CQ 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 G8SEQ 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 look forward to maybe seeing you again at the next Mini G-QRP Convention at Rochdale, courtesy of George Dobbs G3RJV on October 16.

David Ackrill G0DJA, Yorkshire

Editor's reply: You have a valid point David and your letter really emphasises an aspect of v.h.f. operation that's been neglected in *PW* recently. Your reminder of the *PW* 144MHz QRP contest rammed the point home. The next QRP themed issue will redress the balance, and in the meantime we hope you enjoy our 'VHF Special' issue. No doubt you'll let me know if you did when we meet at the Rochdale Mini QRP Convention in October!

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

Thank You

Dear Sir

Through your magazine I would like to thank very much the kind person who found and returned my wallet I had dropped on Sunday 18th July at the Woburn RSGB Rally.

It had dropped out of my pocket in the car park when I got out of my car. Later in the morning I came back to my car looking for it and there it was, under the windscreen wipers, and all was inside, including £200.

So there are still lots of honest people about. Thanks again.

Keith Goodchild
Hertfordshire

Playing Games

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 banal 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 McEwan GM3WJF
Scotland

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 piggery?"

"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?"

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!

Calling Frequency

Dear Sir

With reference to David 2EIBJS's letter, lack of activity on 430MHz. At one time, 432.200MHz was the s.s.b. calling frequency, a quick call and someone would come back, you would then QSY.

However, the RSGB said we will give it a new name. How about calling it an activity frequency, after that nobody would QSY and we had to call CQ above and below hoping someone was tuning the band.

We soon found it was a waste of time and gave 430MHz a miss. It seems odd that 50 and 144MHz have a calling frequency!

John Tye G4BYV
Dereham, Norfolk



Following the successful use of photographs in 'Receiving You' in our Diamond Jubilee issue, October 1992 *PW*, we would like to again include the occasional photograph with your letters. So, if you have a photograph of yourself or something appropriate to your letter send it in and the best ones will end up in print.

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

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 S9 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**

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 our 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 amended so that you are permitted to operate the above mentioned repeater station.'

So there it is, the day the UK repeater network (nearly) closed down!"

Geoff Watts G0EVW, Dorset

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 Wilkinsons (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?

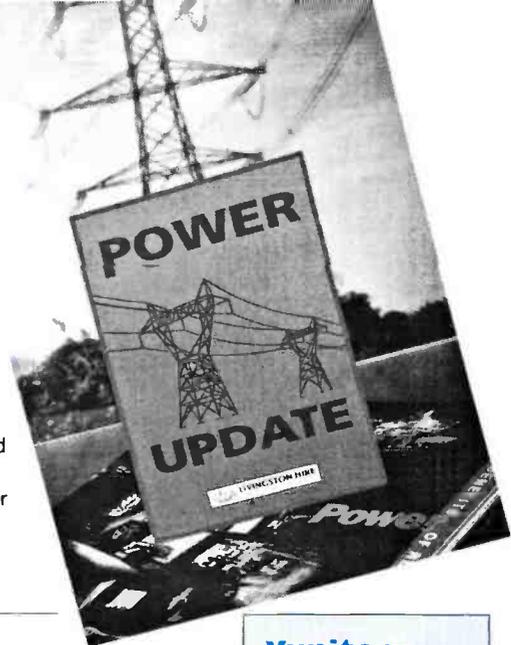


Power Update

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 inducement 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.**

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 would 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.

RAE Courses

Basildon College RAE course commencing 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 0PG. 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**

G3PZC 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 G0OAT. For more informa-

tion 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 9185.** 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 G0MJK. 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.**

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 l.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.

Good Home Needed For PWs

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.**



Bunfight at the Hendon Hamstore

Saturday 22 July saw the official opening of the Icom Hamstore in Hendon. Located at 11 Watford Way, Hendon, London NW4 3JL, the store was overflowing with people, searching for (and finding) bargains, throughout the day. As usual in London, parking is not the easiest, but Hendon Central underground station is a very short distance away.

Doug G0LUH, and Paul G7MNI, were helped out on the day by Matthew 2E1AWE from Icom, Mark Jarvis and Dennis Goodwin G4SOT. Reinforcements were there in the guise of Steve Devine G0TKD from Lowes and David Wilkins G5HY from Kenwood, while Sally Coning masterminded the refreshments. Judging by the number of trips Doug made to the off-licence, the day was a remarkable success.



New Premises

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 £3.75 each.



Newsdesk -93

COMPETITION WINNERS

November 1992 Spot the Rig

The jumbled up rig was a Kenpro KT-44 hand-held.

Winner: John Chisholm G7KGP, 162 Ardington Road, Abington, Northampton NN1 5LT.

Runners-up: Mr R. Nelson, Flat 1, 17 Ashburnham Road, Hastings, East Sussex. J. S. Rushton, 391 Rossendale Road, Habersham Eaves, Burnley, Lancs BB11 5HP.

December 1992 Wordsearch
Winner: R. V. Herr, 6 Palace Gardens, Addington, Croydon CRO 9AG.

Runners-up: K. C. Hubbard G7DXR, 2 Stulp Field Road, Grantchester, Cambs CB3 9NL. Fotis Prassas SV2BXZ, Gambeta 87, Thessaloniki - Macedonia, Greece, CP 54644.

January 1993 Spot The Difference

Winner: B. A. Goddard, 3 Spring Gardens, Springfield Road, Queenington, Cirencester, Glos GL7 5BG.
Runners-up: V. Cundall, 311 Archer Road, Stevenage, Herts SG1 5HF. Mrs P. J. Pitt G3JAA, 52A Ringwood Road, St Ives, Ringwood, Hants BH24 2NY.

February 1993 Spot The Rig

The jumbled up rig was an Eddystone 640.

Winner: A. M. Hockey, 4 Hill Bungalows, Ashcott, Bridgwater, Somerset TA7 9OX.

Runners-up: Michael Fadil G4CLA, 25 North Parade, Horsham, West Sussex RH12 2DA. F. E. Woods, 29 Lorenzo Drive, Liverpool L11 1BE.

March 1993 Wordsearch

Winner: F. Willis, 103 Grasmere Crescent, Sinfyn, Derby DE24 9HT.

Runners-up: F. A. Hacking, 59 Malvern Gardens, Kenton, Harrow, Middlesex HA3 9PA. R. Ashby G3NBR, 21 Albion Hill, Exmouth, Devon EX8 1JS.

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.

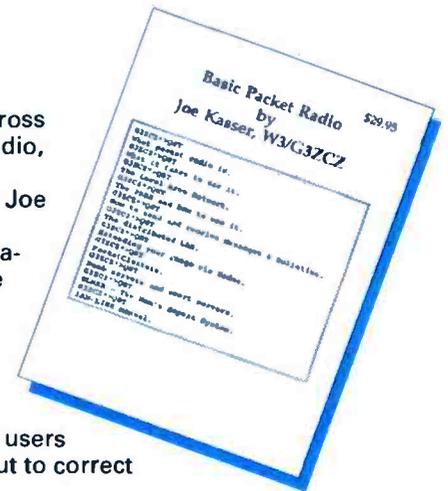
In having had the hard work taken out of using packet radio, many users lose sight of the overall network and its capabilities. This book sets out to correct this deficiency.

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

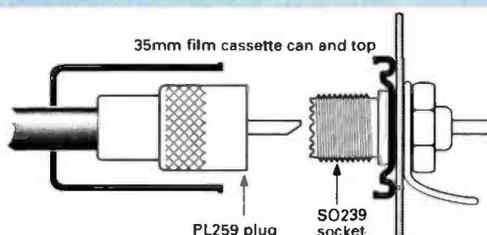
The ubiquitous PL259 plug and its companion SO239 socket are to be found in almost all h.f. equipment. Many h.f. and v.h.f. antennas come with these connections fitted.

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**



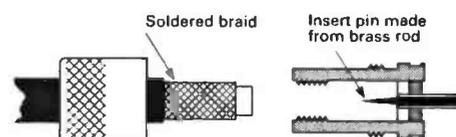
Quick change PL259

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 joint, the braid may be soldered to improve the long-term contact capability. This type of connection should make a good clean joint, time after time.

**Doug Middleton G0CZG
Dorset**



Tell Me That You Want

BUY AT LEICESTER - PAY AFTER PICKETS LOCK - 1994
 On all new and used equipment over £200, pay 10% deposit then nothing until April next year.



- ...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.

LYNCH AT LEICESTER FOR YAESU		LYNCH AT LEICESTER FOR ICOM	
FC757AT USED FROM £249	FT101ZD USED FROM £479	ICR1E USED FROM £299	IC735 USED FROM £699
FT790R USED FROM £269	TL922 UNUSED ONLY £1350	IC725 USED FROM £629	IC765 USED FROM £1695
FT290R USED FROM £249	TR751E USED FROM £529	IC726 USED FROM £795	IC2KL USED 1 ONLY £1195
FT890 USED FROM £349	TS940S USED FROM £1250	IC781 USED 1 ONLY £2895	IC290D USED FROM £379
FV102DM 1 ONLY £249	SM220 USED FROM £279	ICR71E USED FROM £699	ICR100 USED FROM £399
FL2100Z WARC £549	TS430S USED FROM £589	IC271E USED FROM £479	IC751A USED FROM £895
FT480R USED FROM £299	TS930S USED FROM £849	TS450S USED FROM £1150	
FT736R USED FROM £1295	TS530S USED FROM £529	TS757GX USED FROM £389	
FT757GX USED FROM £579			

BARGAIN OFFERS AT LEICESTER



Brand new boxed Icom ICW21E dual band handle, list £369, **Lynch's price £239**... Brand new boxed Icom IC21E miniature 2m handle, list £295, **Lynch's price £239**... Brand new boxed AR3000A, the ultimate all-band scanner, list £949, **Lynch's price £849**... Brand new Yaesu FRG100 receiver, ideal shack second RX, list £599.95, **Lynch's price**

£549...lots more bargain offers on the Kenwood TS608, the Icom IC737, the Yaesu FT890, the Kenwood TH78E, Yupiteru MVT7100 and more.
 The full Universal range of decoders will be available at the show.

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Club News

Please send in all of your 'Club News' items to Donna Vincent at the editorial offices in Broadstone.

Avon

Thornbury & DARC. Wednesdays, 8pm. United Reform Church, Chapel Street, Thornbury, September 22 - Rig Night. **A. Hellon G0RYV** on (0454) 415215.

Bedfordshire

Shefford & DARS. Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. September 16 - Mobile DF Hunt, 23rd - Members Activity Night, 30th - Trunked Mobile Radio by Vince G8NGZ, October 7 - HF Noise Bridge by Hugh G0LVG, 14th - Coopering. **Paul G1GSN** on (0462) 700618.

Berkshire

Newbury & DARS. 4th Wednesdays, 7.30pm. Bucklebury Memorial Hall. September 22 - Amateur Radio - An Old Man Needing A Kiss Of Life! by Stephen Harding G4JGS. **Norman** on (0635) 863310.

Reading & DARC. 2nd & 4th Thursdays, 8pm. The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. September 10 - Club Internal Quiz, 23rd - Autumn Junk Sale. **Nick Challacombe G0LGG** on (0734) 722489.

Buckinghamshire

Milton Keynes & DARS. 2nd & 4th Mondays, 7.30pm. Drill Hall, Wolverton, Nr. Wolverton Station, Milton Keynes. **Dave McQue G4NJU.**

Cheshire

Stockport RS. 2nd & 4th Wednesdays, 7.45pm. Room 14, Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. September 22 - Surplus Equipment Sale, October 13 - The Work Of The RIS by Alan Clayton. **Jim France G3KAF** on 061-439 4952. **Cumbria**

Eden Valley RS. Odd months, 7.30pm. BBC Club, Penrith. September 30 - Video Night by Paul G4XTA. **John Pape G0NYQ, 2 Mill Hill, Appleby-in-Westmoreland** on (07683) 52106/52148.

Derbyshire

Buxton Radio Amateurs. Lee Wood Hotel, Buxton, 8pm. September 14 - Amateur Radio Licence Discussion,

28th - Talk by Clive G4FZH, October 12 - Home-brew Night. **Derek Carson G4IHO** on (0298) 25506.

Derby & DARS. Wednesdays, 7.30pm. 119 Green Lane, Derby. Demonstration Of Video Surveillance Equipment by Damien Mannix G3XER, October 6 - Junk Sale. **Hayley Winfield 2E1AJI** on (0773) 856904. **Devon**

Appledore & DARC (Devon). 3rd Mondays, 7.30pm. Appledore Football Clubroom. September 20 - Bring & Buy Sale. **Reg Lyddon G4ETJ, QTHR** on (0237) 477301.

Exeter ARS. 2nd Mondays, 8pm. The Community Centre, St Davids Hill, Exeter. September 13 - A Visit (to be arranged), October 11 - AGM. **B. L Bolt.** (0392) 214204.

Torbay ARS. Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. September 17 - CQWW Video by Dudley GW6ZUQ. **W. Hipwell G3HTX** on (0803) 526762.

Dorset

Dorset Police ARS. The Dorset Police ARS will now be holding regular monthly meetings, at Force HQ on the first Thursday of every month, at 7.30pm. Membership is open to Police Officers, serving and retired, civilian employees, Special Constables and their immediate family. The club welcomes contact from other local clubs. September 21 - Introduction to Constructional Competition. Further info from **PC 915 Richard Newton** at **Ferndown Police Station** on (0202) 229351.

South Dorset RS. 1st Tuesdays, 7.30pm. Wessex Lounge of Weymouth Football Club. October 5 - Technical Forum chaired by **Bill Burden G3EAT.** **Mike Lenzi G7HNY** on (0305) 773860.

East Sussex

Crowborough & DARS. Thursdays, 8pm. Plough & Horses, Crowborough. September 23 - PDSL Software or Logging With Computers. **Michael Smith G6UUO** on (0892) 661807.

Hastings Electronics & RC. 3rd Wednesdays, 7.30pm. 16 Grand Parade, St. Leonards-on-Sea, East Sussex TN35 6DN. September 15 - Concorde by **K. Ellis. G3YFF** on (0424) 830454.

Southdown ARS. 1st Mondays, 7.30pm. Main Hall of the Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne. Wednesdays (Morse) & Fridays (Novice & RAE), 7.30pm at the clubrooms, Hailsham Leisure Centre, Vicarage Road, Hailsham. October 4 - Equipment Sale. **John Vaughan G3DQY** on (0323) 485704.

East Yorkshire

North Ferriby United ARS. Fridays, 8pm. North Ferriby Ltd., FC Social Club, Church Road, North Ferriby, East Yorkshire. September 10 - DX Pile-ups From The Other End, 17th - Night On The Air, 24th - Visit Of Jandek, October 1 - The Way Ahead Meeting, 8th - On The Air Night. **Frank Lee G3YCC** on (0482) 650410.

Essex

Bishops Stortford ARS. 3rd Mondays, 8pm. British Legion Club, Windhill, Bishops Stortford. September 20 - Construction Contest, October 18 - AGM. **John Dudeney** on (0799) 550313.

Braintree & DARS. 1st & 3rd Mondays, 8pm. Community Centre, Victoria Street, Braintree. September 20 - Aspects of VHF/UHF/SHF Operating by **Ela G6HKM**, October 4 - Widgets 2. **J. F. Button G1WQQ c/o G4JXG, 88 Coldnailhurst Avenue, Braintree, Essex CM7 5PY.**

Vange ARS. Thursdays, 8pm. Barnstaple Community Centre, Long Riding, Basildon, Essex. September 9 - Rally Review, 16th - Weather Satellites by **Dennis G1UBO**, 23rd - Photography. **Doris** on (0268) 552606.

Greater London

Acton, Brentford & Chiswick ARC. 3rd Tuesdays, 7.30pm. Chiswick Town Hall, Heathfield Terrace, London W4. September 21 - The Poor Man's Rig, Discussion. **Colm Mulvany G0JRY** on 081-749 9972.

Cray Valley RS. 1st & 3rd Thursdays, 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. September 16 - Ballooning With Richard Branson by **G4SOT** of Icom UK, October 7 - Surplus Equipment Sale. **Bob Treacheron 081-850 1386.**

Crystal Palace & DRC. 3rd Saturdays, 7.30pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). September 18 - The History Of Crystal Palace by **Ivan Bevan** of The Crystal Palace Foundation. **Will Taylor G3DSC** on 081-699 5732 or **Bob Burns G3OUU** on (0737) 552170.

Edgware & DRS. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. September 9 - Setting Up An Amateur Radio Station by **Stephen Slater G0PWQB**, 23rd - Morse Training Evening, October 14 - Operating QRP by **Wayne Dillion. Howard Drury G4HMD** on (0923) 822776.

Loughton & DARS. Room 12 of Loughton Hall, 7.45pm. September 17 - Testing Printed Circuit Boards by **John Ray G8DZH**, October 1 - Confessions Of A CW Addict by **Frank Butler G0LWI**, 15th - Inter Club Trivia Quiz by **John Short G1DJL. Ray Pedley G0LWF** on 081-500 2811.

Southgate ARC. 2nd & 4th Thursdays, 8pm. Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. September 9 - Amateur TV by **David McQue G4NJU**, 23rd - The Great Erg Race, October 14 - Second Great Junk Sale. **Brian Shelton G0MEE** on 081-360 2453.

Greater Manchester

South Manchester RC. Fridays, 8pm. Community Centre, Norris Road, Sale. September 10 - Satellites For Amateurs by **G32DM**, 17th - Digital CQ Caller by **G4JLG**, 24th - Surplus Equipment Sale. **Edward Spark G7FQY** on 061-969 1964.

Rochdale & DARS. Mondays, 8pm. 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 Crosses Hotel, Menai Bridge. September 18/19 - GB2NTC Nations On The Air, 20th - Discussion Evening, 23rd/25th - Special Event Station, October 4 - AGM. **Tony Rees GW0FMQ** on (0248) 600963.

Hampshire

Basingstoke ARC. 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. October 4 - AGM. (0256) 25517.

Horndean & DARC. 1st Thursdays, 7.30pm. Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. October 7 - AGM. **Stuart Swain G0FYX** on (0705) 472846.

Itchen Valley RC. 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. September 10 - Open Meeting & Natter Night, 24th - Digital Signal Processing by **Nigel Gerdes**, October 8 - Modifying PMR Gear For Use On The Amateur Bands by **Chris Lorek G4HCK. Les Kennard G3ABA** on (0703) 732997.

The Three Counties ARC. Every other Wednesday, 8pm. Railway Hotel, Liphook, Hampshire. September 15 - Heraldry & Coats Of Arms, 29th - A Radio Topic. **Kevin Roche G8GOS** on (0420) 83091.

Winchester ARC. 3rd Fridays, 7.30pm. Red Cross Centre, Durrange House. September 17 - Junk Sale. **Peter Simpkins G3MCL** on (0962) 865814.

Hereford & Worcester

Bromsgrove ARS. 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. September 14 - Technical Topics, 28th - On The Air Night (RTTY), October 12 - EMC Problems. **Mr B. Taylor G0TPG** on (0527) 542266.

Hertfordshire

Dacorum AR & TS. 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. September 21 - Talk by **John G3WGV. Dennis Boast G1AKX, 8 Juniper Green, Warners End, Hemel Hempstead HP1 2NQ.**

Hoddesdon RC. Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. September 16 - Emergency First Aid by **Nurse Jane Churchill**, 30th - Cellular Phones by **Allister**, October 14 - The Scheinder Trophy Air Race Film & Talk by **Rex G3NQT. Roy G4UNL** on 081-804 5643.

Stevenage & DARS. Tuesdays, 7.30pm. Stevenage Day Centre, Chells Way, Stevenage. September 14 - Discussion, 21st - Tony's Trip To Friedrichshafen '93, 28th - Promotional Teaching Video. **Neil Ravilious 2E1ASZ** on (0438) 350882.

Humberside

Goole R & ES. Fridays, 7.30pm. West Park Pavilion, West Park, Goole, last

Fridays at the 'Black Swan Inn', Asselby. September 10 - Quiz Night, 17th - AGM, 24th - Social Evening, October 1 - On The Air Night, 8th - Construction Evening. **Steve Price G8VHL** on (0405) 769130.

Kent

Bromley & DARS. 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. September 21 - Introduction To Electronics by Graham Chamberlain. **Alan G7GBH** on 081-777 0420

Medway AR & TS. Fridays. Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham, Kent. Visitors & new members welcome. September 10 - Video Evening, 17th - Novice Evening, October 1 - Junk Sale. **Mrs Gloria Ackerley G70VI, 40 Linwood Avenue, Strood, Rochester, Kent ME2 3TR.** Tel: (0634) 710023.

Sevenoaks & DARS. September 20 - RADAR by Alistair Dunlop G7EIT. The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

South East Kent ARC. Wednesdays. Dover YMCA, Leyburne Road, Dover. September 15 - Natter Night/Committee Meeting, 22nd - Operating Evening, 29th - Novice Trainees. October 6 - Novice Evening, 13th - Constructional Techniques. **Mick Bowers G7NOR** on (0304) 825030.

Lancashire

Bury RS. Tuesdays, 8pm. The Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays - Lecture/Talk nights & other Tuesdays - general natter nights. October 12 - Constructional Contest. **Colin Fox G3HII** on (0204) 883212.

Hesketh ARC. Every other Tuesday. Birkdale, Southport. September 14 - Autumn Open Evening, 28th - Air Traffic Control Systems, 12th - Vintage Wireless. **Bernie G7DEM** on (0704) 63344.

Leicestershire

Charnwood AR Contest C. 1st & 3rd Sundays. The Albion, Loughborough. September 19 - VHF On The Air Night. **Phil** on (0509) 232927.

Lincolnshire

Grantham RC. 1st & 3rd Tuesdays, 8pm. Kontak Sports & Social Club, Barrowby Road, Grantham. September 23 - Natter & Noggin, October 5 - Instrumentation by Don GOSTT. **John Kirton G8WWJ** on (0476) 65743.

Merseyside

Liverpool & DARS. Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. September 14 - Club On The Air, 21st - Pre-AGM, 28th - Surplus Sale, October 5 - AGM. **Ian Mant G4WWX** on 051-722 1178.

Wirral & DARC. Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. September 15 - D&W, Hotel Victoria, Heswall, 22nd - The Great Egg Race IV, 29th - Quiz Night, October 6 - D&W, Chimneys, Hooton. **Paul Robinson G0JZP** on 051-648 5892.

Norfolk

Dereham ARC. 2nd Thursdays, 8pm. St. Johns Ambulance Hall, Yaxham Road, Dereham. September 9 - Equipment Review, October 14 - Component Suppliers. **Mark Taylor G0LGJ** on (0362) 691099.

Norfolk ARC. Wednesdays, 7.30pm. University Arms, South Park Avenue, Norwich. September 12 - Club Station, Town & County Show, 15th - Refrigeration by Chris G4ILR, 22nd - On The Air Night, 29th - Pre-Historic Elephant Of West Runton by Dr. Tony Stewart, October 6 - Construction Competition. **Dale Simkin** on (0603) 37393.

Northants

Kettering ARS. Tuesdays, 7.30pm. Electricity Sports & Social Club, Eksdale Street, Kettering. September 14 - Anglian Water by Jim Morrison, October 12 - The New UHF Scheme by John Randall. **Len G0RDV** (but QTHR as G7EHM) on (0536) 514544.

Nottinghamshire

Mansfield ARS. 2nd Mondays, 7.30pm. Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. September 13 - Evening On The Air. **Mary G0NZA** on (0623) 755288.

Nottingham ARC. Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. September 9 - 50MHz ATU Construction by G1WSD & The Current Repeater Situation by G2SP, 16th - Foxhunt No. 6/Activity, 23rd - Construction/Activity, 30th - Monolithic Microwave Integrated Circuits by Paul Beasall, October 7 - Forum, 14th - Introduction To Satellite Communication by G4IIO. **Simon G0IEG** on (0602) 501733.

South Notts ARC. Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. September 10 - Talk-on S22/Supported Novice Amateur Radio & Morse Courses by G4IRH, 2E1BKB & G0NVS, 14th - RAE & Morse Courses start, 16th - NRAE and A Class Morse Courses start, 17th - Construction, 24th - Talk-in on S22/On Air HF & VHF, October 1 - Talk-in on S2/WAB Award Scheme by Kate Wragg G0FEZ, 8th - Construction. **Julie Brown G0SOC, PO Box 4, Nottingham NG11 9DE.**

Scotland

Banff & DARC. 1st & 3rd Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB45 1DL. September 24 - Radio Aurora's by Martin GM6VXB, October 8 - Junk Sale. **Martin Andrew GM6VXB** on (03465) 82061.

Dundee ARC. Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. September 14 - Lecture by MEGS, 21st - Construction Evening, 28th - AGM, October 12 - Construction Evening. **George Millar GM4FSB, 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. **Stuart GM70IG** on (0509) 335195. **Somerset**

Yeovil ARC. Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. September 9 - 144MHz DF Event, 16th - A Power Supply Project by G3PCJ, 23rd - WWII Clandestine Radio by G3CQR, 30th - Natter Night & Committee Meeting, October 7 - Curious QSO Cards by G4JBL, 14th - Inter Club Quiz with South Dorset Club. **Cedric White G4JBL** on (0258) 73845.

South Yorkshire

Sheffield ARC. Mondays 7.30pm. Firth Park Pavilion, Firth Park Road, Sheffield. September 13 - Construction Night & Operation Of HF Equipment, 14th - Ten Pin Bowling, 20th - Organisation Of JOTA Station For October, 27th - Presentation Evening, 28th - Swimming at Ponds Forge Complex, October 4 - AGM, 5th - RAYNET. (0742) 446282. **Suffolk**

Felixstowe & DARS. September 13 - Amateur Test Equipment by Alan Melia G3NYK, 27th - Ten Pin Bowling, October 11 - The Radio Investigation Service by a member of Suffolk RIS. **Paul Whiting G4YQC** on (0394) 273507. **Mary G0NZA** on (0623) 755288.

Leiston ARC. 1st Tuesdays, 8pm. Sizewell Visitors Centre, Sizewell Power Station. October 5 - The Use of Computers In Amateur Radio by Paul Whiting G4YQC. **Bob Simmons G0HSI** on (0986) 874800.

Surrey

Horsham ARC. Guide Hall, Denne Road, Horsham, West Sussex, 8pm. October 7 - Surplus Equipment Sale. **Peter Stevens G8SUI** on (0737) 842150.

Surrey RCC. 'Terra Nova' The Waldrons, Waddon, Croyden, Surrey. September 20 - Natter Night, October 4 - Surplus Sale. **Berni G8TB** on 081-660 7517.

The Kingston & DARS. 3rd Wednesdays, 8pm. Alfriston, 3 Berrylands Road, Surrey KT5 8RB. September 15 - Cross Modulation & Filters by Peter Burton G3ZPB. **Ray Fuller** on 081-398 1128.

Wimbledon & DARS. 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. September 10 - Surplus Equipment Sale, 24th - Civil Aviation Safety Videos, October 8 - Desert Island Radio. **Chris Frost G0KEB** on 081-397 0427.

Warwickshire

Coventry ARS. Fridays, 8pm. Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. September 10 - On The Air Night/Morse Tuition, 17th - Home-brew 144MHz Antenna Contest, 24th - On The Air Night/Morse Tuition, October 1 - AGM, 8th - On The Air Night/Morse Tuition. **David G1DRG** on (0203) 311468.

Mid-Warwickshire ARS. 2nd & 4th Tuesdays. September 14 - Visit to CWR, October 12 - Satellites & Amateur Radio by Brian Slatter. **Don Darkes G8HRI** on (0926) 424465.

Stratford-Upon-Avon & DRS. 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. September 13 - Opening Evening, 27th - Evening With David Marcuse, October 11 - Badger Boards & Kits by John Badger G4YZO. **Alan Beasley G0CXJ** on (0608) 82495.

West Midlands

Solihull ARS. 3rd Thursdays. The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. September 16 - EGM/Talk by a member, October 21 - AGM. (0827) 53344 daytime.

West Sussex

Mid-Sussex ARS. Thursdays, 7.45pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. September 17 - Surplus Equipment Sale, October 1 - Global Positioning Systems-Aviation Applications by John Pumfrey G8SNH. **Chris Coward G3YTU** on (0444) 458992.

West Yorkshire

Denby Dale & DARS. Pie Hall, Denby Dale, Nr. Huddersfield, 8pm. September 15 - Sporadic E by Ron Binns G30TS. **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

Halifax & DARS. 1st & 3rd Tuesdays, 7.30pm. September 21 - AGM. **David Moss G0DLM** on (0422) 202306.

Keighley ARS. The Ingrow Cricket Club, Ingrow, Keighley, 8pm. September 16 - Quiz with Northern Heights Pie & Peas, 23rd - Natter Night, 30th - More Packet by G3TQA, October 7 - Natter Night, 14th - Cameo Evening. **Kathy Conlon G0RLO** on (0274) 496222.

Spenn Valley ARS. Thursdays, 8pm. Old Bank Working Men's Club, Mirfield. Alternate Thursdays - 'Noggin & Natter nights'. September 16 - 10GHz ATV by G4XKC & G8HUA, October 7 - Surplus Sale. **Tony Galvin G0IKD** on (0532) 534437.

Wiltshire

Trowbridge & DARC. 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. September 15 - Natter Night, October 6 - Earthquake Disaster Relief Operations by G0KRJ. **Ian G0GRI** on (0225) 864698.

Club
News

The Icom $\Delta 1E$ Tri-Band Hand-Held Transceiver

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 $\Delta 1E$ 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 139x50x60mm, excluding the three band helical antenna (supplied), which measures 170mm long.

The first time I saw the $\Delta 1E$ 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- $\Delta 1E$ 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 key-pad.

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 l.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 l.e.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.

Review

REVIEW

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

Frequency Coverage:	European version 144-146, 430-440MHz and 1.24-1.3GHz
Mode:	Frequency modulation
Antenna impedance	50Ω
Tuning Steps	
144/430MHz:	5, 10, 12.5, 20, 25, 30 & 50kHz
1.2GHz :	10, 20, 25 & 50kHz
Dial select steps:	0.1, 1 (and 10MHz 1.2GHz only)
Number of memories:	78 (Scan edge and call channels included)
External power:	6-15V d.c. negative earth
Current Drain (typical): (700mA), (700mA)	Transmit 13.5V d.c. Input (Min.): 144MHz Max. 1.9A 430MHz Max. 1.9A (700mA) & 1.2GHz Max. 1.1A
Receive	12.5V d.c. Input with Power Save (Average): 144MHz 20mA, 430MHz 24mA, 1.2GHz 24mA
Transmit	12.5Vd.c. Input at Max. Audio: 144MHz 180mA, 430MHz 200mA, 1.2GHz 210mA

Fig. 1: The circuit diagram of the PW Tone-E. The input impedance of 12MΩ is made up with a probe of 1MΩ and the resistors on the range switch. Accuracy depends on the resistor values.

Tone-E

The PW Electronic Analogue Voltmeter

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

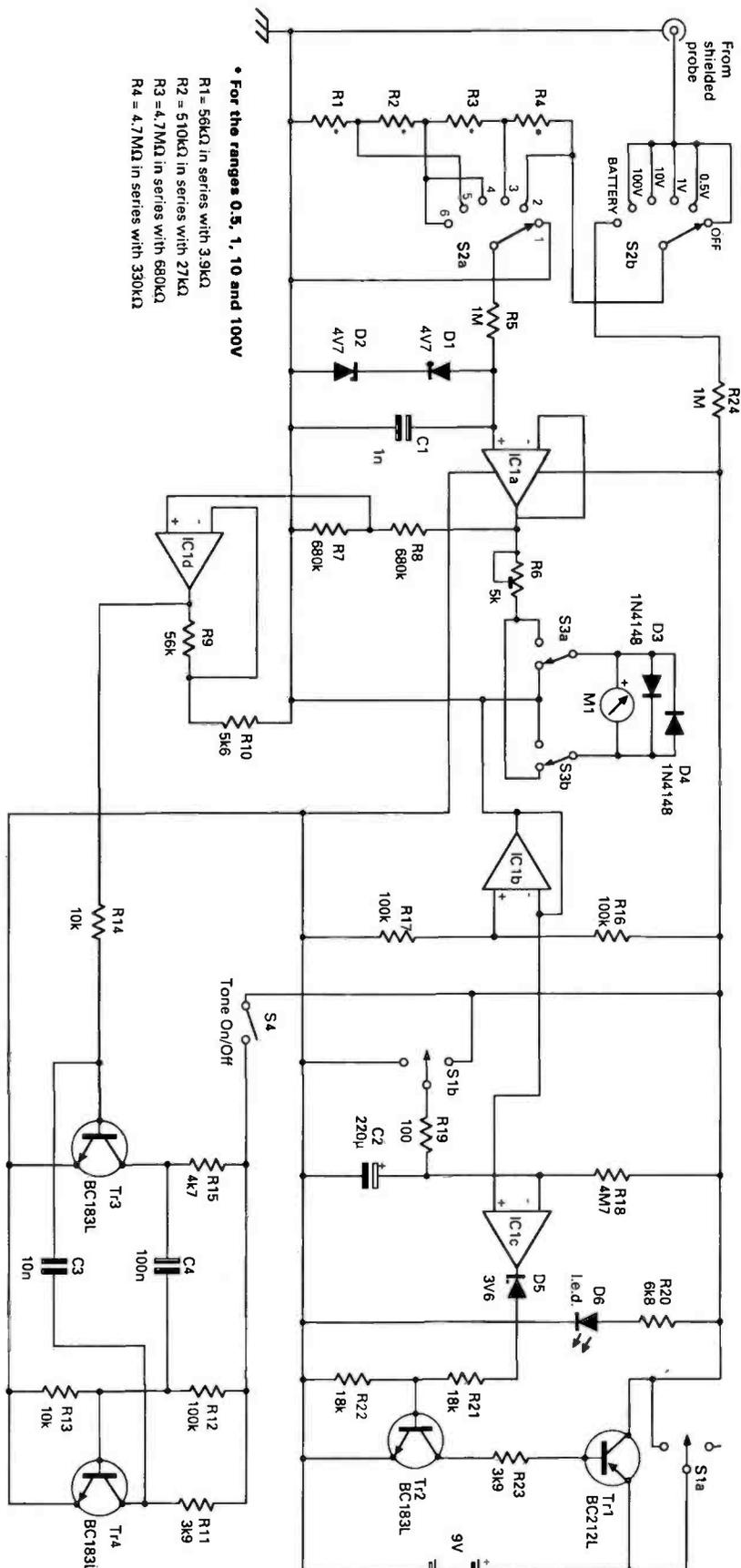
I've explained the background, so let's take a look at the circuit. A passive resistor divider circuit provides the range switching. The chain of resistors R1-4 and R25 (or R26), provide a constant 12MΩ input impedance. The ranges covered are 0.5, 1, 10 and 100 Volts.

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



- For the ranges 0.5, 1, 10 and 100V
- R1 = 56kΩ in series with 3.9kΩ
- R2 = 510kΩ in series with 27kΩ
- R3 = 4.7MΩ in series with 680kΩ
- R4 = 4.7MΩ in series with 330kΩ

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 flipping 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!

Fig. 2a: A d.c. probe is simply made from a 1MΩ resistor in a shielded box.

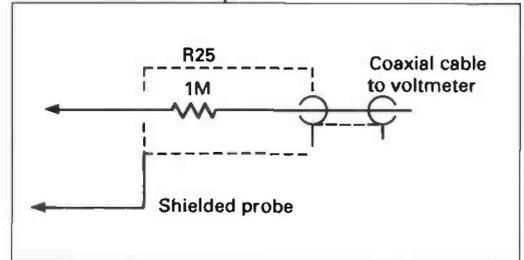
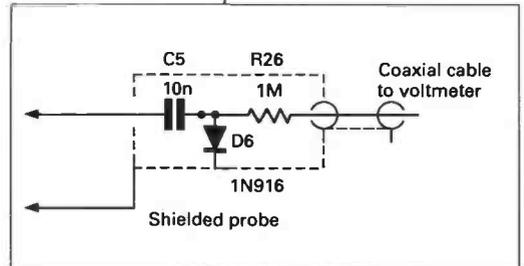


Fig. 2b: This small a.c. probe measures the peak waveform and allowances should be made for this in taking measurements. Use this up to about 50V a.c.



PW

How Difficult? How Much?

Intermediate
£18+ (depends on the
Junk-box for a suitable
meter)

Shopping List

Resistors

Carbon film 5% 0.4W

100Ω	1	R19
3.9kΩ	2	R11, 23
4.7kΩ	1	R15
5.6kΩ	1	R10
6.8kΩ	1	R20
10kΩ	2	R13, 14
18kΩ	1	R21, 22
56kΩ	1	R9
100kΩ	3	R12, 16, 17
680kΩ	2	R7, 8
1MΩ	4	R5, R24, 25, 26
4.7MΩ	1	R18

For details of R1-4 see Fig. 1

Multiturn trimmer

5kΩ	1	R6
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Capacitors

Miniature disc ceramic 10%

1nF	1	C1
10nF	1	C3
100nF	1	C4
Polyester 5% 160V working		
10nF	1	C5
Miniature electrolytic 16V working		
220uF	1	C2

Semiconductors

Diode

1N916	1	D6
1N4148	2	D3, 4

Transistors

BC183L	3	Tr2, 3, 4
BC212L	1	Tr1

Integrated circuits

TL071	1	IC1 (TL081 or LF444 types are alternatives)
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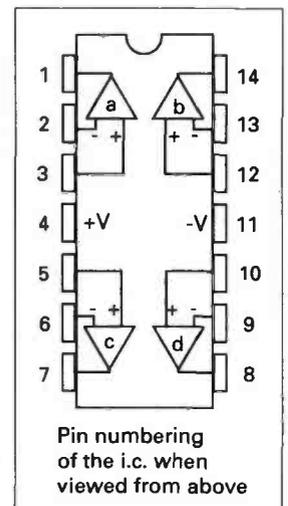
Zener diodes 400mW 5%

3.6V	1	D5
4.7V	2	D1, 2
i.e.d.	1	D7 (colour to suit)

Miscellaneous

A suitable meter 50 or 100μA, a piece of Veroboard or perfboard (about 75x100mm) one centre-off d.p.d.t. switch one d.p.d.t. switch and a good quality (preferably ceramic) 2-pole 6-way switch, a small piezoelectric sounder, coaxial cable for the probes, interconnecting wire a suitable box to house the project and a 9V battery to power the unit.

Fig. 3: This is the pin-out of the TL071 (IC1).



Pin numbering
of the i.c. when
viewed from above

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 Tiny TIM 3.5MHz SSB Transceiver Part 3



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).

In this section, I'll assume you have purchased a ready drilled main p.c.b. This is 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,

D1 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.

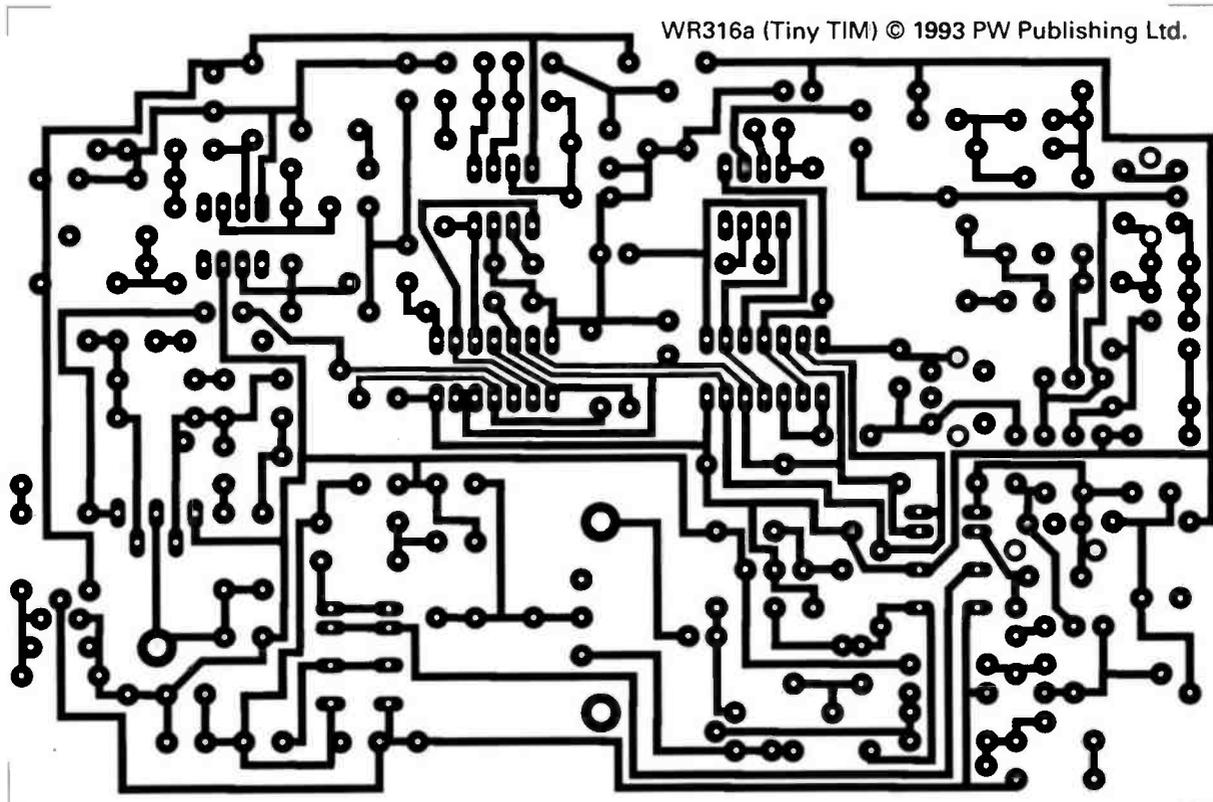
You can now install the front panel controls. Start by mounting the controls R1, 4 and 13 and the loudspeaker jack socket.

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.

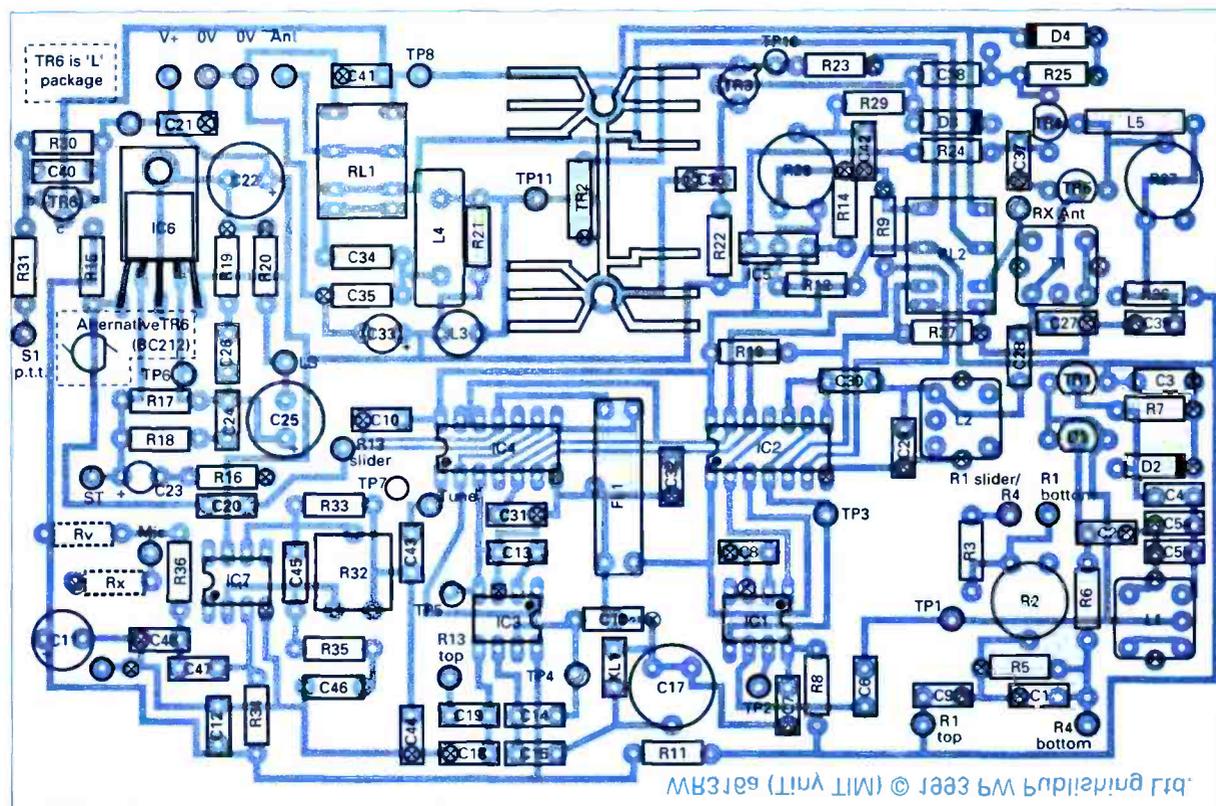
By now, there should not be any receiver components left, if all is well with my instructions and your construction! So, if all is well, it's time to switch

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

Fig. 2: (Bottom)
Component overlay and groundplane diagram.



WR316a (Tiny TIM) © 1993 PW Publishing Ltd.



WR316a (Tiny TIM) © 1993 PW Publishing Ltd.

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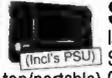
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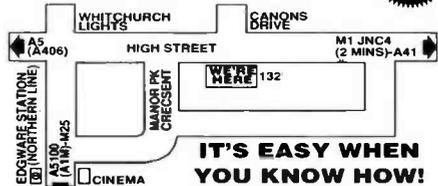
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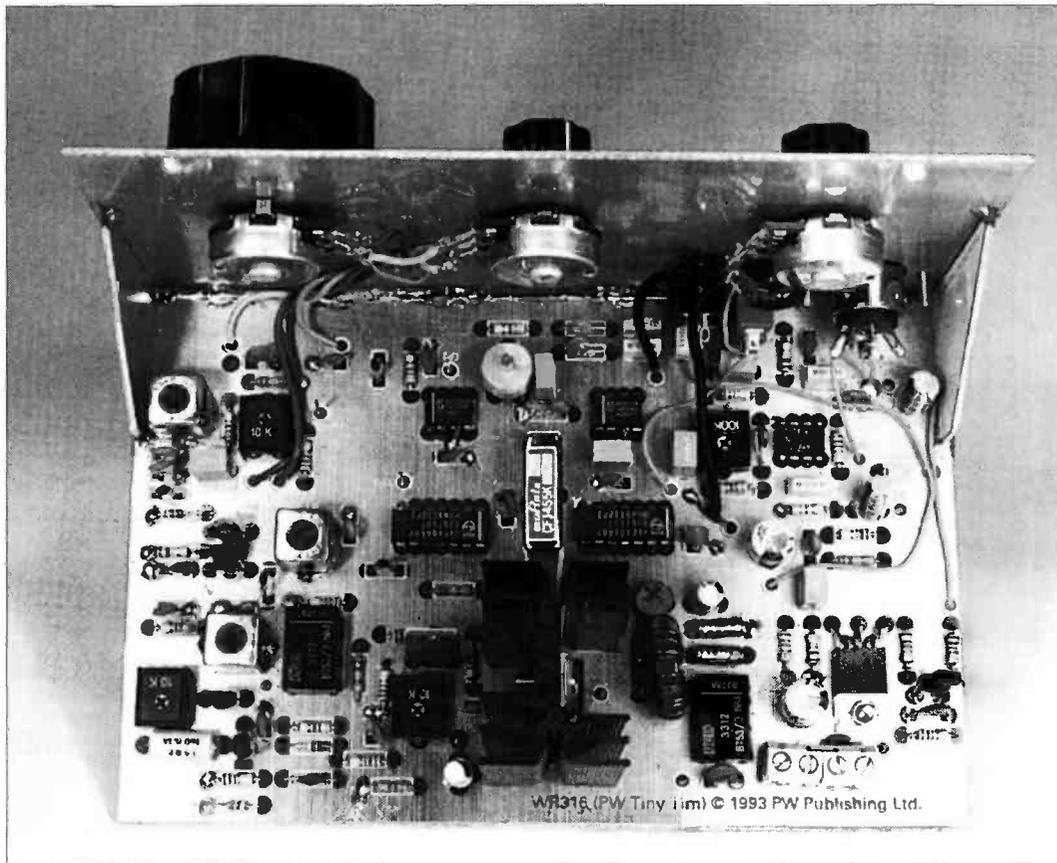


Fig. 3: Rear view of the PW production prototype Tiny TIM, showing the neat and very practical design approach by its designer Tim Walford G3PCJ. The main tuning control potentiometer is on the far left of the front panel, with the fine tuning control in the centre and the audio gain control on the right. The soldered seam running along the bottom of the front panel (made from double-sided p.c.b. material) secures the panel to the main p.c.b. (see text). For strengthening purposes, it is essential that the p.c.b. side cheek pieces are incorporated.

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.

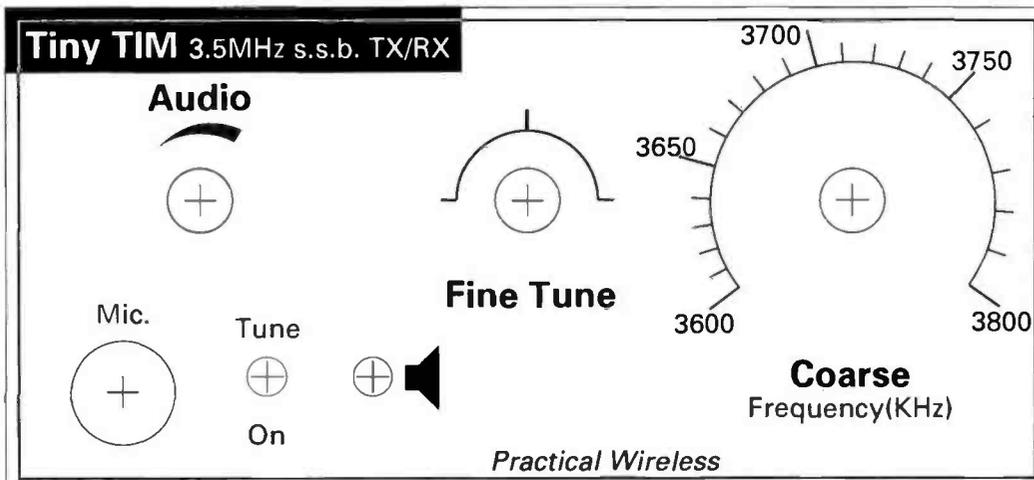


Fig. 4: Front panel layout for the simple transceiver. For ease of construction, the panel uses copper clad p.c.b. material.

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 ex-p.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 ex-p.m.r. sets invariably do. Surplus (ex-p.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 ex-p.m.r. equipment means you can drop it 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



The Icom IC-275A could make of an ideal starting point for a v.h.f. base station.

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 35MHz 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 (!) 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.

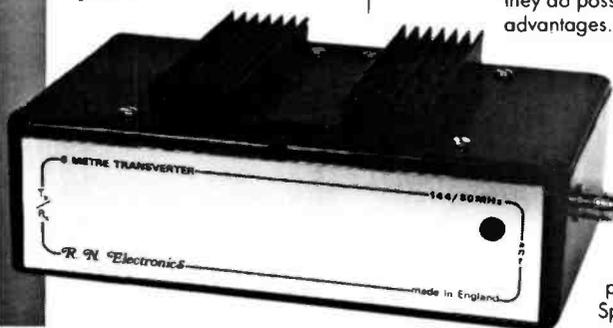
SENSITIVITY LIMITS

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

With a 144MHz rig and a transverter, like this one for 50MHz from R.N. Electronics, other bands are available to you.



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

STRONG SIGNALS

It's no good making the receiver ultra-sensitive 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 (s.f.d.r.).

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

Receiver noise figures between 5-10dB (at 144MHz) are not untypical 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 (μ V) for a signal to noise ratio of so many dB. For example one 144MHz transceiver quotes "better than 0.5 μ V 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 synthesisers, computer control, tone squelch and displays that say "Hello"!

Very few v.h.f. 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 h.f. radio, so if you already have one of these perhaps you should consider using a transverter.

A good transverter would allow a high quality h.f. rig to operate on the v.h.f./u.h.f. bands. This retains the performance and features of the driving transceiver.

OTHER OPTIONS

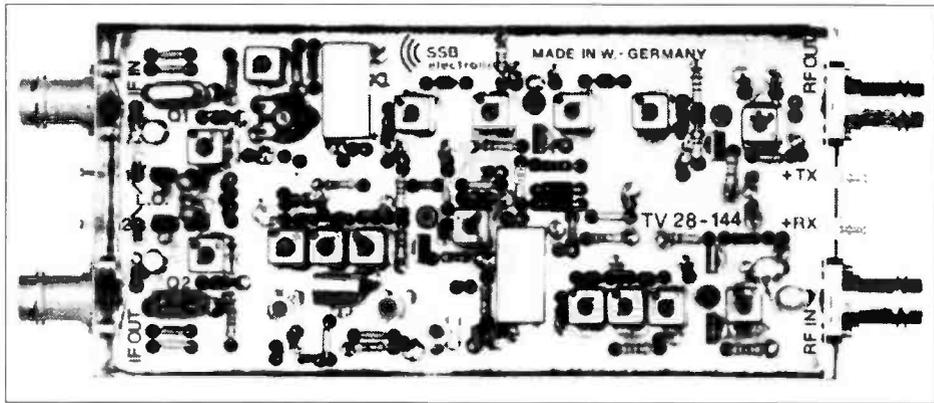
If you don't want to use a transverter, there are two other options to pep up your receiver performance. You could fit a complete replacement front-end board into your existing radio or you could connect a low-noise amplifier (l.n.a.) ahead of the receiver.

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 v.h.f. receiver. Then the use of an l.n.a. 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 is 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 144MHz band is available through an up-transverter from 28MHz. Piper Communications can supply this version from SSB Electronics.

l.n.a. is mounted at the antenna. This is important as losses ahead of the main receiver adds directly to the overall receiver noise figure.

Unfortunately you 'don't get owt for nowt' and there's a real price to pay for the advantages mentioned. The receive sensitivity is only improved if the l.n.a. has sufficient gain. This extra gain decreases the strong-signal handling capability of the main receiver.

Using a pre-amplifier will show overload effects on some signals that originally didn't cause any problems. The gain of the l.n.o. needs to be correctly adjusted taking into account the receiver noise figure and feeder losses.

Typically the gain required will be between 6-15dB. Ideally the l.n.a. should have a facility for gain adjustment. If not, you'll just have to put some attenuation after the pre-amplifier!

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?

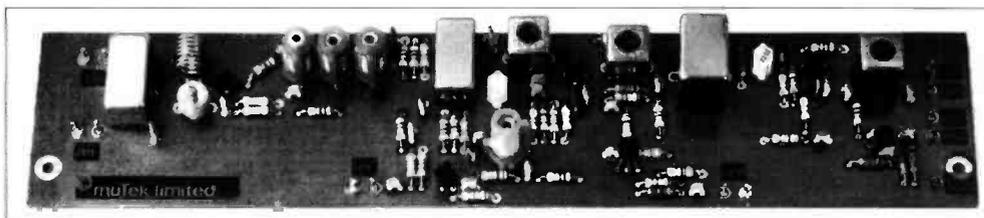
Nowadays f.m. based traffic (voice and digital) uses vertical antenna polarisation. The DX transmission modes of s.s.b. and c.w. use horizontal antenna polarisation. If you want local communications (possibly for a natter-net) then you'll probably need omni-directional coverage. Simple non-directive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

For serious v.h.f. 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.



An alternative to a pre-amplifier is to fit a lower noise receiver front end. A selection of replacement sections are available from muTek Electronics.

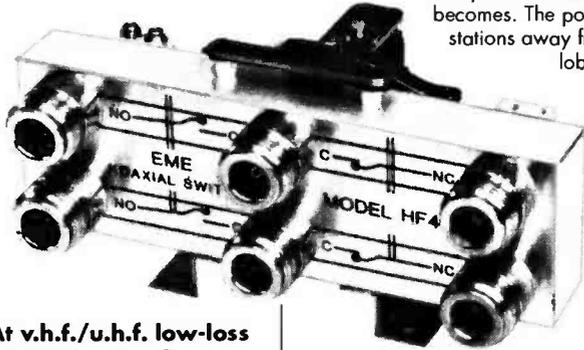
conditions are 'up', a few dB in antenna gain makes little difference.

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 Heliac 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 set-up 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 when 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 3W 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.

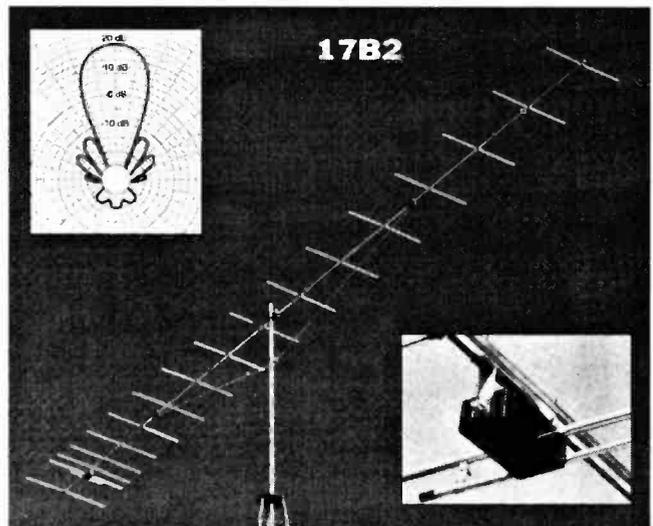
Perhaps at this stage you should invest in a telescopic tilt-over tower, enabling those expensive antennas to be lowered when it gets very windy. When you change the feeder, every bit lost in the feeder system means less power on transmit, and a decrease in the overall system sensitivity. Finally, increase your output power to 400W but only if you know how to handle it properly!

PW

FURTHER READING

The VHF/UHF DX Book by Ian White (ISBN 0-9520468-0-6).

An antenna, such as this 17-ele Cushcraft example, can help both the transmit and received signals.



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CM2 Quality Microphone with VOGAD	£13.50	£18.90
DCS2 "S Meter" for our receivers	£10.90	£15.90
DFD4 Add-on Digital Read-out for superhet radios	£49.90	£69.90
DFD5 5 Digit 35MHz Frequency Counter	£54.90	£79.90
ST2 Morse Side-tone/Practice Oscillator	£9.80	£15.90

Optional hardware packs are available for most of the above, please enquire.



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Optional hardware packs are available to go with the above receiver electronics kits. The amateur band receivers can all be expanded into transceivers by adding on the relevant transmitting kits.

TRANSMITTERS

		Kit	Assembled PCB
AT160 80 & 160M Bands AM/DSB/CW 10W PEP adjustable	£39.90	£62.90	
CTX QRP CW Transmitter, 40M or 80M versions	£15.50	£22.90	
MTX20 20M 10W (adjustable) CW Transmitter	£29.90	£39.90	

All the above transmitters are crystal controlled. Matching VFO kits are available and these enable transceive operation with the relevant receiver kits. There are also kits to build a 10 & 15M SSB transmitter (super Novice rig).

ACTIVE ANTENNAS AND PRE-AMPS

	Kit	Assembled PCB
AA2 150kHz to 30MHz Active Antenna Amplifier	£8.90	£13.90
AA4 25 to 1300MHz Active Antenna	£19.90	£27.90
AB118 118 to 137MHz Optimised VHF Air-band Antenna	£18.80	£25.90
SPA4 4 to 1300MHz Receiver Pre-amplifier	£15.90	£22.90



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ASL5 Filter Kit (£15.90) + HA50R Hardware (£13.90) = **£29.80**

PLEASE ADD £1.50 P&P for kits or £4.00 P&P if ordering hardware.

HOWES KITS contain good quality printed circuit boards with screen printed parts locations, full, clear instructions and all board mounted components. Sales, constructional and technical advice are available by phone during office hours. Please send an SAE for our free catalogue and specific product data sheets. Delivery is normally within seven days.

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 'offset' 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.

FINISHED TRANSCIEVER

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.

STANDARD BASIC

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.

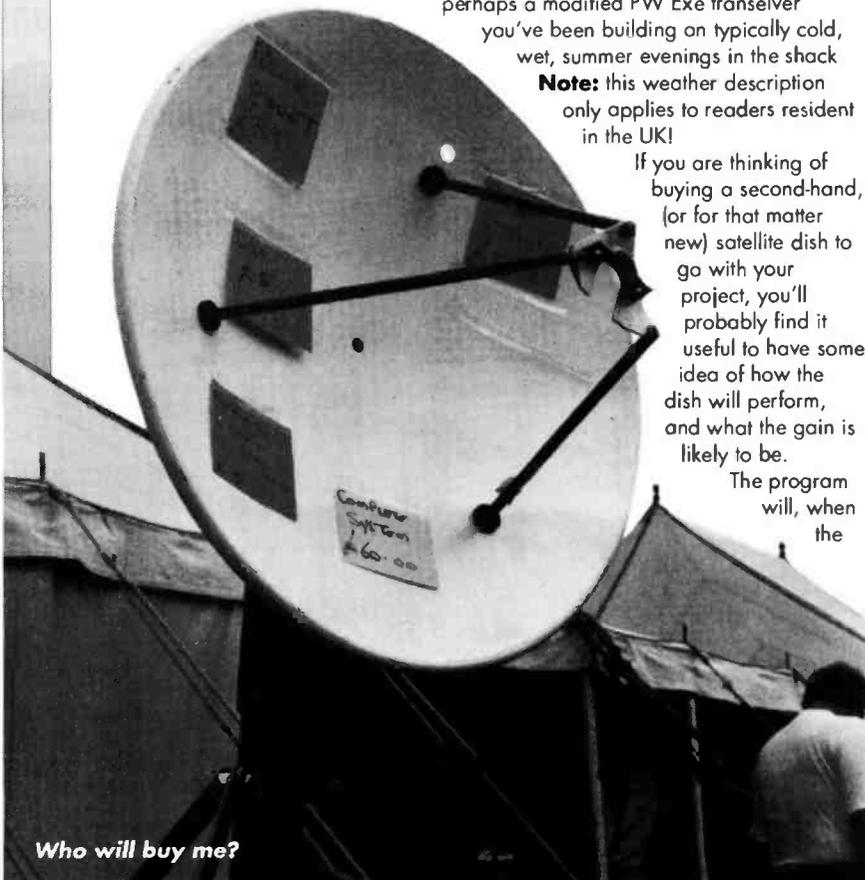
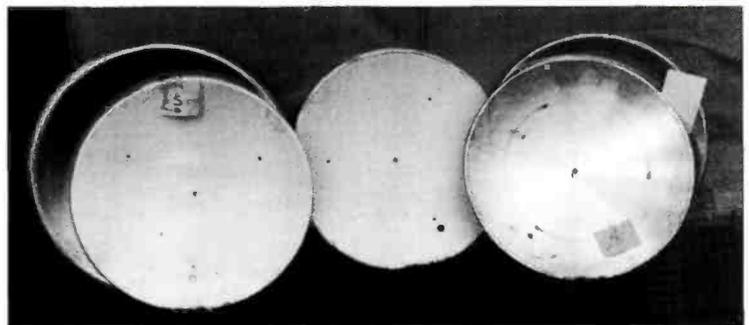
SHORT DESCRIPTION

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 resave 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.

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NC42

Desk top charger

Icom ICW2

The 2/70 Dualbander

Icom IC25RE

2m + Wideband RX

ICOM Accessories

CP13 Cigar Lighter Cable

HM65 Speaker Mic

HS60 Headset/Voxor PTT

OPC288 DC lead

LC71/72/73 W2/SRE Carry Cases

Kenwood TH28 2m Handy

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Kenwood TH78 Dual band Handy

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DC lead

SMC32 Speaker mic

SMC33 Speaker mic multijunction

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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 5UM 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 callsigns of 5RV and 5UM. 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 5UM 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-based'.

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



Fig. 2: Jack doesn't believe in having the heat turned up in the shack during the winter!

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

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 valved 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 telegraphy users to talk to telephony operators.

Virtually all operators used crystal control ('rockbound'). This meant the operator having to tune from one end of 144MHz 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 metre 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 - foiled 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 an 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 an 5MHz i.f. strip, and itself 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 QQVO3/10 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!"

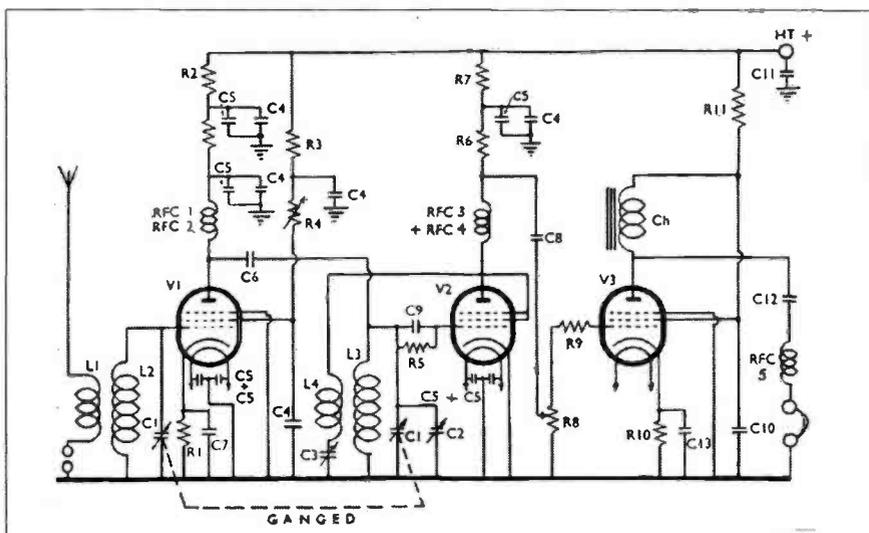
Finally, I feel sure that all our readers would like to wish Jack G5UM the very best wishes. We're all looking forward to seeing him celebrate 70 years 'on the air'.



Fig. 3: Down under with 'UM. Jack G5UM visiting former next door neighbour Gordon Bracewell VK3XX (formerly G3EGK) who now lives in Melbourne, Australia.

G3XFD

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



The 10GHz Microwave Scene

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.

FUNDAMENTAL CHANGE

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,

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 G3JVL 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.



John Fell GOAPI, with the G4RFR/P (mobile) 10GHz antenna system.

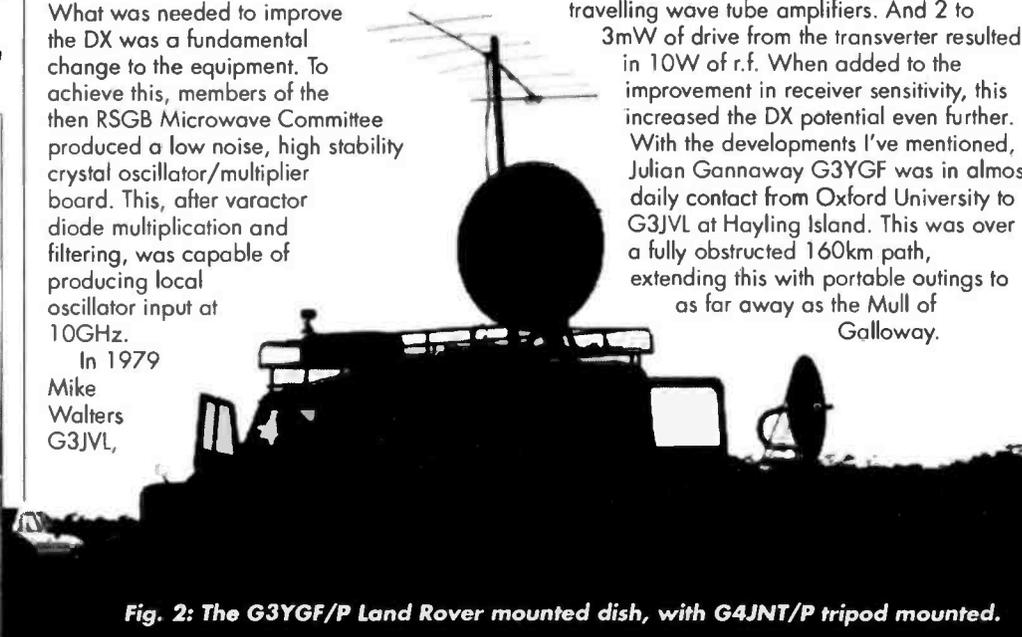


Fig. 2: The G3YGF/P Land Rover mounted dish, with G4JNT/P tripod mounted.

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 experimentations.

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 reproducible 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 144MHz. Once again, this allowed reception of 10GHz narrowband or any modes available on the 144MHz 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 experimentation 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 any 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 fo 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 GaAsf.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 read 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, I4 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 bane 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!

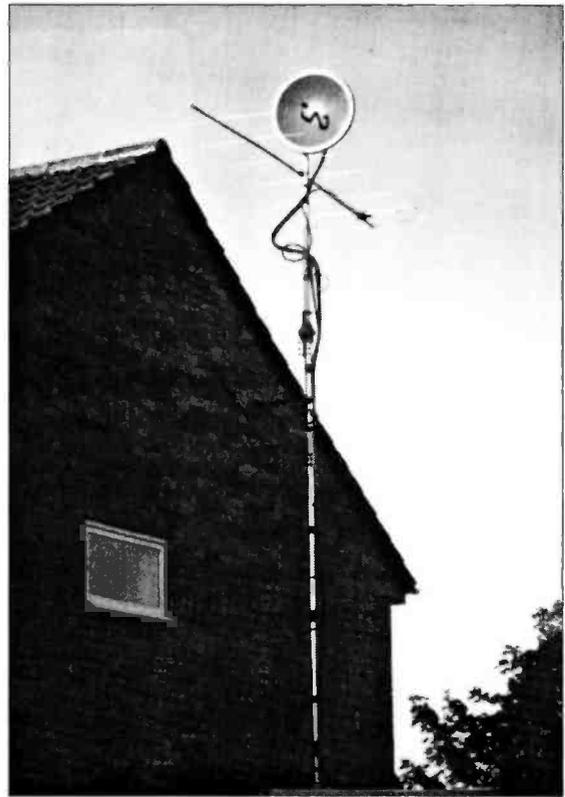


Fig. 3: The neat home station installation of G4JNT.

Fig. 4: Ted G3JMY, holding the active elements of the proposed 10GHz ATV repeater under construction for the Bristol based Severnside TV Repeater Group (GB3ZZ).



Fig. 5: The G3WDG 001 multiplier/amplifier, 2.66GHz in - 10GHz out.

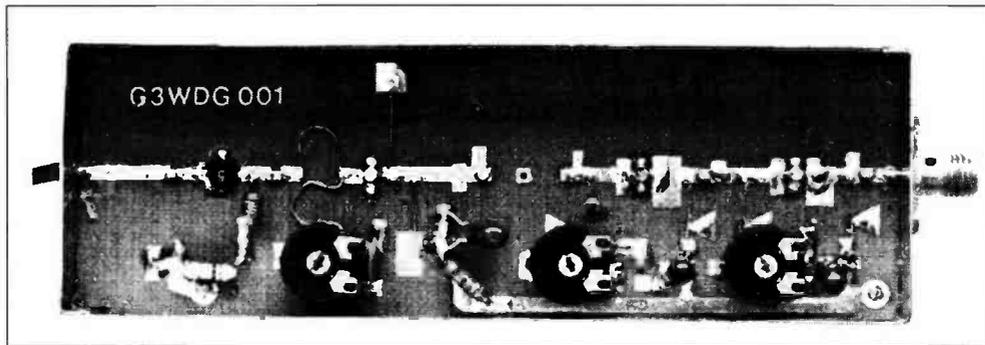


Fig. 6: A single stage h.e.m.t. and two stage GaAsf.e.t pre-amplifier.

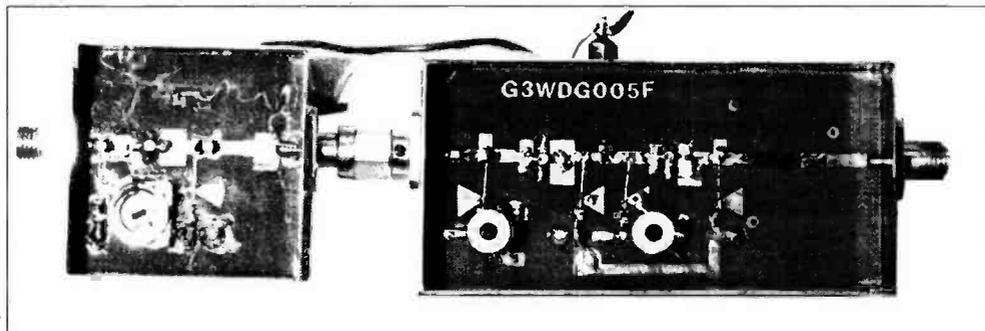
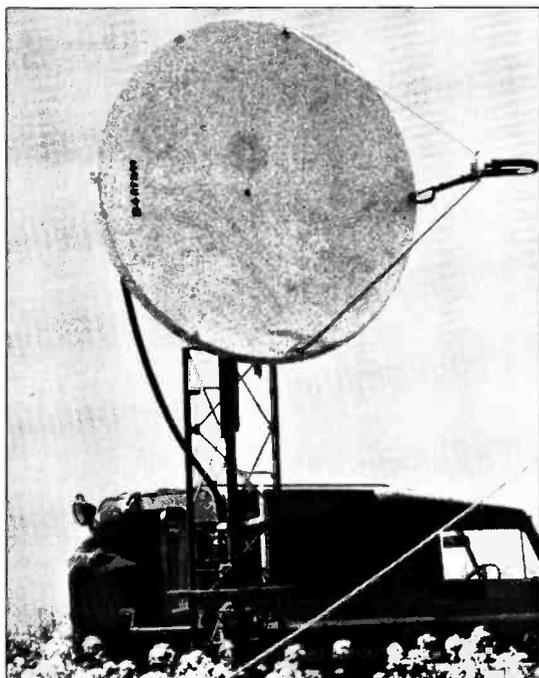


Fig. 7: Shown operating in the June 1993 10GHz cumulative contest is G4RFR/P, using a 1.6m offset fed elliptical parabolic antenna. This system is fully rotatable and can be elevated. It hears good solar noise levels.



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 G4CFD 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 do live in an 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 OSY.**

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

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VHF Operation - It Needn't Cost An Arm And A Leg

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

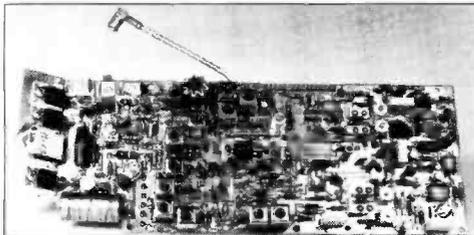
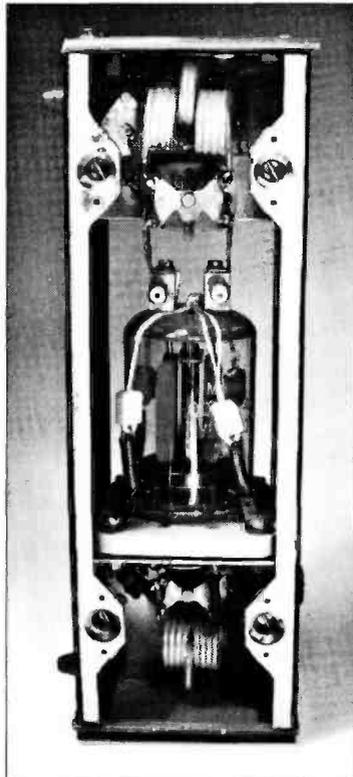


Fig. 1: A 70MHz f.m. transmitter courtesy of a p.m.r. manufacturer gives around 500mW of r.f.

Fig. 4: Garex can provide this beautiful valved p.a. adaptable to all the lower v.h.f. bands.



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 'Handies' 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 EQUIPMENT

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

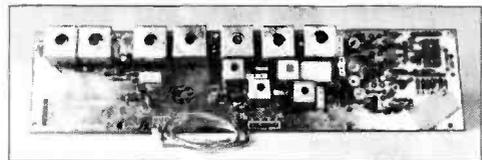


Fig. 2: This 70MHz input down converter (to 10.7MHz) would make an ideal cheap front-end for a receiver (a.m. or f.m.).

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.

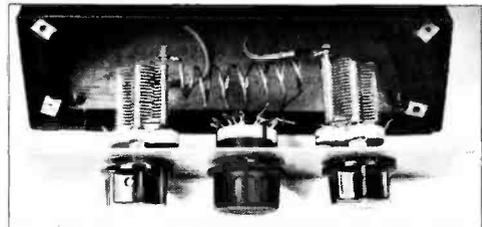


Fig. 3: With a little ingenuity an home-brew antenna tuner would allow the use of a long wire on v.h.f. Especially as it can be built so cheaply.

OVERALL STRATEGY

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



Fig. 7: A Kenwood/Trio Tr2300 synthesized (25kHz steps) 144MHz rig. A nice little set, but if you find one on the market it should have the two battery holders with it.



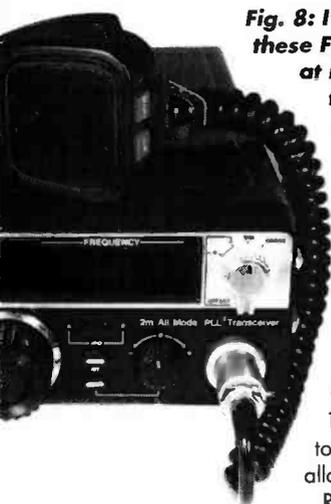


Fig. 8: I've seen some of these FDK Multi-750XX rigs at rallies complete with the 430MHz adapter. They make a good, if somewhat unusual, start to a multi-mode base or mobile station.

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 145MHz 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 home-built projects) 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



Practical Wireless, October 1993

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.) i.f. to listen to the whole of the 70MHz band. Couple that with the low powered f.m. transmitter board of **Fig. 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! **PW**

The following people are just a few, that I know can provide items that don't cost an arm and a leg to get going on v.h.f. and up.

Badger Boards, 87 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JF. Tel: 021-353 9326

J. Birkett, 25 The Strait, Lincoln LN12 1JF. Tel: (0522) 520767

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.

Garex Electronics, Station Yard, South Brent, South Devon TQ10 9AL. Tel: (0364) 72007.

Mainline Electronics, PO Box 235, Leicester LE2 9SH. Tel: (0533) 777648.

Nevada Communications, 189 London Road, Portsmouth, Hants PO2 9AE. Tel: (0705) 662145.

Waters & Stanton, 22 Main Street, Hockley, Essex SS5 4QS. Tel: (0702) 206835.

Westlake Electronics, West Park, Clawton, Holsworthy, Devon EX22 6QN. Tel (0409) 253758.

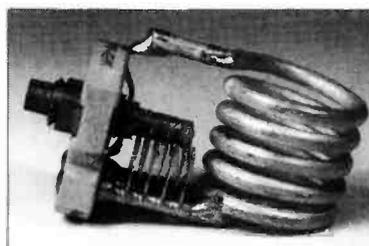


Fig. 5: This combination of high quality capacitor and heavy silver plated coil would make an excellent 100-104MHz trap.

Fig. 6: No information was found for this set, but it appears to work near to the 144MHz amateur band. A very cheap start in spite of the cost of crystals.



**** 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!

Antenna Workshop

In this edition of 'Antenna Workshop' Peter Dodd G3LDO, discusses methods of constructing v.h.f. antennas. The ideas Peter suggests will suit antennas in the range of 50 to 1200MHz.

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 large enough to take the elements, and then solder them into place as shown in Fig. 3a.

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

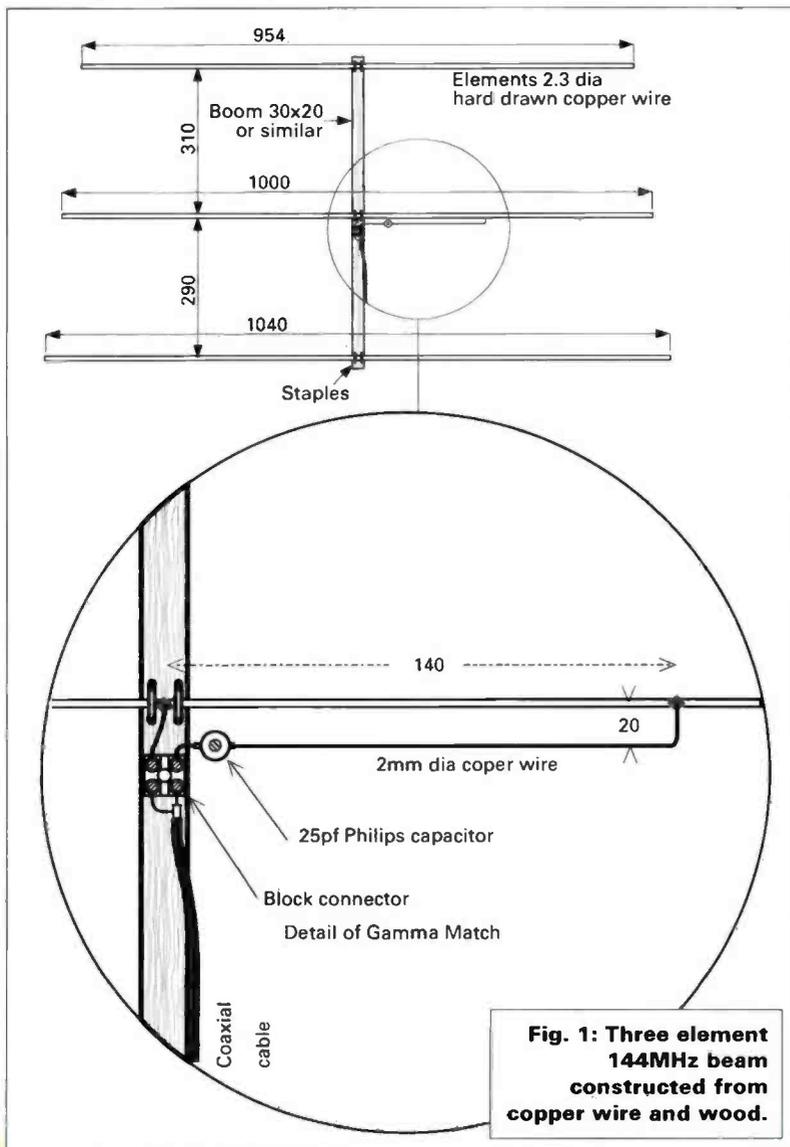


Fig. 1: Three element 144MHz beam constructed from copper wire and wood.

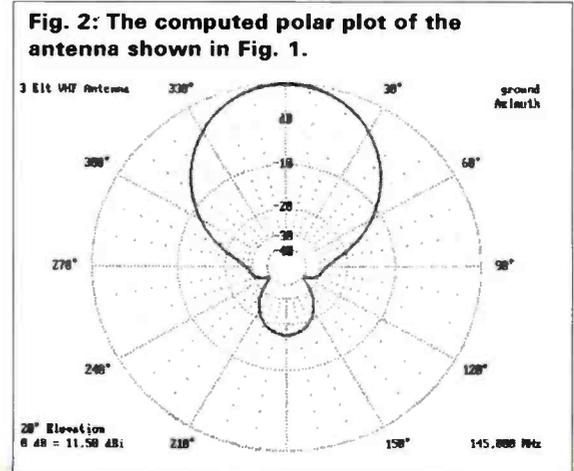


Fig. 2: The computed polar plot of the antenna shown in Fig. 1.

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 clamped 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 the driven element length re-adjusted.

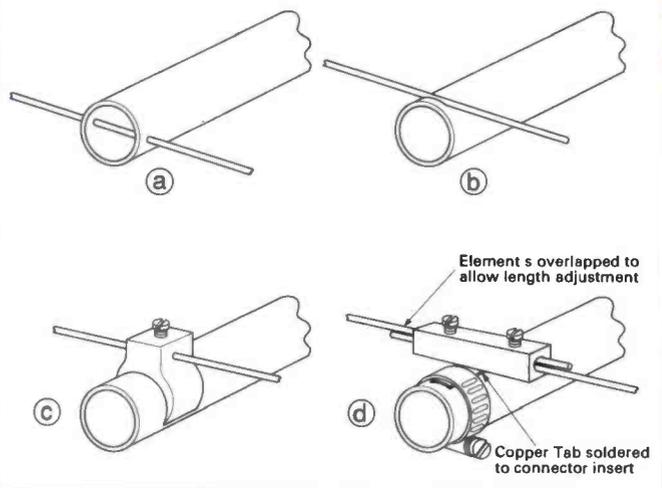
Using a Gamma matching method, a match can be achieved almost regardless of antenna spacing or element length. Remember to waterproof this area if the antenna is for permanent outdoor use.

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!

PW

Fig. 3: A Variety of methods to fix antenna elements onto a boom. See the text for more details.



Further Reading

A method of measuring capacitance using a dip oscillator is given in

The Antenna Experimenters Guide, available from the PW Book Service for £8.90 plus £1 P&P (UK), £1.75 P&P (overseas).

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 300Ω balanced feedline. A loop is provided to hang the antenna up on a support.

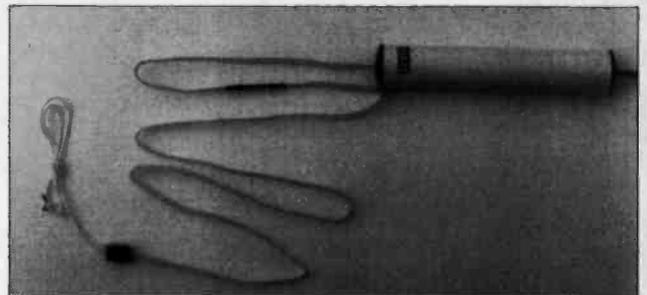
The matching (base) section is built on a p.c.b. strip and enclosed in a plastics tube. Provision has been made, for this section to be easily dismantled to allow feeder replacement if necessary.

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 within the range of the outdoor antenna. The signal on receive was 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), overseas P&P prices on application.

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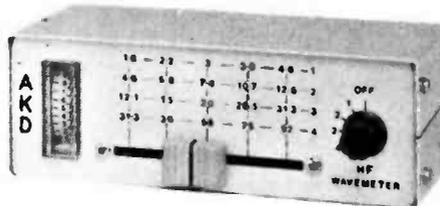
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Instructor Morse Professional

*Mike Richards
G4WNC takes a
look at what must be
one of the most
comprehensive
Morse tutors
available.*

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 PC2086.

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

dot	gap	dot	gap	dot	gap	dash
30	30	30	30	30	30	30

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.

Review



Fig. 1: Photograph of colour screen display of the Instructor Morse program.



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 most straightforward of the tests is found via the Predefined Test menu.

In addition to sending random groups of any combination of letters, figures 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 predefined 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 stylised 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, Sleaford, Lincolnshire NG34 7PN. My thanks to Software Design Ltd for the loan of the review copy. PW

Radio Diary

*Practical Wireless and Short Wave Magazine in attendance.

***September 11:** The Scottish Amateur Radio Convention will be held in Cardonald College, 690 Mossspark Drive, Glasgow G52. Full trade show, lecture theatres, Bring & Buy, Morse tests, bar & restaurant. Free parking. Talk-in on S22. **Tom Hughes GM3EDZ on 041-882 5753.**

***September 12:** Lincoln SWC Hamfest will be held at Lincolnshire Showground & Exhibition Centre, four miles north of Lincoln on A15 Lincoln/Scunthorpe Road. Doors open 10.30am. Usual trade stands, Bring & Buy, refreshments, licensed bar. Lots of attractions for whole family. Admission £1 by lucky programme, free parking, caravans welcome by arrangement. Talk-in on S22. **Denis G1XZG on (0522) 684214.**

***September 12:** The BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Bring & Buy, refreshments, many exhibitor & special interest groups. Doors open 10.30am to 5pm. Admission, adults £1.50 & OAPs £1, under 14s free if accompanied by an adult. Well sign-posted. **Peter Nicol on 021-453 2676.**

September 18: The Annual Isle of Wight Wireless Rally will be held at the

National CEM Wireless Museum, Arreton Manor, Nr. Newport, Isle of Wight. Doors open at 11am. Bring & Buy, refreshments, covered accommodation if wet. Free admission for all, including traders, free parking. Talk-in on S20 by G3IOW. **Douglas G3KPO on (0983) 567665.**

September 19: The Peterborough Radio & Electronics Society will be holding its East of England Rally at The East of England Show Ground, Oundle Road, Peterborough. Doors open at 10.30am, admission £1. Traders, Bring & Buy, Car Boot, flea market. Free parking, full catering & bar facilities. **Mike G0CVZ on (0733) 222588.**

September 26: The Harlow & District Amateur Radio Society will be holding its 35th Annual Amateur Radio Rally & Computer Show at Harlow Town Sports Centre, off Fifth Avenue Harlow (easy access off M11 Junction 7, A414 follow the signposted route). Doors open at 10.30am. Admission £1, OAPs & children 50p. Varied selection of traders, Bring & Buy, free parking at and near to the site. Disabled parking and lifts available. **Mike G7BNF on (0850) 487863 or Ken G0HRR on (0279) 426647.**

October 3: Wincanton Radio Rally 1993 will be held at the Wincanton Racecourse, Somerset. Doors open 10am. Further details from **Norman Varnes G4YXX on (0749) 850432.**

October 10: The Computercations 1993 Amateur Radio & Computer Rally will be held at Hillhead Campsite, Kingswear Road, Brixham, Devon. Trade stands for computer and radio, Bring & Buy, raffle, refreshments. Unlimited free parking with overnight camping available. Talk-in on S22. **Bill Trezise G6ZRM on (0803) 522216.**

***October 29/30:** The 22nd Annual Leicester Amateur Radio, Electronics & Computer Exhibition will be held at the Granby Halls, Leicester. All the usual attractions and facilities. **Frank G4PDZ on (0533) 871086.**

November 6 & 7: The Seventh North Wales Radio & Electronics Show will be held at the Aberconwy Conference Centre, Llandudno. Doors open at 10am on both days. Admission £1, children under 14, 50p. **B. Mae GW7EXH on (0745) 591704.**

November 7: Donegal TIR Cornaill Amateur Radio Society will hold its annual radio rally at Jacksons Hotel, Ballbofey, Co. Donegal, Eire. Large trade presence is expected, Bring & Buy, leisure facilities on site. Special accommodation rates will be available in Jacksons Hotel. **Ken McDermott EI4DW, QTHR on 010-353 74 31109.**

December 5: Leeds & District Amateur Radio Society will be holding its rally at Allerton High School, King Lane, Leeds. Four large main halls, talk-in on S22, catering facilities. **Richard Tillotson G7HUE on (0532) 552344 or FAX (0532) 353856.**

December 12: Centre of England Christmas Radio, Satellite, Computer & Electronics Rally is being held at the Sports Connexion Centre, Leamington Road, Ryton on Dunsmore Coventry A45/A423. Doors open at 11am, 10.30am for disabled visitors, admission £1. Over 80 traders, Bring & Buy, talk-in on S22. Bar and hot food all day, ample free parking. Christmas special 'Spot The Cracker' on many of the trade stands to win a prize. **Frank Martin on (0952) 598173.**

If you're travelling long distances to rallies, it could be worth 'phoning the contact number to check all is well, before setting off.

Roy Merrall, short wave listener, gives his personal view on short wave listening.

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 SWling 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 an indifferent earth!

Success almost certainly means different things to different people. My definition of success rests in the act of receiving the station and whenever possible stopping to listen to what they might have to say. Plus of course making a positive identification of the station.

I don't think it's particularly important to obtain a QSL card as verification. The experienced listener may occasionally make a mistake but they are unlikely to delude themselves too often.

For many others, the verification is an integral part of the process, that remains incomplete until the QSL arrives. Unfortunately, the business of QSLing is getting prohibitively expensive and does not always end happily. Perhaps it should be that we have learn to be selective.

The pastime of DXing on the medium waves, or for that matter on the 60 and 75m bands, tends to require an ability to stay awake all night. This is an attribute that I, and probably many others, no longer possess in the necessary abundance!

As a result, od not being a 'night owl' transatlantic reception is now confined to the occasional logging of WINS or CJYQ.

Peruvian Exotica

The exotica from Peru usually arrives much too late to catch me awake and listening 'by proxy' is decidedly not on. For me at least, using a tape recorder to listen 'out of hours'

would defeat the object of the exercise!

Despite these self imposed constraints, there is still a lot of satisfaction in logging the almost inaudible CAAMA stations from Northern Australia, in the 2.3 to 2.5MHz band, or Windhoek 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 1960s 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 bandsread 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 J Valve s.w. Converter' which arrived as a gift in the mid 1940s. When the converter 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'.

PW

*The Computer
in Your Shack*

BYTES & BITS

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 its 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,



Fig. 1: A Dumb Terminal.



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

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.

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TRANSVERTERS from 2 metres for 4, 6 or 10 metres, 0.5W output. Includes interface to accept 0.5-5W drive. Types TRC4-2i (built only), TRC6-2i, TRC10-2i. New larger box to include linear. **PCB KIT £64.25, PCB BUILT £100, BOX KIT £85.75, BOX BUILT £132.**

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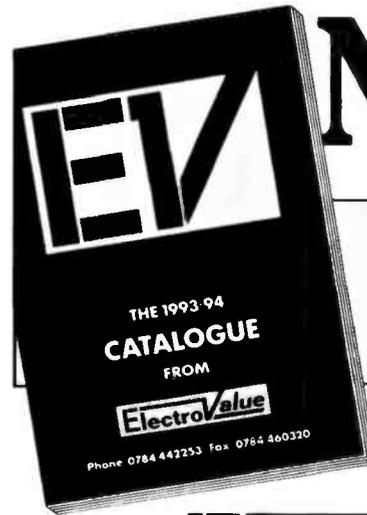
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E180F	4.50	EM84	4.00	DDV03-20A	25.00	6BN6	2.00	6L8A	1.50
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EAB0C80	1.05	EN91 Mull	7.50	DDV06-12	10.00	6BR7	6.00	6X4	3.00
EB91	1.50	EY51	3.50	U19	10.00	6BR8A	4.00	6X5GT	2.50
EBF80	1.50	EY86	1.75	UABC90	1.50	6BS7	6.00	12A77	2.25
EBF89	1.50	EY88	1.75	UBF89	1.50	6BW6	4.50	12AU7	2.25
EBL31	12.50	EZ90	1.50	UCH42	4.00	6BZ6	2.50	12AX7A GE	7.00
EC91	6.50	EZ81	1.50	UCH81	2.50	GC4	1.95	12BA6	2.50
ECC33	7.50	EY501	3.00	UCL82	2.00	GC6	5.00	12BE6	2.50
ECC35	7.50	GZ32 Mull	8.50	UCL83	3.00	GC86A	3.00	12BH7A GE	6.50
ECC81	2.25	GZ33	4.50	UF89	3.00	GCDB6A	5.00	12BY7A GE	7.00
ECC82	2.25	GZ34 GE	7.50	UL41	12.00	GCLE	3.75	12E1	20.00
ECC83 Siemens	3.00	GZ37	4.50	UL84	2.50	GC57 GE	5.25	12HG7 12GN7	3.50
ECC85	3.50	KT61	7.50	UY41	4.00	GCHE	6.00	30FL1/2	1.50
ECC88 Mull	6.00	KT66	12.50	UY85	2.25	GCW4	8.00	30P19	2.50
ECC91	2.00	KT88	15.00	VR105/30	2.50	GD6	5.00	300B(P/R)	120.00
ECCF80	1.50	N78	9.00	VR150/30	2.50	GD05 GE	17.50	572B	70.00
ECI35	3.50	QA2	2.70	Z759	35.00	8D06B	12.50	805	50.00
ECI42	3.50	QB2	2.70	Z803U	25.00	8E48	3.50	807	6.00
ECI81	3.00	QC3	2.50	ZD21	3.50	8E48	1.85	811A	18.50
ECL80	1.50	QD3	2.50	ZB28	20.00	8F6	3.50	812A	52.50
ECL82	3.00	PCF80	2.00	4CX250B EIMAC	75.00	GGK6	4.00	813	27.50
ECL83	3.00	PCF82	1.50	4CX250B STC	45.00	GH6	3.00	833A	85.00
ECL86 Mull	3.50	PCF86	2.50	5R4GY	8.00	GHS6	4.95	866A	25.00
ECL800	25.00	PCF801	2.50	5U4G	5.25	GJ5	3.00	872A	20.00
EF37A	3.50	PCF802	2.50	5V4B	4.00	GJ6	3.00	931A	25.00
EF39	2.75	PCL82	2.00	5Y3GT	2.50	GJ7	4.00	2050A GE	15.00
EF40	5.00	PCL83	3.00	5Z3	4.00	6L8A GE	17.50	5751	8.00
EF41	3.50	PCL84	2.00	5Z4GT	2.50	6LE6C	20.00	5763	10.00
EF42	4.50	PCL85	2.50	6AH6	4.00	6JS6C GE	15.00	5814A	4.00
EF80	1.50	PCL86	2.50	6AK5	4.50	6KG6T	3.00	5842	12.00
EF85	1.50	PCL805	2.50	6AL5	1.00	6K7	4.00	6090	8.50
EF86	7.50	PD500	6.00	6AT6	1.95	6K8	4.00	6146B GE	15.00
EF91	1.05	PL36	2.50	6AN5	5.00	6KD6 GE	18.50	6550A GE	15.00
EF92	2.15	PL81	1.75	6AN8A	4.50	6LG6	8.50	6883B GE	18.00
EF183	2.00	PL82	1.50	6AQ5	3.25	6L6GCSYL	12.50	6973	11.00
EF184	2.00	PL83	2.50	6AR5	25.00	6L6G Siemens	4.50	7025 GE	7.00
EL32	2.50	PL84	2.00	6AS6	6.00	6L6GC GE	9.50	7027A GE	17.50
EL33	7.50	PL504	2.50	6AS7G	9.50	6L7	3.50	7199	18.00
EL34 Siemens	6.00	PL508	5.50	6AT6	2.00	6LD6	20.00	7360	25.00
EL36	4.00	PL509	6.00	6AU5GT	5.00	6O7	4.00	7581A	12.00
ELL80	25.00	PL519	6.00	6AU6	2.50	6RHH8/6KNB	12.00	7586	15.00
EL81	5.00	PL802	8.00	6AW8A	4.00	6SA7	3.00	7587	23.00
EL84 Mull	6.00	PY81	1.50	6B7	4.00	6SC7	3.00	7868	12.00
EL86	2.75	PY88	2.00	6B8	4.00	6SG7	2.50	8417GE	17.50
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Fig. 1: A vintage loudspeaker in the shape of a parrot.

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!

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 Cossor 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.

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

Valve &

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 cross-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-signalman, 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 'Dag-bashers'.

Military Receiver

Can anyone identify the military communications receiver shown in **Fig. 2**? The set was given to **Henk Meerman** (Aerdenhont, 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 MCR1. The whole assembly was recognised by an elderly lady who had used clandestine radio in

Fig. 2: A mystery military receiver owned by a reader in the Netherlands.



Vintage

By Ron Ham

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 Scott.

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 spoilt 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

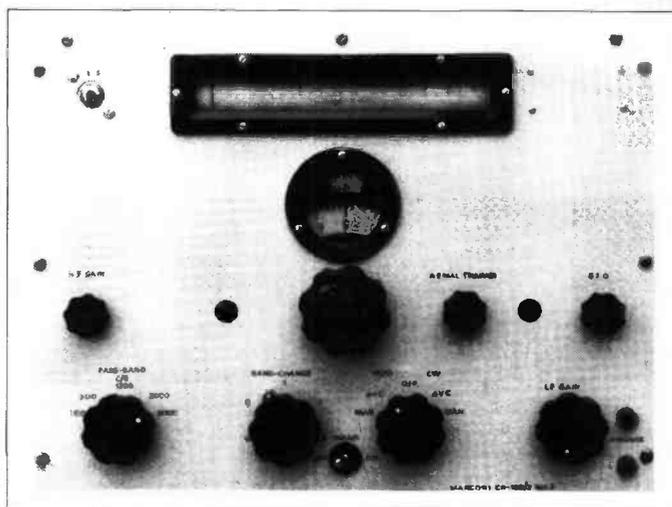


Fig. 3: The famous Marconi CR100 communications receiver.

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 ZC1 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

Report

H F B A N D S

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



Leighton Smart GW0LBI at his QRP Station.

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 a call 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 strength and working Europe.

Always remember if you can hear them, they can hear you on a clear channel; ergo either you are under the QRM or they don't want 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 Romeo is believed to still be in Libya, he hasn't been heard on the air. QSLs for the his P5RS7 operation are still not acceptable to DXCC (still no news on Romeo as this went down).

The DXCC have approved the following operations: 3C1TR, 4J1FS, 5R8DS, 5X1DX, 5X1XX, 9M0S, BV2/WD8E, C9LCK, D2AXK, H44/14LCK, J80I, KH5K/N9NS, KH5/N0AFW, S79CK/D, V47I, VU7SFI/API, and ZX0F. 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 are obtainable from IK5GQM.

The French have changed their callsigns again, says *The DX Bulletin*. FD1s and FE1s are being lumped together as

F5s according to the *Long Island DX Bulletin* via *The DX Bulletin*.

Silent Key: Jim Rafferty N6RJ one of the top exponents of DX working in the USA, died on June 13. He'll be sadly missed.

The 1.8MHz Band

Let's now look at your reports and we'll start with the 1.8MHz band. A receiving loop made from coaxial cable, helped G2HKU in Sheppey with his ON7BW skeds. When ON7BW is inaudible on the wire antenna he is often solid copy on the loop.

Ted G2HKU is yet another to have problems with SSL and his licence. For the record, you should register a complaint in writing to the Radiocommunications Agency, and send a copy to G3HCT, QTHR. John is preparing a dossier and all the ammunition you can give will help.

At the end of his first year 2E0ACN looks back on what he has achieved. On 1.8MHz, the 40m of end-fed wire gives good service but there aren't many stations in the 1.950 - 2MHz segment to be worked. But one he worked was GW0JEQ, not so far from my QTH. Incidentally, John notes that his NRAE pass slip got him off the dole queue - good for you!

Leighton Smart GW0LBI in Trelewis is developing a liking for 1.8MHz QRP. So far he notes DL6ATM, SM7RYR and a regular natter with EI5HJ. Some 40 countries have now been worked on 1.8MHz.

The 3.5 And 7MHz Bands

Now it's up to the 3.5 and 7MHz bands. On 3.5MHz 2E0ACN remarks about the nice contacts with F2WW in particular, not to mention G5LP too.

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 R5 and then ask for a repeat of the call. Alas the lids never learn!

The little DTR7 rig gave Eric GD4IHC, HA5KF/1, OK1DMS, and EA3GAS/P 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 HK1KXA at 0600 was a good S6 and with W2EWD at 0500 with no QRM or fading.

The second contact, W2EWD was using an old Heathkit 1681 and receiving with an SX101. At 79 he has been licensed for 60 years.

The 10, 14 And 18MHz Bands

On 10MHz 2E0ACN used the OXO transmitter at 400mW and a Sudden receiver for his one contact with SM7FUG. 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 4J4GAT on Malyj-Vysotskij Is. Despite his illness, Ted managed, with his wife's aid, to get some more copper down into the ground under his HF6V vertical.

On 14MHz G2HKU worked with UA0QGM, ZA1B (odd, to think of ZA as a common country!) HC5AI, 9V1WWW.

Using the Omni-V on 18MHz G2HKU found 9H3XX, HB0/DJ1FH (again relatively rare but not far!) and 4X1VF. A shift to the IC-721S for QRP provided OD5/SP7LSE, 9H4R and UA0Y/UZ0AM - DX in anyone's language.

The 21, 24 And 28MHz Bands

From Northfield, 2E0ACN put together some 'QRO' for his HW8 to give 2W out into the 40m end-fed wire, hooking VE1BBL, KA9UEY, UB5KCE, and UA9JH. It was down to

750mW for 4N5CEF, EC6PD and lots of small fry. Then 3W from a KW2000A to add KA2RRK to the scalps.

On 24MHz G2HKU tried a bit of s.s.b. on UJ8JMM and EA8AMT, and he then reverted to c.w. for VP5/WD5B 9M2AX, and T93T.

The Omni-V on 28MHz gave G2HKU S79MX, PT0Z, and DL1VJ/T5, while the low-powered IC-721S yielded OY6A and 7Q7XX.

John at 2E0ACN has been surprised with what he has been able to find on 28MHz by Sporadic-E. They were mainly Europeans of course, but as John says the propagation can 'box the compass' within a half-hour period.

Leighton GW0LBI, in Trelewis also noted the Sporadic-E on the 28MHz band, and managed to put his QRP out to S51JI, F1PNP/QRP, DJ3HJ, and HB9KNV. The second letter from him adds F5TFS, EA6CK and DL2MF/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 (Westcliff-on-Sea), Geoff Crawley (Iceland), Simon Griggs (Chelmsford), Gerald Bramwell (Swinton) - and of course to DXNS, *The DX Bulletin*, *The Canadian Amateur* from CARF. 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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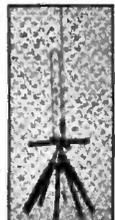
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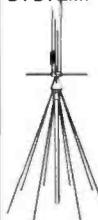
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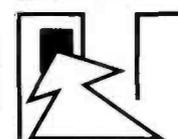
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David Butler G4ASR says he's got news of tremendous July Sp-E openings and that the 50MHz had fleeting openings to North America. David reports that on the 144MHz band there were also openings into the African continent!

Report

50MHz

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 CN8HB (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 G00FE** (IO90) didn't.

Between 1643-1719UTC Jim worked SM5AQJ (JO99), SM5MIX (JO78), SP8BTJ (KO10). He also worked SP9BIF (JO90), HG6NQ (JN98) and S56HCE (JN75).

Another station to notice the Sp-E propagation to Sweden was **Dirk Ernesti DD3DJ** (JO31). At 1716UTC he heard the Oestersund (central Sweden) aircraft beacon, OSD2, 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 1655-1742UTC 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 (KO20). 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 G00RC (IO93) first came across the opening at 1711UTC. He then went on to work 5 x YU, I7CSB (JN71) and LZ2FO (KN18). Vince uses an Icom IC-251E with MuTek front-end board, 150W and a 19-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 IK0BZY (JN61).

Gavin's station consists of a Trio TR-711E, Nag amplifier running 250W, a mast-head pre-amplifier and an OZ5HF 9-element Yagi. A new amplifier running a pair of 4CX-250Bs is just waiting for the p.s.u. to be completed.

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 an s.s.b. QSO with OK2KZR (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 G0CUZ (IO82) and G0KON (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 G0CUZ** (IO82) heard a weak Spanish speaking station on 144.300MHz. There was an 'ocho' (8) in the call sign and he guessed that it was EA8 as there was no sign of tropo to Spain.

At 1728UTC the same weak signal appeared again and a difficult contact with EB8BT (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 one with Spain were also made. Colin noted that when the signals were weak, around S1, the QSB 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.

Mark Holloway G4RY (IO90) 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. contacts with EA8AGA, EB8ALZ and EB8BT between 1822-2055UTC.

Opening Commenced

At my QTH (IO81) the 144MHz opening commenced at 1755UTC, lasting until 1850UTC. During that time I managed to make three 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 (IM58) and Spain (IN52). Interestingly, during this time the only stations I could hear on the 50MHz band were located in 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 EI, G, GI, GM and GW. He was using a Trio TR-9130 left there last year by GM0BQM. So it was fitting that Tarik's furthest contact was with GM0BQM!

Mike Robertson GM0BQM/P (IO85) 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 **G1CET** and **GM4JJJ** managed to work CN8CC, CN8HB and CN8ST.

Brian Jones G8ASO (IO82) observed packet radio signals on 144.650MHz from CS1CRE and CT1ASP. Only a couple of transmissions were received, but they did include text.

Hong Kong

Now it's over to Hong Kong where **Graham Daubney G8MBI** has been domiciled for the past year. Active as VS6YHT, on June 6 he made

Panorama

PACKET

Last month Roger Cooke G3LDI, gave an overview of packet operation in Russia. This month he brings you some more details from Misha UA6LU.

The Rostov (Rostov-on-Don) packet network, (second network in Russia after the Moscow packet network) is due to the efforts of **Mishael Bondarev UA6LU** and **Boris Larionov UA6LQ**. Rostov, a large city on the river Don, in the south of Russia, has a population over a million.

The Rostov packet network, came into being with the support and assistance of many amateurs who donated equipment. The list includes, **N3CBW, KC3VO, GONKZ, W3ASK, G7KPN, WB5EKW, DJ8FR, DL6LAU, F6DIZ, F1JOE, RV6LDP, ZS6AI, ZS6WGH, ZS6ZQ, ZS6BFN, ZS6ABY, SM7TDC, N5VGC**. Sponsored assistance was made by **Richard Ross K2MGA** from *CQ Magazine* and also Kenwood USA.

I've had to shorten Misha's words somewhat, but he says "Our packet network consists of two h.f./v.h.f. mailboxes - UA6LU and UA6LQ. The UA6LU-BBS, after some experimental operation, started regular operation in May 1992, with UA6LQ-BBS following in July 1992. At the present time the operations look like this: PC/XT computer, 21Mb HD, home-made FBB MUX (port multiplexer) and IF-232 interface for autoQSY. BBS software is F6FBB V.5.14d.

The following equipment is in use at UA6LU: h.f.-port - TS-450SAT, MFJ-1278 + DED Firmware, home-made 4-ele. Yagi (15m) and dipole (30m). On the v.h.f.-port - IC-255A, MFJ-1270B + DED Firmware, with a vertical antenna.

At UA6LQ may be found: on the h.f.-port - a TS-130S with DFC-230, MFJ-1278 + WA8DED Firmware, homemade KT-34XA 6 ele. Yagi. On the v.h.f.-port - IC-25A, SAATI (kit) TNC2 + DED Firmware, vertical antenna. Completing 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 UA6LQ 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.



Misha (or Mike) UA6LU at his station.

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

Distant User

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 UA6LQ 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 UA6LQ and ZS6AI-2 Node.

Lots of personal mail from Europe, for South Africa, Asia and Oceania, is forwarded through our BBS. We have very good routes to Australia, New Zealand and Asia via ZS6AI and 3B8FP. Lots of personal mail also goes from South Africa to Europe from Mike ZS6AI. Rachid 3B8FP, forwards personal messages from Asia and Oceania to Europe if he has a problem with his link to PA0SCH.

Any Old Equipment

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, AM7910, 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.**



Misha's enthusiastic children, Vladimir (12) and Peter (6). Vladimir is the sysop of UA6LU when Misha is away on business!



Boris UA6LQ at his station.

E N D

Round-up

BROADCAST

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 Satellit 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 *PW* 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 150-01, 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; 2100 on 17.89, 17.81, 15.43, 15.28, 15.195, 11.384 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 5kW, the Morse tests are in upper sideband and beamed at 250°. Reception reports are welcome, with two International Reply Coupons, to **PO Box 1792, Vilnius, Lithuania**. Reception is good in Stockholm, says programme presenter, George Wood.

Satellite News

I'll move on now from good 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-F1 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 11.554GHz 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 30, 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

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with the UN peace keeping force in Bosnia in July. Each Sunday the Flevo 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 3.232MHz. 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 2200 to 2215 on 9.76 and 11.815MHz and on medium wave 1395kHz.

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



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E N D

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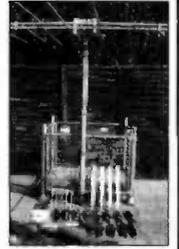
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TSM1328	2m/70cms 3dB/5.5dB 0.95m	£27.43
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This month, Andy Emmerson G8PTH brings you some welcome news of a new ATV product.

The World of ATV

FOCAL POINT

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 design 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? 13.8V 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), 1276MHz (RT1 input) and 1256MHz (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, Warks CV23 8UF. Tel: (0788) 890365, 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 G6ACI/T. 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,

G3GNR in Exeter, G3ZFP in Dunstable, G18GJX in Belfast and GM4ISM 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.**

E N D

A R C A D E

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 your 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 *PW*!

Services

Queries:

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

- 1: We **cannot** deal with technical queries over the telephone.
- 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.

Binders

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.

Constructional Projects

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.

Intermediate: A fair degree of experience of building radio or electronic projects is assumed, but only basic test equipment will be needed to complete any tests and adjustments.

Advanced: A project likely to appeal to the experienced constructor. Access to workshop facilities and test equipment will often be required. Definitely not for the beginner to attempt without assistance.

Mail Order

All items from *PW* are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 659930. Payment should be by cheque, postal order, money order or credit card (Mastercard and Visa only). All payments **must** be in sterling and overseas orders **must** be drawn on a London Clearing Bank.

Come Fly With Us To The 1994 Dayton HamVention

And See What's On Offer At The Biggest Amateur Radio Show In The World.

Join the *PW* party, led by the Editor Rob Mannion G3XFD, when we fly out on a scheduled Delta Airlines flight from Gatwick on Monday April 25 1994. We'll fly direct to Cincinnati and our private coach will take us to the Holiday Inn in Dayton for our seven night stay.

There'll be several day trips in our private coach and we'll spend a day at the world famous United States Air Force Museum. There's plenty of shopping and other attractions for the family too!

Book your seat on the *PW* 1994 HamVention Holiday for only £630 per person, sharing a twin bedded room. Single rooms are available for an extra £205. The price includes the return flight and meals on the aircraft, coach transfers, seven nights' accommodation, two day excursions by coach and admission ticket to the HamVention. We return home on Monday May 2, arriving at Gatwick on Tuesday morning.

Although Rob Mannion G3XFD is leading the *PW* party, the entire holiday is being organised by the Bristol based professional group tour operator RCT International. Annette Oxley at RCT is waiting for your enquiry and she'll be delighted to send you a full itinerary and booking form. Don't delay, send away today and fly with *PW* to the greatest amateur radio adventure of 1994!

To Annette Oxley
Practical Wireless 1994 HamVention Holiday
RCT International
44 College Green
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I am interested in joining the *Practical Wireless* 1994 Dayton HamVention Holiday, please send me further details.

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B O O K S

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Extensively revised & updated (October 1992). Air band radio listening enables you to listen-in on the conversations between aircraft and those on the ground who control them, and is an increasingly popular and fascinating hobby. A new chapter on military air band has been added. The author, an air traffic controller, explains more about this listening hobby. 190 pages. £7.99

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George Wilcox

The listener's check list and guide to European radio broadcasting. Covers m.w., l.w., v.h.f. & s.w., including two special fold-out maps. Also includes a full list of British stations, a select list of European stations, broadcasts in English and 'Making the Most of Your Portable'. 46 pages. £4.25

FLIGHT ROUTINGS 1993

Compiled by T.T. & S.J. Williams

This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 122 pages. £5.95

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This book covers the complete short wave range from 3 to 30MHz together with the adjacent frequency bands from 0 to 150kHz and from 1.6 to 3MHz. It includes details on all types of utility stations including FAX and RTTY. There are 19549 entries in the frequency list and 3590 in the alphabetical callsign list plus press services and meteorological stations. Included are RTTY & FAX press and meteorological schedules. There are 11800 changes since the 10th edition. 534 pages. £24.00

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GUIDE BP255

Peter Shore

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GUIDE Bill Laver

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Langley Pierce

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WORLD RADIO TV HANDBOOK 1993

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Because antennas are a topic of great interest among radio amateurs, ARRL HQ continues to receive many more papers on the subject than can possibly be published in QST. Those papers are collected in this volume. 208 pages. £9.50

ARRL ANTENNA COMPENIUM

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Edited by Jerry Hall K1TO

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Compiled and edited by P. Linsley

G3PDL & T. Nicholson

KA9WRI/GWOLNQ

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HF ANTENNA COLLECTION

(RSGB)

Edited by Erwin David G4LQJ

This book contains a collection of useful, and interesting h.f. antenna articles, first published in the RSGB's *Radio Communication* magazine, between 1968 and 1989, along with other useful information on ancillary topics such as feeders, tuners, baluns, testing and mechanics for the antenna builder. 233 pages. £9.50.

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Dr James. L. Lawson W2PZV

This book is a polished and expanded version of a series of articles first published in *Ham Radio* following from a series of lectures by the author, who was well-known as the expert on Yagi design. Chapters include simple Yagi antennas, loop antennas, effect of ground, stacking and practical antenna design. 210 pages. £10.95

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SATELLITE BOOK - A Complete Guide to Satellite TV Theory and Practice

John Breeds
This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by an expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology. 280 pages. £30.00

SATELLITE EXPERIMENTER'S HANDBOOK 2nd Edition

Martin Davidoff K2UBC
The book is divided into four main sections - History, Getting Started, Technical Topics and Appendices. It provides information on spacecraft built by and for, radio amateurs. In addition, it discusses weather, TV-broadcast and other satellites of interest to amateurs. 313 pages. £14.50

SATELLITE TELEVISION

A layman's guide
Peter Pearson
Pictures from space, that's what satellite television is all about. Orbiting satellites, 35000km high, receive TV signals from stations on

the earth and re-transmit them back again. This book explains all you need to know to set up your own satellite TV terminal at home, dish and accessories, cable and tuner. 73 pages. £1.00

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AMATEUR RADIO

ALL ABOUT VHF AMATEUR RADIO

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Written in non-technical language, this book provides information covering important aspects of v.h.f. radio and tells you where you can find additional data. If you have a scanner, you'll find a lot of interesting signals in the huge span of frequencies covered, 100-300MHz & 50, 420, 902 & 1250MHz bands. 163 pages. £9.50

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This is the 70th edition of this handbook and contains the best information from previous issues. New for this edition is some information on feedback-loop design for power supplies, a new gel-cell charger project, updates on antenna systems and new coverage of baluns, propagation programs are compared and colour SSTV and telephone FAX machines are also covered. Finally there's a new section on 'for the workbench' with new projects for the reader to build. 1214 pages. £18.95

ARRL OPERATING MANUAL

Another very useful ARRL book. Although written for the American amateur, this book will also be of use and interest to the UK amateur. Topics covered range from short wave listening through operating awards to repeaters, operating and satellites. 684 pages. £12.95

ARRL SATELLITE ANTHOLOGY

The best from the Amateur Satellite News column and articles out of 31 issues of QST have been gathered together in this book. The latest information on OSCARs 9 through 13 as well as the RS satellites is included. Operation on Phase 3 satellites (OSCAR 10 and 13) is covered in detail. 97 pages. £5.95

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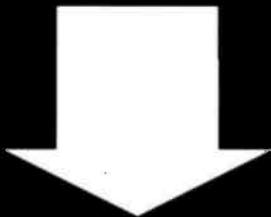
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We have talked to Badger Boards about the club and group discount on orders, and they are happy to continue this service. Club secretaries and group leaders should contact Badger Boards direct for the new discount rates. Please allow 28 days for delivery.

Board	Article (Project) Title	Issue	CALL BADGER BOARDS ON			021-353 9326 FOR UP-TO-DATE PRICES
WR315	PW Bourbon 3.5MHz TX	Aug 93	CALL BADGER BOARDS ON	WR286	Meon-4 (RF PA)	Jun 91
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WR313	10MHz Transmitter	Nov 92		WR255	Meon-4	May 91
WR312	Receive/Mixer (Getting Started)	Nov 92		WR285	Scope Probe PSU	Apr 91
WR311	Oscillator BFO (Getting Started)	Sept 92		WR284	Scope Probe	Apr 91
WR310	1.2GHz Pre-scaler	Aug 92		WR283	Sudden Receiver	Mar 91
WR309	Volt Reg/Divide by 100	Aug 92		WR282	Repeater Toneburst	Feb 91
WR308	TTL 1MHz Oscillator (Getting Started)	July 92		WR281	High Voltage PSU	Jan 91
WR307	Crystal Checker (Getting Started)	June 92		SET	WR263/264 +WR276-80	Jul 90
SET	WR303/304/305/306	Apr 92		WR272	Marland Transmitter	Sep 90
	Inductance Bridge			WR275	NiCad Recycler	Jun 90
WR302	GDO (Getting Started)	Apr 92		WR273	Low Voltage Alarm	Jun 90
WR301	Challenger Receiver	Feb 92		WR274	Vaive PSU	May 90
WR300a	OSCAM Oscillator	Mar 92		WR271	RX Attenuator	May 90
WR300	OSCAM Amplifier	Feb 92		WR270	Product Detector	Apr 90
WR299	Multivibrator (Getting Started)	Jan 92		WR269	Badger Cub	Apr 90
WR297/298	Additional Beaver boards			WR268	Glynme	Feb 90
SET	WR295/296 PW Beaver	Oct 91		WR267	Irwell (RF PA)	Feb 90
SET	WR292/293/294 Chatterbox	Aug 91		WR264	Irwell (Relay)	Feb 90
SET	WR290/291 Robin Freq. Counter	Aug 91		WR263	Irwell (VFO)	Jan 90
SET	WR292/293/294 Chatterbox	Aug 91		WR267	PW 49'er	Jan 90
WR289	Meon-4 (Control)	Jul 91		WR266	Tuned Active Antenna	Jan 90
WR288	Morse Master	Jun 91		WR265	Tuned Active Antenna (PSU)	Jan 90
				WR199	Meon 50MHz Transverter	Oct 85
				WR161	Marchwood 12V 30A PSU	Jul 83

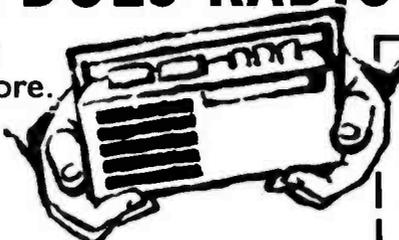
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HANDHELD HEAVEN

IC-P2E/P2ET

The picture below shows the IC-P2E 144MHz FM transceiver, typical of ICOM's new wave of handhelds. The IC-P2E has extended functions and is keypad operated. Both of these compact radios have AI (Artificial Intelligence) a unique feature that allows instant access to



previous functions. The IC-P2E and P2ET will evaluate your operating capability and memorize the order of functions used. Other features include: 100 memory channels, programmable call channel, ergonomic design, system clock with timer and lots more.

IC-P4E/P4ET

The IC-P4E and P4ET (pictured) are 430MHz FM transceivers visually similar to the IC-P2E range.

Features include: compact and ergonomic design, 100 memory channels, 5 watt power output with 13.8VDC, cartridge-type battery pack, full programmed and memory scan



features, a variety of tuning steps, simple 1750Hz tone call, auto power-save and frequency lock function. The durable splash-resistant body measures 49W x 105H x 38D mm, and weighs a mere 280g. We think you will agree that these compact handhelds will prove to be winners.

IC-2iE/4iE

These two new, ultra-slim and rugged handhelds have got to be the smallest transceivers around. Even including battery pack these radios will fit snugly into your shirt/jeans pocket or handbag. The IC-2iE operates on 144 - 146MHz FM and the IC-4iE on 430 - 440MHz UHF FM bands. Both of these



radios feature: maximum 5 watt output (with 13.8VDC battery), output miser to conserve battery power, 10 memory channels, scanning, power-save function and dual tuning steps. A full range of practical accessories are also available to make these pocket pals even more fun to operate.

IC-W2iE

The IC-W2iE offers dual-band 144/430MHz simple operation using few switches and independent volume / squelch for each band.

The ergonomic and splash-resistant design makes the IC-W2iE a snug fit in the palm of your hand. Features include; cellphone-style



'whisper' function. This allows cross band full duplex use via the mic-equipped battery pack and easier repeater operation with repeater memory. Every time you access a repeater all settings are automatically memorized in a repeater memory.

IC-W2iET

The W2iET has the same dual-band performance characteristics as the IC-W2iE but sports a command keypad and relocated back-lit display (manual operation is also available).

Features are as the IC-W2iE and include: battery capacity indicator, remote control via an optional HM-75 speaker mic, 70 channels, dial select steps, monitor function, high-speed scan functions, frequency lock function, external DC power jack for mobile use, auto power-down to allow last minute operation before battery fades, giving you the most from your IC-W2iET.



IC-2SRE/4SRE

The distinctive appearance of these two handhelds is bound to start the tongues wagging. You can enjoy the advantages of a handheld transceiver



with a wideband receiver allowing true reception of FM Broadcast, Air and Marine bands. Until now this has only been achieved by purchasing separate equipment. The IC-2SRE is a 2m FM transceiver with wideband receive and the IC-4SRE is its 70cm companion. Other great features include: selective calling, 30 ham memory and 60 wideband receive memory channels plus loads more.

N.B. Photographs not to scale.

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