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# practical Wireless

## QRP DXpedition

A Mobile Peter Barville G3XJJ Visits Monaco

## Features

The World Of QRP

The Challenge Of QRP

## Build

The Tiny Tim 3.5MHz SSB Transceiver

The Queensbury 7MHz CW Transceiver

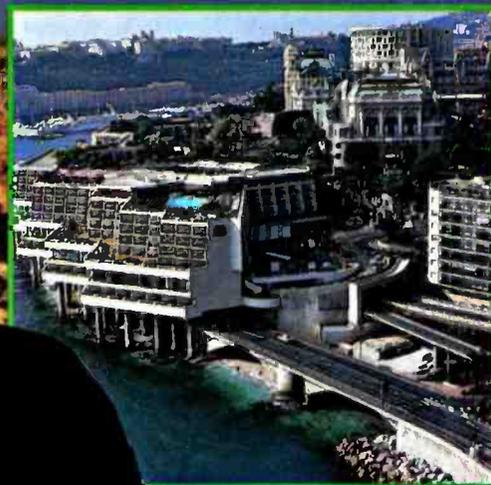
The Bourbon SMD Transmitter

## Reviewed

The Jim MX-14S HF Hand-Held SSB Transceiver Tested By G4SU

## Plus

Bits & Bytes - Antenna Workshop - Valve & Vintage And Lots More!



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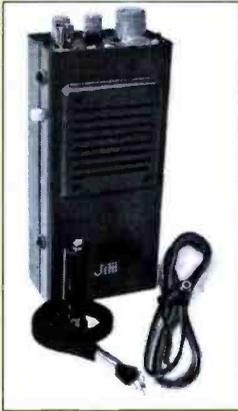
JULY 1993 (ON SALE JUNE 10)  
VOL. 69 NO. 7  
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NEXT ISSUE (AUGUST)  
ON SALE JULY 8

## JULY 1993 CONTENTS

### 13 Dayton HamVention 1993 Show Report

Rob Mannion G3XFD brings the news from the world's biggest amateur radio show



### 20 Review - Jim MX-14S 14MHz Transceiver

Clive Hardy G4SLU tries out an h.f. bands hand-held QRP transceiver

### 21 The Tiny Tim 3.5MHz SSB Transceiver Part 1

Tim Walford G3PCJ describes his delightfully simple QRP s.s.b. transceiver

### 25 My QRP DXpedition to Monaco

Peter Barville G3XJS tells the story of a successful holiday in France, with a very special day trip to Monaco thrown in for good measure

### 28 The World of QRP

Leighton Smart GW0LBI invites you to join in and explore the world of QRP

### 30 The Queensbury 7MHz CW Transceiver

Steve Ortmayer G4RAW & Clive Hardy G4SLU invite you to build a simple c.w. transceiver, and have fun on the air.

### 33 Basic QSOs In Spanish Part 1

Gareth Roberts GW4JXN & Ildefonso Sevilla EA7BWX help you with your Spanish, useful for holidays and amateur radio alike

### 36 The Challenge of QRP

Frank Lee G3YCC says that there's an exciting challenge waiting for you, when you work with QRP amateur radio

### 40 The Bourbon QRP 3.5MHz Transmitter Part 1

Bill Mooney G3VZU introduces his 3.5MHz double sideband suppressed carrier and c.w. transmitter, which uses surface mount techniques

### 44 Making Traditional Morse Keys Part 2

Dr Jim Lycett G0MSZ shows you how to complete your home made traditional style Morse key

### 46 Antenna Workshop

Peter Dodd G3LDO explains how you can maximise your QRP transmissions, by paying proper attention to your antenna

### 48 Valve & Vintage

Ron Ham opens the doors of the PW wireless shop, and chats about vintage military radio equipment and servicing older receivers

### 51 Bits & Bytes - The Computer In Your Shack

Peter Hunter G0GSZ invites all computing in radio enthusiasts to help compile a special database

Front cover acknowledgements. Our Thanks go to Mike Richards G4WNC for the rugged background shot from Minorca. Thank you also to Brigitte Charles of the Monaco Tourist Office, No. 3-18 Chelsea Garden Market, Chelsea Harbour, London SW10 0XE, tel. 071-352-9962, for the inset photograph showing the famous Casino and Hotel in Monte Carlo.

### 52 HF Bands

Paul Essery GW3KFE with his monthly report on what's happening on the h.f. bands

### 53 Satellite Scene

Pat Gowen G3IOR looks up at the world of amateur radio in orbit

### 54 VHF Report

David Butler G4ASR explores the fascinating events taking place above 30MHz

### 57 Packet Panorama

Roger Cooke G3LDI with his news on the world of datcomms

### 59 Broadcast Round Up

Peter Shore listens in on the world's short wave broadcasting stations

## Other Regular Features

- 67 Advert Index
- 60 Arcade, All PW services under one roof
- 61 Bargain Basement
- 16 Club News
- 9 Competition
- 9 Keylines
- 12 Newsdesk '93
- 39 Radio Diary
- 10 Receiving You

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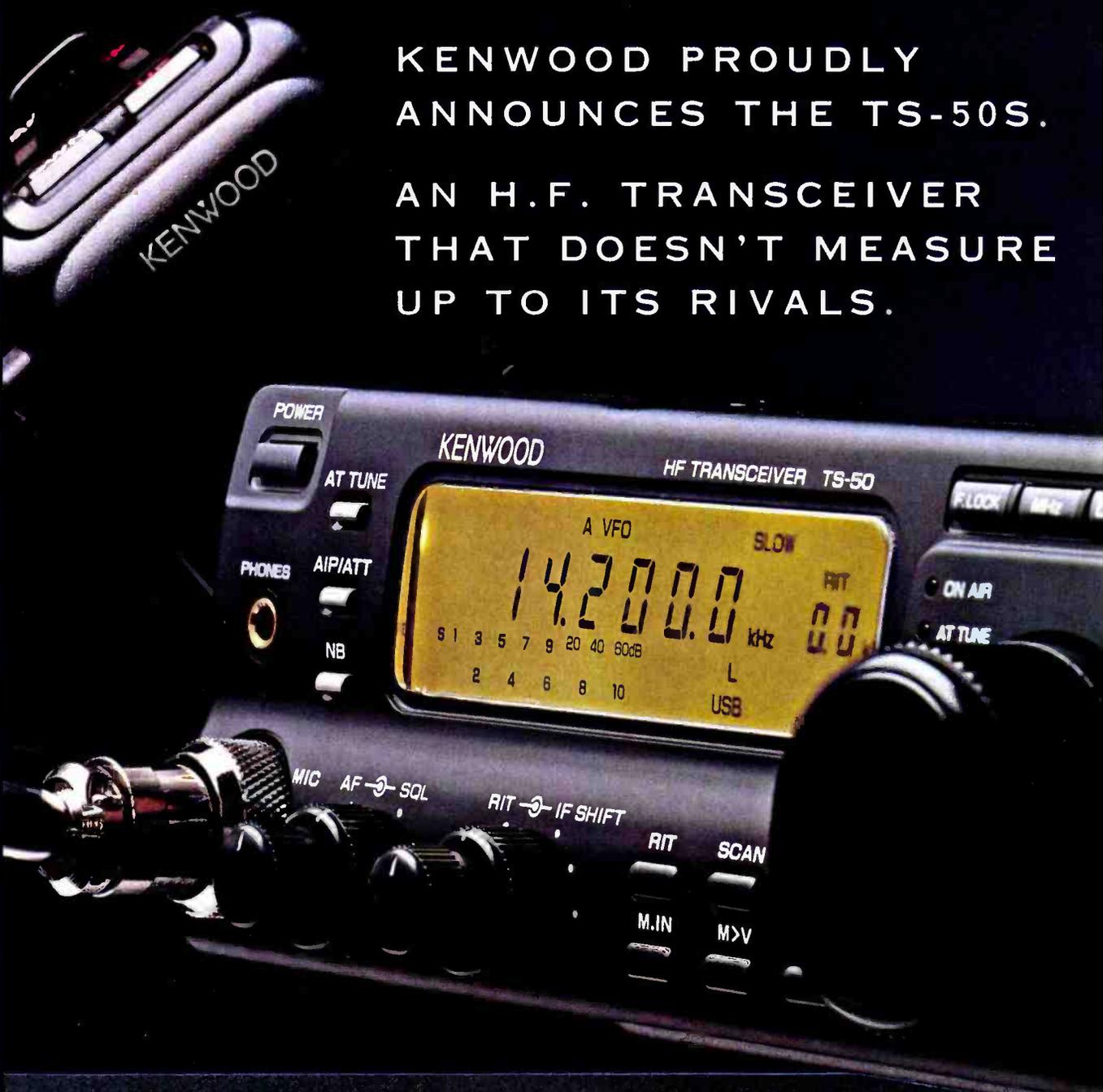
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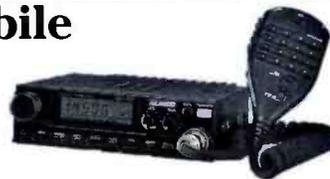
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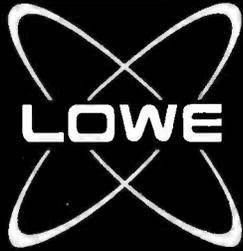
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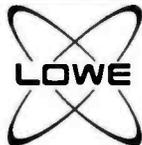
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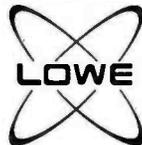
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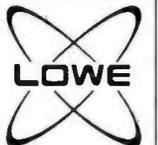
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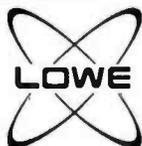


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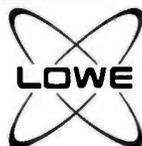


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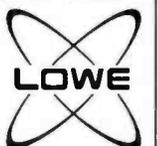
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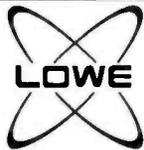
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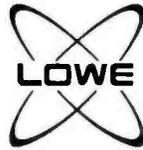
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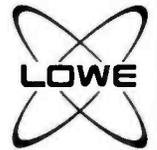
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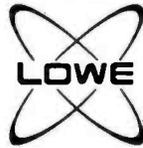
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Slough, Berks  
SL3 8XB  
Tel: 0753 545255



## NEW BRANCH

DEREK G7ESZ  
& Peter G6ZKO  
The Basement  
Royal Fleet Club  
Devonport, Plymouth, Devon PL1 4PQ  
Tel: 0752 607284



# KANTRONICS

## WORLD LEADERS IN DIGITAL COMMUNICATIONS

Once again Kantronics assert themselves as leaders in the world of digital communications. The ever-popular **KAM** has been fully upgraded to meet the demands of the latest digital modes. The new **KAM Plus** will become the standard by which all the others are judged, and the new facilities now include:

- **New User and Expert command sets**
- **On-line help messages for each command**
- **128K RAM**
- **1 Megabit EPROM**
- **Socketed lithium battery to back up RAM and on-board clock**
- **Expanded personal mailbox**
- **PACTOR now fitted as standard (V6.1)**
- **Enhanced CW operation – dot/dash weighting, Farnsworth spacing, tone transmission, and programmable CW filter bandwidth and centre frequency**

- **Programmable mark and space tones**
- **Extended RTTY and AMTOR character sets**

The **KAM Plus** should be available about now, but you don't need to throw away the old one! Simply buy the new **KAM Expansion Board** to upgrade to

all the new features. Both still run with Hostmaster software, now available for the PC, C64 and the Macintosh.

The **KPC3** continues to be the world's most popular VHF TNC. Designed to be user friendly (even to new Packeteers!), this amazing TNC delivers high performance in a very small package. It's less than half the size of its nearest rival but manages to pack in many more features.

The **KPC3** features an improved DualLevel™ command set that gives new users just 23 commands (all most people will ever need!) that get you up and running but with the full 130 plus commands available in Expert mode for those wishing to exploit the full potential of Packet.

The power consumption is so low it can be run from a PP3 battery, ideal for portable operation and Raynet use. Runs on 6–25V.

Additional features include Kantronics PBBS with reverse forwarding, message header editing, a mail waiting led, remote sysop access and Kantronics KA-Node. Kiss mode and Kantronics Hostmode are also included for TCP/IP compatibility and advanced operation. If that's not enough, it also decodes WEEFAX with appropriate software.

Hostmaster software expandable RAM and Real Time Clock are a few of the options.

**FULL DATASHEETS AVAILABLE ON REQUEST**

Some people still regard Packet as a difficult mode to operate (probably when they see their friends TNC manuals! Don't worry, it's a lot easier than you think! We'll also help you out by providing an RS232 lead, a lead to your radio and some free terminal and fax software to get you on the air with the minimum of fuss and delay. Ask for your **FREE Packet Package** when buying a TNC at any of our branches. Don't forget our Branch Managers if you need help in setting up – many of them have been doing this for years and will happily help you out.

Specialist help available at our **Maidstone, Cambridge, Cumbernauld and Matlock branches.**



**A**s I write this month's 'Keylines' I'm looking back at the *PW* trip to the Dayton HamVention. It was a memorable trip in many ways, particularly as I achieved two ambitions.

The first ambition was to visit the United States Airforce Museum, close to Dayton itself. It turned out to be a fascinating day's visit and it was free to enter the museum itself! Along with several friends on the trip, I bought a \$4 ticket and 'travelled' in the 'IMAX' 3-D cinema, experiencing a flight in a balloon (nearly colliding with a church steeple) and looping the loop in barnstorming aircraft.

The sensation of flight and movement was such I had to hold on to my seat. It was a wonderful experience, with great company from my fellow *PW* travellers.

The second ambition was to have ridden on all of the Dayton trolleybus routes. I managed it, and I'm looking forward to riding on the newly-extended, pollution free system next year. I admire the Daytonians' determination to keep and extend the trolleybus network, especially when there's no real money-saving incentive (as there is in Europe) as petrol only costs around \$1 a gallon!

On the first day of the HamVention, I was out and about with my camera, and managed to interview a lot of people. I

# Keylines



Two gasbags seen at the 1993 Dayton HamVention!

even managed to be photographed next to the Kenwood balloon.

In fact, if you think you can beat our caption - please send your entry in as soon as possible (by the end of July please). The *PW* team will pick the funniest, and I'll award a special Editor's prize for the winner. Let's face it, if you can't laugh at yourself sometimes, you must be a really sad person. So, get those postcards on the way!

While we were at Dayton, we met many old friends, and made many new ones. One old friend from previous years came and asked if *PW* was available on audio cassette in the USA for the blind.

Although the service could be provided from the UK, via the excellent newspaper and magazine cassette systems, I'm appealing to our American readers for help. So, if you live in the USA, could you read *PW* onto cassette for a blind radio amateur?

If you can help, please write or FAX me the details, and I'll be in contact as soon as possible. I'm hoping that our friend (he's got a delightful Labrador guide dog), will be able to enjoy *PW* with your help very soon.

In the meantime, I'm looking forward to coming back to the USA again. Hopefully, I'll be 'deflated' somewhat before then!

*Rob Mannion G3XFD*

## COMPETITION CORNER

## Spot The Difference



### First Prize

A year's subscription to *Practical Wireless* or a £20 book voucher.

### Second Prize

Six month subscription or £10 book voucher

Subscription  Voucher

Name .....

Address .....

.....

.....

Mark the 12 changes made to the right hand version of the cartoon. Details of entry are below.

Send your entry (photocopies acceptable with corner coupon) to: Competition Corner, Spot The Difference Competition, July '93, *PW* Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by Friday 23 July 1993.

# 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, PCB or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

## 'No Code' Correspondence Closed

Correspondence on the specific subject of the 'No Code HF' Licence discussion is now closed. However, as I reported in the June issue, readers have been invited to air their thoughts on the subject by the Radiocommunications Agency. Please address your comments to Mrs. Karen Scott, Room 712, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London SE1 8UA.

## ★★★★ Star Letter ★★★★★

### Renewal Of A Friendship

**Dear Sir**

You may be interested to hear how the appearance of my article 'A Table Top Project Bench' in *PW* December 1992 has resulted in the renewal of a friendship from 27 years ago when I moved from the Cambridge area to the North East.

My friend John Cutler, ex G3KBC, now living in New Zealand, was looking through the particular copy of *PW* in a shop in Wellington when he came across my article. This resulted in an immediate letter to renew our acquaintance and now the possibility of a regular 'over the air' schedule. Incidentally, a copy of *PW* in Wellington is the equivalent of £3.50 so I must suggest he takes advantage of the 'Subscribers Club' method of payment!

**Vic Flowers G8QM**  
Sunniside  
Newcastle Upon Tyne

**Editor's comment: The team were pleased to hear that *PW* has helped renew an old friendship Vic. Did he send his copy of the magazine back for you to autograph your article?**

### No Code Licence

**Dear Sir**

Whilst listening to BBC Radio 4 (I think) recently while mobile in my car I was pleased to hear a program concerning the use of computers in the UK (I am presently attempting to unravel the mysteries of a secondhand Amstrad 1640 I purchased).

A point dealt with in great depth was 'Networking' whereby one person may contact another user anywhere in the world via computer to have a chat or leave a message, etc. Probably similar to our packet radio.

It occurred to me that in the near future,

will prospective radio amateurs go to the bother of obtaining a Class B licence, a Class A licence and a lot of very expensive radio equipment in order to access the h.f. bands? Or will they instead use a computer and modem at less cost, and with no licence required, no studying and no licence restrictions in order to have their chat? Perhaps groups such as the RSGB and the DTI should bear this in mind while they are considering the possibility of a 'No Code' h.f. licence.

**Victor Best**  
Portadown  
N. Ireland

## Cordless Telephones

**Dear Sir**

I share the concern about the cordless 'phones expressed in the May edition of 'Keylines'.

Can I draw your attention to the new EMC regulations, which are more relevant than obvious from first glances. It could help you (see 2).

**1:** The CE approved cordless 'phones should not become a major problem with out of band transmissions and breakthrough.

**2:** As for illegal units, under section 73 of SI no: 2372 1992 it is the **DUTY** of the weights and measures authorities to enforce the EMC regulations.

Under section 79 an officer can issue a suspension notice to a **USER** where there is a suspected breach of the regulations.

Under section 76, with the approval of a Magistrate, an officer can enter a private residence and seize apparatus.

This duty applies to and can be used in respect of both approved apparatus, and relevant apparatus which is not approved. You can take 'relevant' to mean all electrical and electronic apparatus.

These powers apply to any apparatus taken into service after 28th October 1992, and the powers of confiscation apply to any apparatus. There is no appeal for six months, and not many people keep dated receipts. If they have, and it's not CE approved - well, the answer is the same.

The weights and measures authorities are the Trading Standards bodies. It would now appear that 'suspected' cordless phones fall into a similar category to illegal CB sets. The practical question is how to get the officials to act. Like the user asks "Why did you let them sell it to me?".

**3:** The RA has discretionary EMC power under the Secretary of State, and prefers to confine it's role to interference to wireless telegraphy under the Wireless Telegraphy Act, as you report.

However, things do change. The RA now says it will act on justified complaints of interference to **ANY** EMC schedule III listed apparatus, according to my latest enquiries about the effect of the EMC regulations, despite what the form says and what you have been told. I reproduce the list overleaf. It could inform the Trading Standards, for example, who have appropriate powers.

**4:** Radio amateur apparatus is not on the list. When CE marked commercial radio amateur apparatus appears on the market, it would appear reasonable to campaign to have it added. There can be no justification for not giving an approved £1500 radio the same protection - under the EMC regulations - as a £20 toaster. Note I do not ask for greater protection for obvious reasons like the lower signal strengths and greater sensitivities. Also, one asks why should the RA not adopt, in the cases of interference to approved (radio amateur) apparatus, the same levels of immunity as for say, a burglar alarm, when determining what constitutes undue and excessive interference, as specified in EN5008-2.

It is obvious that the EMC regulations and the Wireless Telegraphy Act have different but relevant bearings on the matter.

In conclusion, there is hope. What is needed is some push and shove through reasoned publicity. Let's start with cordless phones and the Trading Standard offices, and a few solid reports of suspected breaches of the new EMC regulations.

Why not check it out?

**Donald Elkington GOPAN**  
Adel  
Leeds

**Editor's reply: Thank you Donald for an interesting letter. I'll be contacting the local 'Weights & Measures' office to see what they say!**

## Phone Patching

Dear Sir

With reference to the letter from GM01JV in the May issue concerning the possibility of 'phone patch use. I am pleased to see that you feel that an approach should be made to the RA for comment and I for one would hope that this would be favourable.

I would however, object to it's use being restricted to members of certain amateur radio groups. I feel that this would only lead to a certain amount of dissension in our hobby.

There are a number of other reasons for 'phone patch use, other than connecting just service personnel with their families. There are quite a number of civilians abroad who have no access to a tele-

phone. As I well know, having spent the better part of my working life in Africa where one can be 300 miles from a 'phone as such and perhaps dependent on a h.f. radio link to the nearest main town or city. These links are never suitable for connecting into international circuits.

There have been a number of times in my experience in our hobby when handling life saving traffic, when I would have given a great deal of the use of a 'phone patch. The last time was on May 2 to May 6 last year when the MV *Spirit* on route from Angola to Guatemala was in the middle of the Atlantic when a number of crew were taken ill, together with the Captain's young daughter.

The s.s.b. Emergency System that operates daily on 14.332MHz (of which I have

been a member these past 15 years) helped to maintain contact. This was done from the USA with help from South Africa and New Zealand and stations in Brazil. The main co-ordinator being Chuck PJ4CR, in the Dutch Antilles.

We stayed with this emergency from the May 2nd to the 6th May. Finally, the moment arrived (due to conditions) I was the only station in touch with the *Spirit*. This is when I would have given a lot for a 'phone patch, instead of which I had to relay to a Brazilian station who had to relay to an American station. Had I had the use of a 'phone patch the US Coastguard could have spoken direct to the Captain.

I have not done very much on my own since returning to this country. But I have a commendation or two for life-saving abroad with the rig, as

does my good friend Roz Nelson ZS1JS in Cape Town. Between us I think we have about 10 lives in the book. We must have something going for us, other than TV!!

**Ron Greenwood G4E00  
Thorney  
Peterborough**

**Editor's comment: I have made enquiries, and apparently there's not much chance of amateur radio in Europe being allowed to 'phone patch. It appears that radio amateurs passing third-party traffic are seen as possible competition for the telephone industry. This is unfortunate, as we could assist in situations where official administrations can't, particularly in the sort of emergencies in the news at the moment.**

## Use It Or Lose It

Dear Sir

We have all heard of the phrase 'Use it or lose it' when it comes to protecting bands for amateur use. In an attempt to increase more activity locally, we at the Harwich Amateur Radio Interest Group have designed some ingenious ways of entertaining ourselves 'on air', during our regular Sunday evening net (S-18 145.450MHz).

At first we borrowed an idea of a 'trivia quiz' heard on GB3SA. This has proved good fun, but for more concentration and the possible chance of answering clues that other operators couldn't, we also run a crossword.

The crossword is produced in our quarterly newsletter *Crosstalk*. On the evening itself, one station gives out the clues asked for, a station fills in all the answers as they are correctly answered and scoring is simple, as one point is awarded for each letter in the answering word.

The crossword and the trivia quiz are good fun and provide a good deal of activity on the band, other than just the normal chat. I would be interested if other groups have any activities they use to brighten up their evenings.

We are putting together a game of Bingo. Easy you say? But we're using c.w. to call the numbers!

**Colin Kendrick G0STW  
Harwich  
Essex**

**Editor's comment: Sounds as if you have a busy group up there Colin! Although I'm not quite so sure about the Bingo over the air, I think that provided that your communication is always addressed to a particular station, you will remain within the licence conditions when you're playing the other games. Any other initiatives out there readers?**

## Radio Hams In Newspapers

Dear Sir

I am not a radio amateur but I often notice articles about 'radio hams' in newspapers. The interesting point about all these stories is that none of the people mentioned are actually radio amateurs.

Newspaper reporters describe anyone who has enough money to buy an expensive toy such as a radio scanner as a 'Radio Ham'. I suggest that *PW* runs a regular column which reprints these stories. You could award a £5 voucher for each new example sent in by readers.

**Robin Soar  
Doncaster  
Yorkshire**

**Editor's comment: Thank you for the newspaper cutting you sent in Robin. Although the 'tabloid press' (the worst offenders) have been told many times, I am afraid we are wasting our time. The argument I get from editorial staff is 'The public know what a radio 'ham' is, and it's a convenient term'. Unfortunately, they (the newspapers) obviously DON'T know what amateur radio is all about despite the intervention of journalists such as myself, the Radiocommunications Agency and the RSGB.**

Dear Sir

Tuning below 7MHz at approximately 1630UTC, on Thursday 4th March, this year, listening for Sydney Volmet on 6.676MHz, I was astonished to tune into a positive British network using 6.675MHz. They were all talking to each other in very technical terms, with perhaps the exception of a very Irish lady who insisted that her dog should talk into her microphone, because "he liked doing it".

Transmitter locations, from what I could learn, ranged from the North of Scotland, Northern Ireland to the South of England, some indeed claiming to be mobile. Callsigns were most odd, MA3, MA4, EDH21, RT1, TS52 to name but a few.

Later, during the week, I found them again at approximately the same time of day. This time they were using 6.655, 6.673 and

6.678MHz.

Who are these people? There is no reference to these frequencies in the Radiocommunication Agency's publication 'How to become a Radio Amateur'.

**Roy Nicholls G7NUW  
Epsom, Surrey**

**Editor's comment: It sounds as if you've discovered a long established 'pirate' network Roy. Illegal activity on the frequencies mentioned, has been monitored for many years (although there are of course legitimate services in this part of the spectrum). In the past, much of the activity was centred on the use of military surplus equipment and it's unfortunate that they give the false impression they are 'radio amateurs'.**

## New Fluke Meters

Fluke have introduced three new digital multimeters called the series 10 to their range. The new meters are designed to support first level electronic and electrical troubleshooting, their compact shape and push button controls aid one handed operation. The meters offer a.c. and d.c. volts, ohms, diode test, continuity bleeper and 4 000 count digital display. There's also auto ranging and 'sleep' mode to preserve battery life.

Model 10 is the cheapest of the range, Model 11 has a 'VCheck' facility to simplify the safe measurement of power sources, supplies and capacitance with auto or manual ranging from .001 to 99µF and to 9999µF. Model 12 combines the features of the other two plus min/max record with a relative time clock and continuity capture to collect intermittent opens and shorts as brief as 250µs.

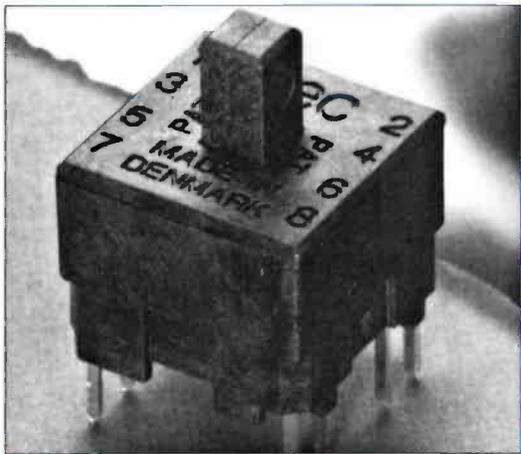
All new range will run for 650 hours on alkaline batteries and 450 hours on carbon-zinc, and are guaranteed for three years.

For further details contact **Alpha Electronics Plc., Units 5 & 6, Linstock Trading Estate, Wigan Road, Atherton, Greater Manchester M29 0QA, tel. (0942) 873558.**



## Special Event Station GBOAMY

The North Ferriby United Amateur Radio Society will be operating a special event station - callsign **GBOAMY** throughout the month of July. This event is to commemorate the 90th anniversary of Amy Johnson's, the pioneer lady aviator, birth. She was the first lady to fly from England to Australia in a tiny Gypsy Moth. The special event station will be regularly operational on all bands and a special QSL card will be issued to confirm contacts and s.w.l reports.



## High Temperature PCB Switches

The Danish company MEC have announced the introduction of the new second generation UNIMEC 1500 switch series. Using Liquid Crystalline Polymer (LCP), UL94VO high performance plastics the life-time of the switch has been increased from 1.5 million cycles to 10 million cycles for momentary switches and from 500 000 cycles to 5 million cycles for alternate action. The switches will operate in temperatures ranging from -40°C to +160°C with a protection rating of IP54, making them ideal for use in harsh environments where style and durability is required.

Each switch module is capable of performing any one of eight contact functions, depending on p.c.b. layout, at a rating of 250mA/120V.

For a free sample and more information contact British suppliers **Quiller Switches Ltd., 2 Paisley Road, Bournemouth, Dorset BH6 5EU, tel. (0202) 417744 or FAX, (0202) 421255.**

## Siskin Digital Radio Products

Siskin Electronics have produced a new catalogue covering their digital radio products.

The comprehensive catalogue gives details on their digital products, specifications and product ratings on the three major areas of, performance, quality of documentation and expandability.

There is also a useful reference guide

together with a question and answer section on frequently-asked digital radio topics. To obtain your free copy of this catalogue contact **Siskin Electronics, 2 South Street, Hythe, Southampton SO4 6EB, tel. (0703) 207155/207587 (quoting Digital Radio Products Catalogue No.8).**

Send in your news, photographs and product information to **Donna Vincent at the editorial offices in Broadstone.**



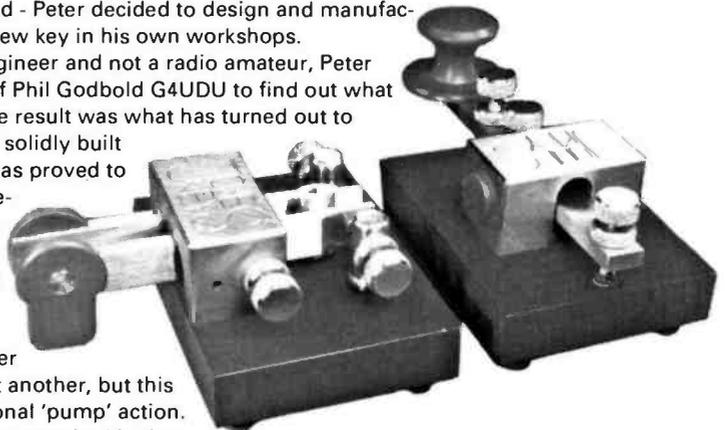
## Enterprising Engineer's Key To Success

Peter Jones is an enterprising engineer, and almost by accident he has found himself in the Morse key business. He's the driving force behind Peter Jones Engineering in Smallfield, Surrey, not far from Gatwick airport. When he heard that an American distributor wanted 200 Morse keys, and that the manufacturer was not interested - Peter decided to design and manufacture an entirely new key in his own workshops.

As he's an engineer and not a radio amateur, Peter took the advice of Phil Godbold G4UDU to find out what was required. The result was what has turned out to be a popular and solidly built paddle key that has proved to be a winner, especially in the USA.

Following the interest shown in the Jones' key at the 1992 Dayton HamVention, Peter has produced yet another, but this time it's a traditional 'pump' action. The latest key was launched in time for the 1993 HamVention, attracted a great deal of interest on the Palomar Engineering stand at the show.

The newly-introduced traditional key from Jones Engineering has a very heavy metal base, with an attractive finish. It's likely to appeal to operators who prefer a traditional key that's not likely to slip around the operating desk during QSOs. **Further details on this and other products are available from Peter Jones Engineering, Chapel Road, Smallfield, Surrey RH6 9NR, tel: 034-284-3555.**



# SHOW REPORT

*In the first of three reports on the 1993 Dayton HamVention, Rob Mannion G3XFD explores the enormous open air 'flea market'. It's said to be the largest in the world.*

The *PW* party flew to the USA via Cincinnati this year, and were then transported direct to our Hotel in Dayton by coach. In the three years *PW* has been running the trip, we've tried various routes, and travelling via the attractive city of Cincinnati certainly seems the most convenient.

The HamVention, held in the large Hara Arena sports complex on the outskirts of Dayton, officially opens on the Friday at mid-day. But, what is perhaps the most attractive part of the HamVention for the European visitor, the gigantic flea market, opens from around 6am.

As the weather is far more variable than in Britain in late April, I decided it was best to try and see as many of the 2000 plus flea market stalls as I could on the Friday morning. It was a wise decision because it was a delightfully sunny and clear day and as it turned out, the only dry day of the show.

## Test Equipment And Vintage Radio

There seemed to be a tremendous variety of test equipment and vintage radios on offer this year. Each year seems to bring various items to the fore in the flea market. Several years ago it was Heathkit equipment, this year brought test equipment and vintage radios. It was truly an Aladdin's cave.

Some sellers had small pitches, and one or two had three or four car parking spaces filled with equipment for sale. Two Danish *PW* readers on the trip had a field day and sent home a variety of modern radio laboratory instruments, which even after air freight and customs charges, were superb value. Sending them home wasn't a problem either because Cincinnati based Delta Airlines had a 'pack and despatch' service at the show, which in conjunction with reasonable freight charges, made getting things home much less of a worry.

On the other hand, I was tempted at some of the vintage equipment, particularly the world-famous Zenith 'Transoceanic' receivers. There were lots of these delightful old receivers available, and memories of my schooldays returned when I saw several

models I'd originally seen advertised in the National Geographic magazine in the 1950s. However, although the Zenith receiver alongside the seller, was offered to me for \$20 (£13), unfortunately I had to decline.

I met quite a few independent travellers from the UK, and had chance to ask them what they got out of the show. Several even went as far as to say that they came specifically for the flea market and were not so interested on what was going on in the main Hara arena.

## Up And Coming

Several 'up and coming' American and Canadian amateur radio equipment manufacturers were showing their products in the flea market. Among their products were some interesting new antenna ideas.

One, particularly fascinating stall had a selection of guided missiles (minus harmful fuel and warheads) for sale as the ultimate 'conversation pieces'. The same stall had a radio-controlled artillery target aircraft for sale, an ideal toy for someone, except that its wings spanned nearly five metres.

## Born Lucky

Some people are born lucky, and so it seemed to be for the one of the husband and wife teams on the *PW* trip. Arthur GONDJ and Anne Izzard GONDJ, from Birmingham, won two major prizes in the huge HamVention draw.

The couple were pleased and surprised the first time. When the second win came up they were (to quote) "Gobsmacked". And that about sums up the effect the Dayton HamVention flea market has on me. It's got to be seen to be appreciated, and even then you won't believe it!

**Lucky couple Arthur GONDJ and Anne Izzard GONDJ from Birmingham, won two prizes in the huge draw at the 1993 Dayton HamVention.**



**This vintage Zenith radio was offered to G3XFD for \$20, but he had to decline the offer because his suitcase was full!**



**The 1993 Dayton HamVention flea market had plenty in store for anyone needing test equipment. And to help, Delta Airlines had a (very busy) pack and dispatch facility on site throughout the three-day event.**



# DAYTON HAMVENTION 1993

## No. 2

Right up at No. 2 is the new TS-50S from Kenwood. A real MINI-MOBILE H.F. Transceiver, no bigger than a TR751E 2M Multil 500kHz to 30MHz, 100w out, AT-50, auto ATU & Kenwood's MAS mobile antenna available as options.

**DEPOSIT £199.95 & 12 payments of £66.66**  
**With AT-50 Auto ATU, Deposit £295.00 & 12**  
**payments of £83.75**

## No. 3

My favourite for months, the Yaesu FT-890. With or without Auto ATU, a real winner for BASE or MOBILE H.F. Did you know that it is now available with SPEECH ANNOUNCEMENT, (as an option), for blind operators? Only from LYNCHI

**Without Auto ATU, Deposit £375.00**  
**& 12 payments of £85.00**  
**With Auto ATU, Deposit £495.00**  
**& 12 payments of £90.00**

## No. 4

Probably the best selling H.F. transceiver in the world, the TS850S from Kenwood. Certainly one of the most reliable. A true base station radio from a world beating company.

**Without Auto ATU, Deposit £510.00**  
**& 12 & payments of £95.00**  
**With Auto ATU, Deposit £540.00**  
**& 12 payments of £105.00**

## No. 5

It's crept up in price, but it's now only the same cost as an old TS940S listed at, 4 years ago! The radio? Yaesu's FT990. For Peter Hart to use words like "thoroughly recommended", I can't really comment anymore.

**Without Int. PSU & CW filter, Deposit £595.00**  
**& 12 payments of £129.50**  
**With both options, Deposit £699.00**  
**& 12 payments of £150.00**

## No. 6

At the budget end of the market, the Icom IC-728 offers excellent performance together with the quality feel from this famous manufacturer.

**Deposit £195.00 & 12 payments of £66.66**

## No. 7

For those of you who want a good, no frills H.F. package but also want to dabble on 6 Metres, how about the Icom IC-729? Identical to the IC-728 at No. 6, but with 10 watts on 50MHz as well as a full 100 watts on H.F.

**Deposit £275.00 & 12 payments of £85.00**

## No. 8

Performance and flexibility of the "big boys", the TS-690S from Kenwood is still up in the TOP-TEN, and there's good reason. The price. Closely compare the spec of the '690 with other H.F. machines and the rig scores high up the ladder. Throw in a SIX METRE option giving a massive 50 watts output in addition to 100 on H.F., and you can see why this one is so popular.

**Without Auto ATU, Deposit £480**  
**& 12 payments of £85.00. With Auto ATU, Deposit**  
**£510 & 12 payments of £95.00**

## No. 9

Want the No. 8 slot, but without SIX Metres? You got it with the TS-450S. 100 watts, General Coverage, All Mode, Selectable filtering in both I.F.s. Big radio features in a mid-sized package.

**Without Auto ATU, Deposit £449.00**  
**& 12 payments of £75.00. With Auto ATU, Deposit**  
**£480.00 & 12 payments of £85.00**

## No. 10

A joint entry at No. 10, The Flagships from YAESU & KENWOOD, the FT1000 & TS950SDX transceivers. Both have features for the really serious amongst our H.F. operators, including 150-200W output, Dual Receive, Built in Power supplies & Auto Tuners as standard, the list goes on forever. If your serious, ring me for a tailored quotation to suit your needs. If your not, ring someone else!

**FT1000 & TS950SDX, deposits from as little as**  
**£700.00.**

# MARTIN

G4

## THE AMATEUR RADIO

### THE MARTIN LYNCH H.F. TOP TEN No. 1

It's made it, the NEW ICOM IC737 has had all the ergonomics are superb, the receive performance is stunning, so is the AUTO TUNER & the KEYS & the DISPLAY & a DOZEN other features. Better still, I'll pay you top money for your trade-in, be it an IC735 or not!

**DEPOSIT £475.00 & 12 payments of £85.00**

## Twelve Months ZERO IN

**DID YOU KNOW, that you can turn that (transceiver, receiver or accessory) into ready deposit against a new model, put the rest of pay for your NEW one over TWELVE months and it is! Better still, there's no catch. No doc CREDIT CARD HANDLING CHARGE, just the to me, WITHOUT**

**It's all under written by LOMBARD T**



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# MARTIN LYNCH

## DEALS

### SECOND-HAND EXCHANGE CENTRE

#### THE MARTIN LYNCH V.H.F. TOP TEN

It's got to be the LYNCH + muTek FT736RDX from Yaesu. The most flexible multiband 2/6/70/23 all mode transceiver available today. Complete FRONT END REPLACEMENT DESIGNED BY muTek, push this transceiver to the No. 1 slot. The performance is now exceptional - expect to see these being used in "VHF CONTESTS" around the world.

**FT736RDX, with muTek, 2/70 operation,**  
Deposit £495 & 12 payments of £125

**FT736RDX/6 with 6m extra,**  
Deposit £608 & 12 payments of £142.50

**FT736RDX/23 with 23cm extra,**  
Deposit £623.00 & 12 payments of £160.00

**FT736RDX/6/23 with all bands fitted, 2/6/70 & 23cm,**  
Deposit £742 & 12 payments of £175.00.

# No. 1

\* muTek FRONT END BOARDS available as "after fit kits",  
£199.95, plus £59.00 fitting charge if required.

## How To Pay At INTEREST

Old piece of equipment (whether it be a cash? Then, use part of your wedge for the your notes in the bank earning interest and - INTEREST FREE! Sounds bloody marvelous why TEN YEAR GUARANTEE's offered here, no best possible deal to extract money out of you AT ANY CATCHES. RICHITY FINANCE & they're o.k., OKAY!

CALL, WRITE OR FAX - SPRING NEWSLETTER NOW AVAILABLE

Packed with interesting goodies, including 'First Impressions' by Ken Feather and Henry Lewis, an insight into using all the latest Handies and H.F. products from Japan, also a look at the latest HF Mini Mobile from KENWOOD, plus much, much more, TOGETHER WITH THE LATEST MARTIN LYNCH SECOND-HAND LIST!! WRITE OR PHONE FOR YOUR FREE COPY TODAY!!



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#### No. 2

Not a transceiver, but a WIDE BAND ALL MODE PORTABLE RECEIVER, the NEW MVT7100 from Yupiteru. As supplied by MARTIN LYNCH to the M.O.D. and countless other customers, this new model from Japan is truly amazing. 500KHZ to 1650mHZ, ALL MODE, in your hand? Are they serious? Yep. I'm handing them out like confetti. It's not a toy, it's the most incredible miniature receiver available.

Deposit £49.00 & 9 payments of £44.45

#### No. 3

First the FT727, then the FT470 and now the FT530, YAESU get better and better at Dual Band portable design. Complete with CTCSS fitted as standard, (NONE of the others have), extended RX, AM/NBFM selectable, Auto Repeater facility, it's been the choice for hundreds already.

Nicads & Charger Included.

Deposit £100.00 & 12 payments of £35.75

#### No. 4

Icom were the first company back in 1980 to bring you a fully synthesised solid state transceiver - their technology in digital design carries on - witness the NEW IC-W21ET dual band Handie. Massive dual display, Extended RX, superb "feel" to the user.

Nicads & Charger Included.

Deposit £74.00 & 9 payments of £45.00

#### No. 5

Ainco have been knocking the "big three" for several years now and they continue to do so with the DJ-580. Ask around the Dual-Band Handie users and the odds are they'll be using one. All the bells and whistles, well built and very reliable.

Nicads & charger included.

Deposit £53.00 & 12 payments of £33.00

#### No. 6

When Angus Mckenzie, G3OSS said this is THE transceiver for Two metres all mode, he wasn't kidding. I've been selling them for years and there's still nothing to touch it. Full 25W out and don't forget the matching 70cm version, the TR851E!

The TR751E 2M, Deposit £149.00

& 12 payments of £50.00. For the TR851E 70cm,

Deposit £199.00 & 12 payments of £50.00

#### No. 7

Kenwood's TH-78E marches into the TOP TEN because of its performance, excellent ergonomics, (if SONY ever designed a dual band Handie, this is what it would look like), beautiful build quality and endless user features. For people who like mind blowing "ADVANCED" facilities, wait no longer.

Deposit £49.00 & 12 payments of £35.00

#### No. 8

Want a simple to use, REMOTE HEAD DISPLAY, High-Power Dual-Band Mobile, that doesn't blow your brains away whilst OUEUING ROUND THE HANGER LANE GYRATORY? (WHERE?) - Well get your cheque book out lads & ladies, the TM-732E from KENWOOD is for you! Yes, it's got all the gizmos if you want them, but if you don't, then it's got to be the easiest mobile/base FM 2/70 transceiver available.

Deposit, £69.00 & 12 payments of £50.00

#### No. 9

Hands up those who want a SINGLE BAND HANDIE, but quite fancy the thought of being able to listen to the "other mob" on 2 or 70? Thought so. Kenwood thought so as well. The NEW TH28E & TH48E. Single band FM Handie, but press one button, and instantly monitor the opposite band to the one your transceiving on. They're lower priced so I can offer them on my nothing to pay (but small deposit), for 3 months scheme.

TH28E Transceiver on 2M, rx on 70cm,

Deposit £39.00, £250 in 3 Months

TH48E Transceiver on 70cm, rx on 2M,

Deposit £49.00, £280 in 3 Months

#### No. 10

Still a firm favourite for people who want MULTI-MODE PORTABILITY on 2 Metres, the FT290R mk11, still has the market to itself. The rest have given up! Available with a "clip on" 25W linear, the FT290R is the perfect all rounder for 2M operation, either portable, base or mobile.

Without matching linear,

Deposit £129 & 12 payments of £35.00

With Matching FL2025 Clip on Linear,

Deposit £159 & 12 payments of £45

...THE MARTIN LYNCH V.H.F. TOP TEN...THE MARTIN LYNCH V.H.F. TOP TEN...

# Club News

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

## Avon

**North Bristol ARC.** Fridays, 7pm. Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol. RAE & Morse tuition available for members. June 11 - Bull's Eye Competition, 18th - Table Sale, 25th - Relax & Chat Evening. **Tony G4ROX** on (0272) 513573.

## Bedfordshire

**Shefford & DARS.** Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. June 17 - NFD Planning, July 4 & 5th NFD, 8th - BBQ. **Paul G1GSN** on (0462) 700618.

## Berkshire

**Maidenhead & DARC.** The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. June 15 - Sparks In The Ether by John G3TWG, July 1 - Foxhunt, 3rd & 4th - VHF NFD. **Neil G8XYN** on (0628) 25952.

**Newbury & DARS.** Wednesdays, 7.30pm. Bucklebury Memorial Hall. June 23 - Paknet by G Keans. (0635) 46241.

**Reading & DARC.** 2nd & 4th Thursdays, 8pm. The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. June 10 - VHF NFD Planning, 24th - The Battle Of The Beams, July 3 & 4th - VHF NFD Contest, 8th - RSGB Evening, talk by Peter Chadwick G3RZP RSGB President. **Nick Challacombe G0LGG** on (0734) 722489.

## Cheshire

**Mid-Cheshire ARS.** Cotebrook Village Hall, Cotebrook, nr. Northwich, Cheshire. June 16 - Question & Answer night, 23rd - Video Night, 30th - Contest Planning. **Mike Baguley G7LQD** on (0606) 331210.

**Wirral ARS.** 1st & 3rd Wednesdays, 7.45pm. Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. June 15 - natter night, 16th - Members' Surplus Sale, 22nd - Natter Night, 23rd - Guest Speaker, 29th - Natter Night. **Alec Seed G3FOO** on 051-644 6094.

## Clwyd

**Wrexham ARS.** Maesgwyn Community Centre, Maesgwyn Road, Wrexham. June 15 - Field Evening, July 6 - Quiz. **Ian Wright GW1MVL** on (0978) 845858.

## Derbyshire

**Buxton Radio Amateurs.** Lee Wood Hotel, Buxton, 8pm. 25 May - SWL An Enjoyable Hobby by Brendan G1OHD, June 22 - Talk by Castle Electronics. **Derek Carson G4IHO** on (0298) 25506.

**Derby & DARS.** Wednesdays, 7.30pm. 119 Green Lane, Derby. June 16 - Talk by Castle Electronics, 23rd - Radio In The St John Ambulance Service by Alan Jones, 30th - Video Show, July 7 - Junk Sale. **Hayley Winfield 2E1AJI** on (0773) 856904.

## Devon

**Appledore & DARC (Devon).** 3rd Mondays, 7.30pm. Appledore Football Clubroom. June 21 - Satellite TV by Graham Bailey G1ZTJ. **Reg Lyddon G4ETJ QTHR** on (0237) 477301.

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

**Exeter ARS.** 2nd Mondays, 8pm. The Community Centre, St Davids Hill, Exeter. June 14 - Talk by Richard G2DYM.

**Plymouth RC.** Tuesdays, 6.30pm RAE class, 7.30pm Morse class, 8pm club activities. (As from June for the summer, meetings will be fortnightly). The Basement, The Royal Fleet Club, Devonport. June 15 - Table Sale. **G7NMA, 50 Bellington Crescent, Plympton, Devon PL7 3QP.**

**Torbay ARS.** Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. June 18 - 5B4 Christmas by Andy G4VPM. **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. July 1 - Hampshire Police ARS visit Dorset Police ARS. Further info

from **PC 915 Richard Newton** at **Ferndown Police Station** on (0202) 229351.

## Down

**Bangor & DARS.** 1st Fridays, 8pm. Winston Hotel, Queens Parade, Bangor, Co. Down. **Des Buckley G13HCP** on (0247) 460251.

## Essex

**Bishop's Stortford ARS.** 3rd Mondays, 8pm. British Legion Club, Windhill, Bishops Stortford. June 21 - Briefing for VHF Field Day. **John Dudeney** on (0799) 550313.

**Braintree & DARS.** 1st & 3rd Mondays, 8pm. Community Centre, Victoria Street, Braintree. June 21 - Discussion on Future Venues for the Club. **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. June 10 - First Aid by Tony G0BTS, 17th - QRP by Ray G3IOD, Peter G4VZF & John G4XTS, 24th - Discussion, July 1 - Junk Sale. **Doris** on (0268) 552606.

## Greater London

**Acton, Brentford & Chiswick ARC.** 3rd Tuesdays, 7.30pm. Chiswick Town Hall, Heathfield Terrace, London W4. June 15 - Pre Low Power Field Day. **Colm Mulvany G0JRY** on 081-749 9972.

**Crystal Palace & DRC.** 3rd Saturdays, 8pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). **Wilf Taylor G3DSC** on 081-699 5732 or **Bob Burns G3OOU** on (0737) 552170.

**Edgware & DRS.** Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. June 10 - Experiences In Sri Lanka by Doug Goodison G0LUH, 24th - Morse Training Evening, July 8 - Antenna Systems & Discussion by John Plested G4GYS. **Howard Drury G4HMD** on (0923) 822776.

## Greater Manchester

**Tameside ARS.** 2nd & 4th Tuesdays, 7.30pm. ATC Camp, Moorcroft Street, Droylsden, Tameside. **A. N. Laughlan G1YCM, 8 Kempton Close, Droylsden, Tameside, Manchester M35 7LJ.**

## Hampshire

**Basingstoke ARC.** 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. June 27 - 144MHz Direction Finding Competition OS174 Fox: Dave G4WIZ, July 5 - Performance Racing Cars (real ones not models). (0256) 25517.

**Farnborough & DRS.** 2nd & 4th Wednesdays, 8pm. Farnborough Community Centre, Meudon Avenue, Farnborough, Hants. **I. F. Ireland G4BJQ** on (0252) 543036

**Itchen Valley RC.** 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. June 11 - Visit from RSGB President Peter Chadwick G3RZP, 25th - Hampshire Ambulance Service, meeting open to visitors. **Les Kennard G3ABA** on (0703) 732997.

**Southampton ARC.** 1st Mondays. Millbrook Community School, Green Lane, Maybush, Southampton, also 3rd Mondays at the home of one of the club members. **Malc Troy G1UWL QTHR.**

**The Three Counties ARC.** Every other Wednesday, 8pm. Railway Hotel, Liphook Hampshire. June 19 - Family Visit to the Bluebell Railway, 23rd - Telecommunications Of The Future, July 7 - preparation for the Field Radio & BBQ Weekend. **Kevin Roche G8GOS** on (0420) 83091.

**Winchester ARC.** 3rd Fridays, 7.30pm. Red Cross Centre, Durngate House. June 18 - Ham Radio An Old Man Dying On His Feet by Steve Harding G4JGS. **Peter Simpkins G3MCL** on (0962) 865814.

## Hereford & Worcester

**Bromsgrove ARS.** 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. June 22 - Night on the Air (h.f.). **Mr D. Edwards G4ZWR** on (0527) 546075.

**Vale of Evesham RAC.** July 1 - Visit to Wyre Mill/Night on the Air from the Mill. **Alasdair** on (0386) 41508.

**Woodpecker RG.** Mondays, 8.30pm. Richmond Place Club, Edgar Street, Hereford. **Bob G1HWP** on (0432) 277591.

## Hertfordshire

**Dacorum AR & TS.** 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. June 15 - WWII Radar Countermeasures by J. Crabbe G3WFM. **Dennis Boast G1AKX** on (0442) 259620.

**Hoddesdon RC.** Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. June 10 - Social Night, 24th - Visit to Tolmers Campsite, July 8 - Social Evening. **Roy G4UNL** on 081-804 5643.

## Humberside

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

Fridays at the 'Black Swann Inn', Asselby. June 11 - NFD Logfill, 18th - VHF NFD Preparation, 25th - Conload, July 2, 3 & 4 VHF NFD. **Steve Price G8VHL on (0405) 769130.**

## Kent

**Bredhurst T&RS.** Thursdays, 8.15pm. Parkwood Community Association, Parkwood Green, Rainham, Kent. **Martin Pearson G7JBO on (0634) 365980.**

**Bromley & DARS.** 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. June 15 - Remote Imaging. **Alan Messenger G7GBH on 081-777 0420**

**Sevenoaks & DARS.** June 21 - Kit Cars by Alistair Dunlop G7IET. **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.**

## Lancashire

**Hesketh ARC.** Every other Tuesday. Birkdale, Southport. June 22 - Microwaves, July 7 - Battle Of The Atlantic. **Bernie G7DEM on (0704) 63344.**

## Leicestershire

**Charnwood ARCC.** 1st & 3rd Sundays. The Albion, Loughborough. June 20 - VHF Contest, July 4 - AM Day Planning. **Phil on (0509) 232927.**

## Lincolnshire

**Spalding & DARS.** Fridays, 8pm. The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. June 11 - Wire Aerials & Matching Units by G400. **David Johnson on (0778) 425367 (6-7pm).**

## Merseyside

**Liverpool & DARS.** Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. June 15 - Construction Techniques G0IFK, 22nd - HMS Plymouth G3SGO, 29th - Surplus Sale. **Ian Mant G4WWX on 051-722 1178.**

**Wirral & DARC.** Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. June 16 - O&W The Harp Ness, 23rd - Mobile Treasure Hunt, 30th - Eileen Medley OF Hunt, July 7 - D&W. The Ridger, Newton. **Paul Robinson G0JZP on 051-648 5892.**

## Norfolk

**Dereham ARC.** 2nd Thursdays, 8pm. St. Johns Ambulance Hall, Yaxham Road, Dereham. June 10 - Fast Scan TV demonstration, July 8 - Night on the Air at Joe's G7MPQ. **Mark Taylor G0LGJ on (0362) 691099.**

**Norfolk ARC.** Wednesdays, 7.30pm. The Norfolk Dumpling, The Livestock

Market, Harford, Norwich. **Dale Simkin on (0603) 37393.**

## Nottinghamshire

**Mansfield ARS.** 2nd Mondays, 7.30pm. Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. June 14 - Packet Update & Demonstration by Dennis G0KIU. **Mary GONZA on (0623) 755288.**

**Nottingham ARC.** Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. June 10 - BBQ, 17th - Foxhunt No 3/Activity, 24th - Construction/Activity, July 1 - Narrow Band TV by Doug Pitt, 8th - Forum. **Ian Miller G4JAE on (0602) 232604.**

**South Notts ARC.** Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. June 11 - Talk-in on S22/Design & Construction Of High Current Power Supplies by The Wizard, 13th - Club Stand at Elvaston Castle Rally, 18th - Construction at Fairham College, 20th - Second Fox Hunt, 25th - On Air HF & VHF. **Julie Brown G0SOC, PO Box 4, Nottingham NG11 9DE.**

## Scotland

**Wigtownshire ARC.** Thursdays, RAE & Morse, Chats, etc. Community Education Office, Stranraer Academy, 7.30pm to 10pm. **Ellis Gaston G6MHPK on (0776) 7215 evenings or (0294) 217979 day.**

## Shropshire

**Salop ARS.** Thursdays, 8pm. Old Buck's Head, Frankwell, Shrewsbury. June 10 - RAYNET Recruitment Evening, 17th - Crime Prevention by Sgt Bob Lloyd. **Glenda G1YJB on (0939) 232090.**

**South Yorkshire**

**Chapel Green ARS.** Thursdays 6.30pm. The Chapel Green Project, 230 Lane End, Chapeltown, Sheffield. **Roy Saunders 2E1BJD on (0742) 846720.**

**Devonshire Arms ARC.** Mondays. Devonshire Arms Public House, Herries Road, Sheffield. June 15 - Swimming at the Ponds Forge Complex at 7.15pm, 22nd - Ten Pin Bowling at the Super Bowl, Halifax Road, Sheffield at 7.15pm. **David G0JJR on (0742) 446282.**

**Mexborough & DARS.** Fridays 7.00pm. Harrop Hall, Dolcliffe Road, Mexborough. **Tom Sheppard G0SK on (0709) 586329.**

## Suffolk

**Felixstowe & DARS.** June 19 - Walton Hobby Faire, Demonstration

Station, 21st - Amateur Satellites by Pat Gowen G3IOR, July 5 - Data Made Simple by Fiona Pattinson G7ANH. **Paul Whiting G4YQC on (0394) 273507.**

**Leiston ARC.** 1st Tuesdays, 8pm. Sizewell Visitors Centre, Sizewell Power Station. June 26 - Annual Foxhunt & BBQ, July 6 - Radio Data Service by Alan Gard G4LWA. **Bob Simmons G0HSI on (0986) 874800.**

**Sudbury & DARC.** 1st Tuesdays, 8pm. Five Bells Inn, Great Cornard, Sudbury, Suffolk. July 6 - Natter & Noggin Night with Raffle. **Colin Muddimer G0PAO on (0787) 77004.**

## Surrey

**Coulsdon ATS.** 2nd Mondays, 7.45pm. St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. June 14 - Secret Listeners by Brian Cannon G8DIU. **Andy Briers G0KZT on (0737) 557198.**

**Surrey RCC.** Terra Nova, The Waldrons, Waddon, Croyden, Surrey. June 21 - Natter Night, July 5 - Amateur Remote Imaging by John Tellick. **Berni G8TB on 081-660 7517.**

**Sutton & Cheam RS.** 3rd Thursdays, 7.30pm. Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Natter Nights - 1st Thursdays. June 17 - Computers In Amateur Radio by Jim Todd G3XLM & Peter Borrett G3XTC, July 3 & 4th - VHF NFO, Leek, Staffordshire. **John Puttock G0BWW, 53 Alexandra Avenue, Sutton SM1 2PA.**

**The Kingston & DARS.** 3rd Wednesdays, 8pm. Alfriston, 3 Berrylands Road, Surrey KT5 8RB. June 17 - Radio With Computers by Jim Todd G4XLM, Peter Borrett G3XTC & Roger Brown G3LQP. **Ray Fuller on 081-398 1128.**

**Wimbledon & DARS.** 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. June 11 - Dip Oscillators And Their Use by George Cripps G3DWW, 25th - Intruder Watch by John Cleeve G3JVC. **Chris Frost G0KEB on 081-397 0427.**

## Warwickshire

**Mid-Warwickshire ARS.** 2nd & 4th Tuesdays. June 22 - Foxhunt. **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. June 14 - Mobile Operation by Oerek Bedford G4ABS, 28th - Technical Topics Evening. **Alan Beasley G0CXJ on (0608) 82495.**

## West Midlands

**Midland ARS.** Unit 22, 60 Regent Place, off Caroline Street, Birmingham B1 3NJ. Wednesdays - RAE classes. Thursdays - natter nights. 2nd & 4th Mondays - PC Night. Last Fridays - Atari Night. **John Crane G0LAI on 021-628 7632 evenings.**

## West Sussex

**Crawley ARC.** Wednesdays, 8pm & Sundays 10.30am. Hut 18, Tilgate Forest Recreational Centre, Tilgate, Crawley, Sussex. June 23 - DXCC by G3LQP. **P. Cheyney G0PVK, 11 Southgate Drive, Southgate, Crawley, Sussex RH10 6EE.**

## West Yorkshire

**Denby Dale & DARS.** Pie Hall, Denby Dale, nr. Huddersfield, 8pm. June 16 - Pre-rally Meeting, July 7 - Homebrew Test Equipment by John Townend G3BBO. **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

**Halifax & DARS.** 1st & 3rd Tuesdays, 7.30pm. June 15 - Modifying PMR Equipment by Philip Morley G4FSQ. **David Moss G0DLM on (0422) 202306.**

**Keighley ARS.** The Ingrow Cricket Club, Ingrow, Keighley, 8pm. June 10 - Radio Controlled Models by R. Horrell, 17th - Natter Night, 24th - Foxhunt, July 1 - Natter Night, 8th - Questions & Answers. **Kathy Conlon G0RLO on (0274) 496222.**

**White Rose ARS.** Wednesdays, 8pm. & Sundays 12pm Moortown RUFC, Far Moss, Alwoodley, Leeds LS17 7NT. **Murray G3AAS on (0532) 665287.**

## Wiltshire

**Devizes & DARC.** Weekly 8pm, Hare & Hounds Inn, Hare & Hounds Streetm Devizes. June 18 - Alternative Technology & Amateur Radio, July 3 - BBQ. **Noel Woolrych G4TIX.**

**Trowbridge & DARC.** 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. June 16 - Natter Night, July 7 - Transciever Surgery with G3UUR & G8NEY. **Ian G0GRI on (0225) 864698.**

**Donna says "send in some funny club photos or anecdotes to liven up this page...really good ones will end up in print and make your club famous!"**

# NEVADA

EVER

## SCANNING RECEIVERS



**NEW - MVT-7100,**  
Set to be THE handheld of 1993. This radio must be heard to be believed. It provides effortless reception of SSB and CWV signals using TRUE carrier injection with 50Hz resolution. It can even (with accessories) be hooked up for FAX and DATA reception.

- 100kHz-1650MHz
- 1000 memory channels
- All mode reception (incl. SSB & CWV)

Each set is supplied with all accessories including: UK Charger, NiCad Batteries, Earphone, Telescopic Antenna, Original Yupiteru English Manual. **PRICE £449**



## YUPITERU MVT 7000 HANDHELD

- Receives 8 to 1300 MHz
- 100kHz-1300MHz (at reduced sensitivity)
- 200 Memory channels
- Rotary or keypad freq. control
- AM/FM/NFM
- Large display with strength meter

Each set is supplied complete with:-

Full set of high power NiCads, AC charger, DC power lead and carry strap. **£369**

## HP2000 HANDHELD

Still our most popular handheld scanner.

- 500kHz-1300MHz
- 1000 Memory channels
- AM/FM/WFM Modes
- Sensitive Receiver
- Supplied with all accessories & UK charger. **£299**



## MS1000 Base/mobile

A mobile version of the HP2000 hand-held but with added features.

- ★ Tape recorder voice activated switching
- ★ Audio squelch
- ★ 500kHz-600MHz, 805-1300MHz
- ★ Supplied with mains adaptor. **£279**



## MVT-8000

Mobile version of the 7000 c/w mains adaptor. Especially sensitive @ UHF. Recommended. **£389.00**

## AR3000A

Our most popular base scanner. Latest updated version. (100kHz-2036MHz) **£899**



## SCS computer software

New software for IBM/clones. Gives logging, monitoring and control of AR3000. **£59.95**

## ACE PAC-3 software

Full feature software for AR3000. **£119**

## AR1500 HANDHELD

Covers 500kHz-1300MHz receiving NFM/WFM/AM and SSB. Supplied with a large selection of accessories including:-

- Charger
- Dry Cell Battery Case
- Long Wire Antenna
- Ear Piece
- Soft Case. **£339**



## YAESU RADIO

### Yaesu FRG100 HF receiver

A superb new radio covering 50kHz to 30MHz - our top selling general coverage receiver. **£559**



**Yaesu FT747GX** - Still an unbelievable performer across the H.F. bands and one of the top 5 in budget H.F. Transceivers. Top Band to Ten, you won't be disappointed. **£785**

**Yaesu FT-890** - Recent reviews answer all your questions. Based on a winning combination, available with or without auto A.T.U. **£1175**

**Yaesu FT-530** - A Twin Band Handheld and a host of features including Dual In-Band RX, CTCSS DTMF all fitted. Wideband coverage plus optional speaker mic with LCD display. Guaranteed to be the next No. 1. **£449.95**

**Yaesu FT-1000** - You will never want another H.F. Transceiver! The FT-1000 does it all. This has to be the ultimate word in H.F. communications.

Full brochure available. **£3275**

Yaesu FT990 All mode HF TCVR. **£1995**

Yaesu FT757GX HF TCVR. **£995**

Yaesu FT767GX HF + VHF/UHF. **£1597**

Yaesu FL7000 500 Watt HF amp. **£1795**

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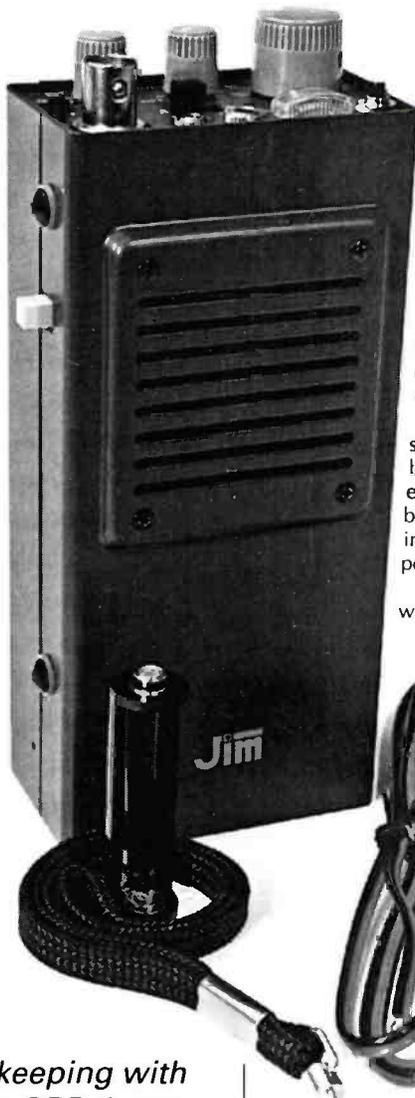
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# Review

## The Jim MX-14S 14MHz Transceiver



The Jim MX-14S is a hand-held, low power s.s.b. and c.w. transceiver manufactured by Santec in Japan. Coverage of the MX-14S is two 50kHz sections of 14MHz with the frequency controlled by a variable crystal oscillator.

The MX-14S can be powered from seven NiCad or six ordinary AA size batteries fitted internally, or from an external 9.5V d.c. supply. If NiCad batteries are fitted they can be charged in situ with 13.8V via the external power socket.

As delivered the MX-14S is supplied with a d.c. lead, six dry cell batteries, and a dummy battery.

There's also a short carry strap, but it doesn't come with an antenna.

### Small Manual

The small operation manual consists of two double-sided sheets of printed A4, and it's written in real English by the importers! It includes all the information necessary to use the MX-14S and wiring diagrams for the external attachments.

First impression of the MX-14S is that it's solid and robust. The case is metal and in two parts, the rear section of which has to be removed to fit the batteries.

All the major controls are on the top panel and clearly marked. The fitted Morse key is a small button next to the S/output meter.

There are also sockets for an external speaker/microphone on the top panel. On the bottom panel are the connections for a key and the d.c. power lead, plus the mode switch and 10dB receiver attenuation switch.

### On The Air

Having read the manual the time came to try the MX-14S on the air. Only one crystal is fitted as supplied,

providing coverage from 14.20 to 14.25MHz, this doesn't include the international QRP s.s.b. frequency of 14.285MHz.

I used a bench power supply and found the r.f. output into a dummy load to be a little over 2W on c.w. It was a little under 2W on s.s.b. when I whistled hard into the microphone.

Listening on the band revealed the receiver to be sensitive but prone to overloading by very strong signals. Switching in the 10dB attenuator was helpful under those circumstances.

**Editorial note: Waters & Stanton, commenting on the review say the overloading occurs on a large antenna, because the receiver front end is optimised for the optional whip antenna. A simple five minute modification to the attenuator (increasing it to 20dB) removes the problem. Details on the modification, and other operating tips are available direct from W&S.**

The tuning rate of the variable crystal oscillator is slow enough to allow signals to be easily resolved. On receive the audio output from the internal loudspeaker was clear and of more than adequate volume.

The output reading on the meter is useful reassurance that r.f. is going out into the ether when nobody answers your QRP calls! Despite my pessimism, with the MX-14S connected to a trap dipole via an a.t.u., my first proper contact came within the hour with Alex UZ3AZW in Moscow who gave me a 5 and 5 report.

I got a crystal to cover the QRP s.s.b. frequency and the total coverage available was 14.2 to 14.3MHz. In practice the coverage is slightly more as the variable crystal swings the crystals a few extra kHz beyond their quoted coverage.

There are a considerable number of optional accessories for the MX-14S. These include all the crystals required to cover the band from 14.00 to 14.35MHz, a carry case, and antenna. Also available is a c.w. semi break-in and sidetone circuit, a 10W linear amplifier and a 12V to 9.5V d.c. to d.c. converter.

Although there's no sidetone, keying is not completely blind as the 'send' l.e.d. lights when the key is depressed. If an external key is fitted it must be unplugged on receive.

I used the MX-14S over a bank holiday weekend, only s.s.b. was used. Contacts were made with several European countries. I received S9 reports from Juan EA6YX and Ati HA8RJ.

### Summing Up

Summing up, however good the MX-14S is (and it is good), the price has to be a significant consideration. At £289 at the time of writing for the basic rig, it seems to me to be a great deal of money. I think that there's absolutely nothing wrong with this rig that a substantial price reduction won't cure.

The MX-14S may be pocket size, but it is a real h.f. radio. Operating QRP is a challenge but contacts can be made, and you may be surprised how far a few Watts will go.

My thanks go to Waters & Stanton of 22 Main Road, Hockley, Essex SS5 4QS, tel. (0702) 206835/204965, FAX (0702) 205843, for the loan of the review transceiver which is available from them at £289 inc. VAT with free delivery. PW

*In keeping with our QRP theme, Clive Hardy G4SLU has tried out a low powered s.s.b. and c.w. portable rig that could prove useful to 'hardy' outdoor types!*

### Manufacturer's Specifications

Frequency coverage	14MHz band
Modes	J3E, A1A
Supply voltage	8.4 - 9.5V d.c.
	7 x AA NiCads or 6 x AA dry cells or 9.5V external
Power consumption	RX 70mA no signal TX 620mA max
Antenna impedance	50Ω
Dimensions	66 x 39 x 142 mm
Weight	590g inc. batteries
Transmit power	2W max
Modulation	Balanced
Carrier suppression	40dB minimum
Unwanted sideband suppression.	40dB minimum
Spurious radiation	-40dB maximum
Receiver type	Single superhet
Sensitivity	S/n 15dB min @ 0.5μV
Intermediate frequency	11.2735MHz
Local oscillator	Variable crystal

# THE TINY TIM 3.5MHz SSB TRANSCEIVER

## PART 1

Tim Walford G3PCJ is a well known QRP enthusiast, and he's come up with a delightfully simple low powered s.s.b. transceiver for 3.5MHz using very straightforward techniques.

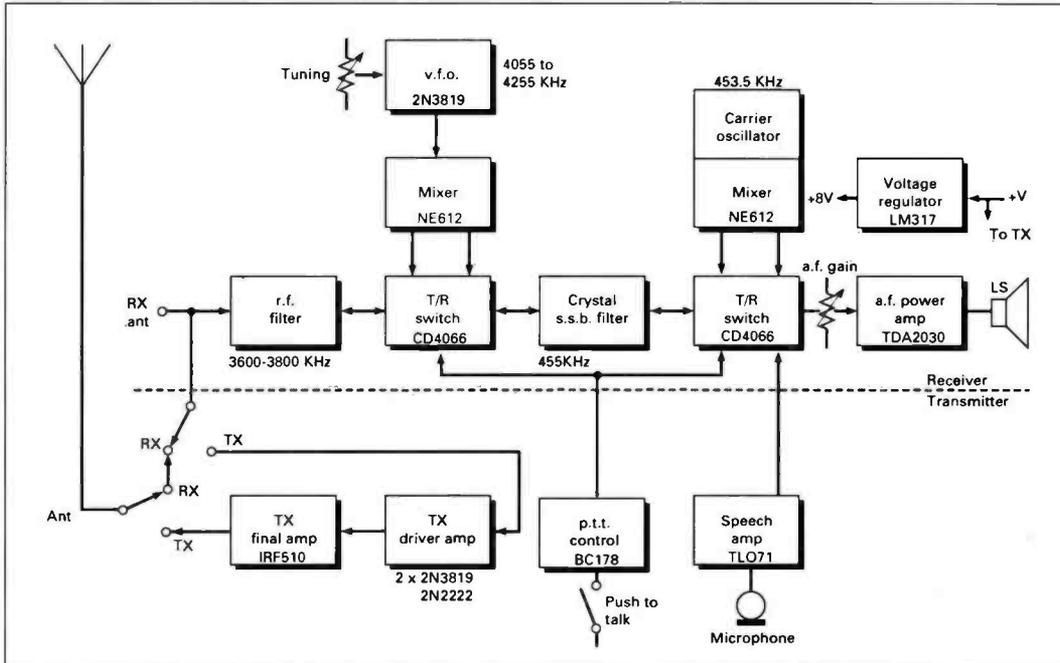


Fig. 1: Block diagram of the 'Tiny Tim' QRP s.s.b. transceiver for 3.5MHz.

The 'Tiny Tim' is a 3.5MHz single sideband 'phone Transceiver In Miniature (hence Tiny TIM!). My aim was to design a rig which is complete, simple yet effective, low cost, suitable for home construction and with an output of about 10 to 20W p.e.p.

The rig is a superhet using the filter method of s.s.b. reception/generation. In this way it avoids the main snag of extra QRM inherent in the simple direction conversion method which receives (and transmits) both sidebands.

The block diagram, Fig. 1, clearly shows how simple the transceiver is. You'll also see that the filter is used 'both' ways, another technique towards simplicity.

### KEY TO SIMPLICITY

The key to the mechanical simplicity in the 'Tiny Tim' is the use of varactor diodes for tuning. The tuning range is 3.6 to 3.8MHz, and is provided by potentiometers.

Using potentiometers, allows the use of p.c.b. copper clad material for the front panel. This can then be soldered directly to the main board itself.

The transceiver provides audio output for a speaker or headphones. In use, it only requires an uncritical d.c. power supply in the range of 12 to 25V at 2A.

Operating on 12V d.c. the transceiver will provide 10 to 12W p.e.p. It's possible to run it with higher voltages, and up to about 35W p.e.p. output can be achieved. The

transmitter output uses a robust f.e.t. with a high Q tuned matching circuit.

The design is suitable for most types of microphone. The transceiver also has built-in r.f. speech limiting or processing.

Setting up is relatively simple. A frequency meter is desirable, and you'll also need a 2A d.c. meter and an output power indicator.

Although primarily designed for s.s.b. 'phone operation, the transceiver can be used on c.w. If there's enough interest, this could be the basis of a future modification.

The complete transceiver only uses six i.c.s, seven transistors and a voltage regulator. My prototype measured 160 x 100 x 80mm.

The Tiny Tim is aimed at constructors with previous experience. I suggest you photocopy the circuit from the magazine page, and you can then cross off the parts as you fit them.

### THE RECEIVER

I shall depart from the usual PW convention, by describing the receiver first. I'm doing it this way since the receiver can be built and used on its own, whereas the transmitter part of the project can't be used by itself.

The receiver, as can be seen in the circuit diagram, Fig. 2, is actually a simple superhet in which the incoming signals are converted to the intermediate frequency of 455kHz.

They're then filtered, detected and the audio amplified for either the headphones or a loudspeaker.

The circuit appears more complicated than

**Fig. 2: Circuit diagram of the receiver section of the 3.5MHz s.s.b. transceiver.**

you might expect. This is because electronic switches are included in the signal path to reverse the flow during transmission (more on this later).

Because of the two-way flow, I call the rig a 'bi-directional' superhet'. If you only want to build the receiver, this circuit works on its own, provided you connect your antenna to the receiver antenna terminal.

### INCOMING SIGNALS

Incoming signals are initially filtered in the double tuned r.f. filter T1 and C27 and L2/C29. These cover the 3.6 to 3.8MHz band without the need to retune.

Output from the second resonator is capacitively coupled to the NE612 first mixer i.c., IC1, at an impedance of 1.5kΩ. It's done through one section of the CD4066 quad electronic transmission gate, IC2

An LM317 voltage regulator, IC5, is used to provide a very stable +8V supply for the varactor diode and other circuits that can't withstand the intentionally wide range of main transceiver supply voltage (12 to 25V).

In this particular application the first mixer, IC1, is driven by an external v.f.o., Tr1, working in a Hartley configuration over the range of 4.055 to 4.255MHz. Special ceramic capacitors with a negative temperature coefficient compensate for temperature changes in the coil leading to a stable v.f.o.

The tuning varactor diodes, D1a and D1b, are connected across part of the coil. And to avoid slow motion drives (with all their horrible mechanical complexity) the tuning voltage is obtained from two potentiometers R1 and R4.

The potentiometers provide coarse and fine tuning control, rather like some older rigs had band-set and bandspread controls. Without this arrangement it would not be a TIM! However, in practice it's very easy to use.

### THE MIXER

The output of the mixer (again at 1.5kΩ) is fed back through another transmission gate to the i.f. filter. The filter FL1, has excellent performance for its price, and removes unwanted signals and the other unwanted sideband.

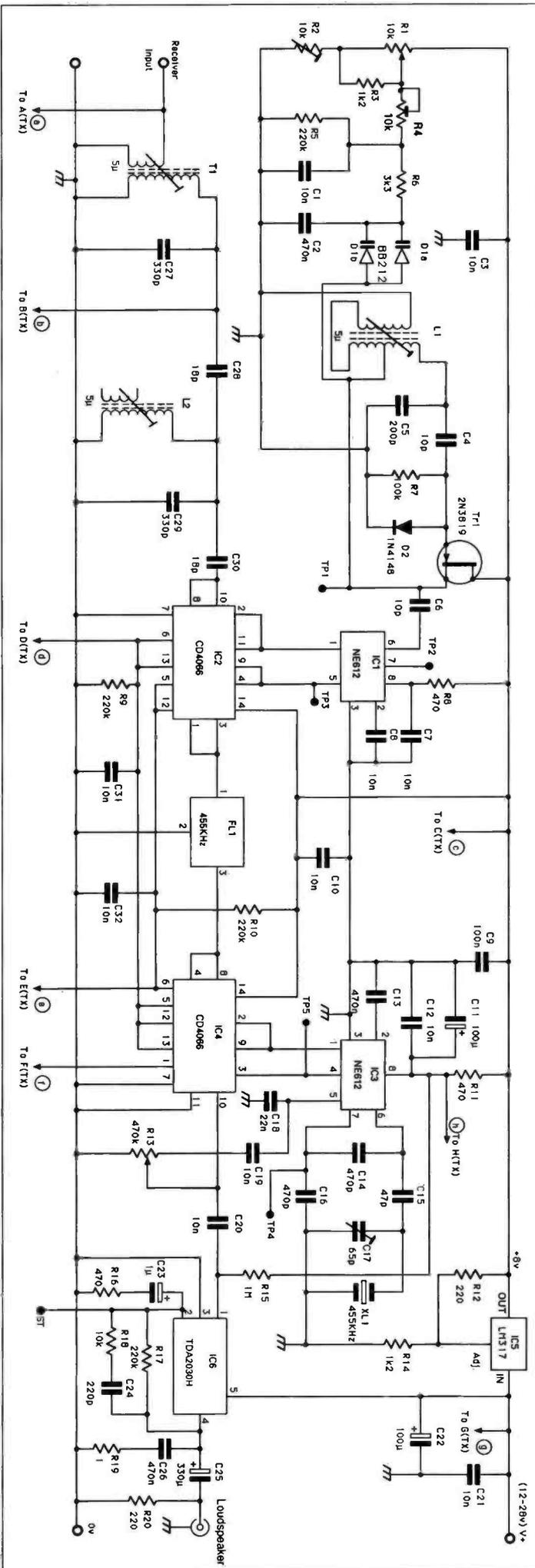
The filter output is applied (through another transmission gate in the second 4066, IC4) to the second NE612 mixer which acts as a product detector. This NE612, IC3, uses its own oscillator section which is stabilised by the ceramic resonator XL1, which is pulled down from its nominal frequency of 455 to 435.5kHz.

Each NE612 mixer has about 15dB of gain, so this compensates for the lack of an i.f. amplifier. Audio output from the product detector is applied direct to the a.f. gain control. This is set at a higher impedance than normal to improve receiver muting on transmit.

The audio amplifier, IC6, is a TDA2030H and provides all the audio gain and low impedance output necessary for driving a loudspeaker. It's a cheap and very flexible device which is used in op-amp fashion.

In this particular application the audio amplifier i.c. remains active on transmit, so that c.w. enthusiasts can feed in a side-tone signal at ST on the IC6 negative input, while remaining unaffected by the receiver audio gain setting.

**That's enough on the theory of the Tiny Tim for now. Next time, I'll describe the construction of the receiver and we'll proceed on to the p.c.b. aspect of the project.**



## SHOPPING LIST (FOR THE RECEIVER)

### Resistors

Carbon Film 0.4W 5%

1Ω	1	R19
220Ω	2	R12, 20
470Ω	3	R8, 11, 16
1.2kΩ	2	R3, 14
3.3kΩ	1	R6
10kΩ	1	R18
100kΩ	1	R7
220kΩ	4	R5, 9, 10, 17
1MΩ	1	R15
Miniature p.c.b. mounted preset		
10kΩ	1	R2
Rotary 'Normal' size potentiometer		
10kΩ	2	R1, R4 (Linear)
470kΩ	1	R13 (Logarithmic)

### Capacitors

Miniature Disc Ceramic

10pF		C4, 6 (NPO type)
18pF		C28, 30
47pF		C15
100pF	2	C5 (N150 types making C5, 200pF)
220pF		C24
330pF		C27, 29
470pF		C14, 16
10nF		C1, 3, 7, 8, 10, 12, 21, 31, 32

Miniature Polyester 5%

10nF		C19, 20
22nF		C18
100nF		C9
470nF		C2, 13, 26

### Capacitors

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10pF		C4, 6 (NPO type)
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Miniature Polyester 5%

10nF		C19, 20
22nF		C18
100nF		C9
470nF		C2, 13, 26

Miniature Electrolytic (16V working)

1μF		C23
100μF		C11, 22 (C22 must be 35V if using a higher voltage p.s.u.)
330μF		C25

Rotary Trimmer Type

65pF		C17
------	--	-----

### Inductors

5μH	3	L1, 2 and T1 (Toko KANK3337 type)
-----	---	-----------------------------------

### Semiconductors

1N4148		D2
2N3819		Tr1
BB212	1	D1 (a and b)
CD4066	2	IC2, 4
LM317	1	IC5
NE612	2	IC1, 3
TDA2030H	1	IC6

### Miscellaneous

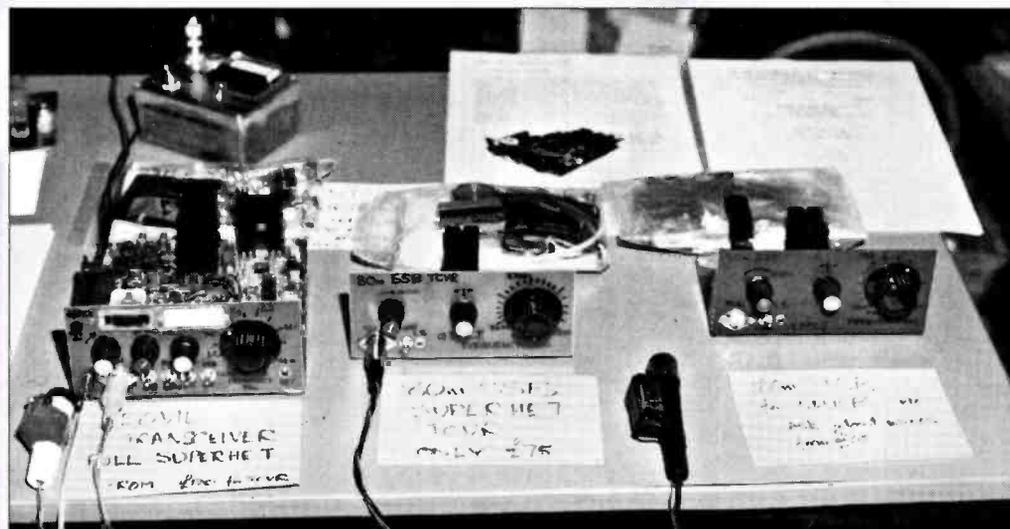
The filter FL1 is a CFJ455K5 type, and the resonator XL1 is a CSB455E, suitable connecting wire and cables, plus suitable plugs and sockets. Other constructional items will be needed to finish off the project.

An additional components list for the transmitter section of the transceiver, together with a combined miscellaneous list will appear in part two of the project.

### TINY TIM KIT

A complete kit including the p.c.b. and additional components for the Tiny Tim will be available from G3PCJ for £75 inc p&p. For further details contact Tim Walford G3PCJ, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ.

PW



Tim Walford G3PCJ is a busy designer, and the 'Tiny Tim' prototype (Centre) is shown with his 'Yeovil' and other items at the 1993 Yeovil QRP Convention.

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FT5200R



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# My QRP DXpedition to

# Monaco,

*Peter Barville G3XJS had an idea "Why not nip along to Monaco and put 3A on the QRP map?". However, at 5am when the alarm clock was ringing loudly in his ear, he thought the trip seemed less attractive. But, he went, and here's what happened.....*

**Parked alongside the harbour in Monaco. Peter Barville G3XJS, was grateful for the shade offered by the tree when he was operating as 3A/G3XJS/M from the Principality.**



I was on holiday with my family in the south of France, just outside Frejus when the idea came. I would have an ideal opportunity to activate Monaco. It's one of the few European countries from which (as far as I know) there had never been any h.f. QRP c.w. activity.

At first, it all looked too easy. Monaco was, after all, only about 100km from our holiday site. And I would have the h.f. mobile equipment with me.

It seemed sensible to make a few enquiries to minimise possible problems. So, I wrote to Claude (3A2LF) for any tips he might have. I also spoke to the operators of 3A/G0FUN/M who had been to Monaco twice previously.

I soon realized that there would be many problems, and that they could make my proposed operation impossible. This view was supported by John (3A2LU), to whom I was lucky enough to talk at length on 144MHz f.m. whilst he was visiting Britain.

## Small Principality

Monaco is small (in English terms 8 square miles). It's a densely populated Principality, with no spare space whatsoever. The Principality is dominated by high mountains to the north. These rise steeply from the shore line, enclosing the whole area.

No antennas may be put up at any location for portable operation. So, it's not possible (or indeed legal) to operate a portable amateur radio station from Monaco.

The only way to activate 3A is to operate mobile (unless you use a local station's site!). But there are some parking spaces beside the harbour, and from which mobile operation is permitted.

However, several million tourists visit the Principality each year, and parking spaces are very much in demand. As we would be going during August, parking couldn't be guaranteed, unless we arrived at the crack of dawn!

## Very Hot

Monaco is very crowded in August, and very hot indeed. So much so, many

residents choose to spend August elsewhere. Both Claude and John would be away for that very reason.

Claude suggested I would be able to cool off in the harbour swimming pool. For this and security reasons, ideally I would need at least one other member of the family with me.

So, how could I ask the family to devote one day of our holiday to amateur radio, and get up very early? I was also hoping somebody might like to join me on the venture!

## Floating The Idea

So, I began floating the idea of 'a day trip to Monaco'. There was much discussion, particularly concerning the fact that it would involve getting up at 5am! And, to my surprise, agreement was reached that we would all go later that week.

I now had a few days to provide as much warning as I could for those operators I knew would be keen to work 3A 2-way QRP. Luckily, with some pre-arranged skeds, I was able to warn friends I was to be in Monaco on the following Friday.

I suggested the start time would be about 0500z (0700 local French time, 0600 in Britain) so we could park the car and make use of the coolest part of the day. The heat was likely to be a limiting factor to the amount of time I could operate.

Fortunately, the timing of my s.s.b. sked enabled Bren G4DYO to put some advance publicity in the *DX Newsheet*. The QRP gang also did their best to alert others. From now on it was down to me and the alarm clock!

## Into Monaco

The route into Monaco from the coastal motorway takes you via a 1.5km tunnel through the mountains. Nothing can prepare you for the experience of emerging into the wonderful spectacle and atmosphere which is Monaco.

Perhaps the fact that we arrived before 7am, and that the town was still largely asleep, contributed to the magic. It was too early for tourists, but there were men with high pressure hoses washing down the roads and pavements. We were to learn how spotlessly clean Monaco is maintained, and I was soon to learn how powerful the hoses were!

We asked one of the men the way to the harbour, and although he gave us suitable directions, he was obviously somewhat bemused at being approached by tourists at that time of day!

Sure enough, we discovered the parking spaces next to the harbour I had been told

## My QRP DXpedition to

# Monaco,

**During the G3XJS Monaco QRP DXpedition, the cramped operating conditions in the hot and humid car weren't helped by the inquisitive visitors and high pressure hosepipes!**



about. But to my dismay, there was a very large building just across the road.

Not only would the QRP r.f. have to contend with the mountain barrier, but also the large man-made barrier. And how much QRN would be generated from within the building?

Well, there was nothing for it but to screw on the 7MHz whip, set up the rig and try a call. A quick check of 7.030MHz to find a clear frequency, and then at 0507z, a brief "CQ QRP de 3A/G3XJS/M QRP".

### First Contact

To my utter delight, Bob G4JFN QRP came straight back. We exchanged RST 549, for what may well have been the first two-way QRP QSO between the UK and Monaco.

Many other QRPers were waiting on frequency. I was delighted to have a steady supply of callers from all around Europe, there were so many I missed breakfast!

My family soon went off to explore a still delightfully peaceful Monaco. Meanwhile, I was discovering how difficult it can be working a c.w. mini pile-up while sitting in a cramped car.

There were other problems too. An American gentleman stuck his head through the open window to ask (in mid pile-up) what sort of radio I was using, and to say that I looked like a "mobile radio station"!

A lorry carefully but noisily manoeuvred in front of me to the edge of the harbour wall to pick up a waiting skip. The heat and humidity was far too great to close the car windows against the noise and diesel fumes it was creating.

However, I had to hurriedly close the windows when one of the high pressure hose operators appeared from nowhere to clean the road. The water may have been refreshing in smaller quantities, and lower velocity, but it did nothing for my operating technique at that instant!

The parking spaces quickly filled, leaving barely enough room between cars to open the doors. An Italian family parked next to me, spent a considerable amount of time standing by my

open windows discussing, in a very loud and animated fashion, the contents of their picnic lunch.

### Family Exploration

My family returned from their exploration, and we enjoyed our picnic lunch. But by then, I had completed many QRP QSOs on 7, 10 and 14MHz. I had already remained active for longer than anticipated, thanks largely to some shade offered by the small tree next to me.

My family were enjoying their visit immensely, and were keen to offer me the chance to have a look round. While my wife and daughter stayed with the car, my son took me on a guided tour of some of the wonderful sights they had discovered.

Before leaving Monaco, the others chose to cool off in the harbour swimming pool. By now, the heat was affecting the rig, and (strange as it may seem) I couldn't wind the power down to QRP levels, but had to use slightly higher power.

By then though, I think I had satisfied most of the stations looking for two-way QRP QSOs. I felt the trip had been more successful than I could have hoped for.

### Voted The Best

What really pleased me, was that the Monaco trip was voted as the best day of the holiday by the whole family. It's a fabulous place to visit, and the local people are very welcoming.

My efforts in acquainting myself with local licensing conditions, and informing one or two of the locals, paid dividends. Without the help from Claude and John, my mini DXpedition would not have been successful, and my thanks go to them. For anybody contemplating a similar venture, the moral of this story is obvious.

The rig recovered once it was allowed to cool down. However, I suffered a little the following day due to dehydration. Perhaps the man with the hose was only trying to be helpful, and I should have made better use of the water coming my way!

PW



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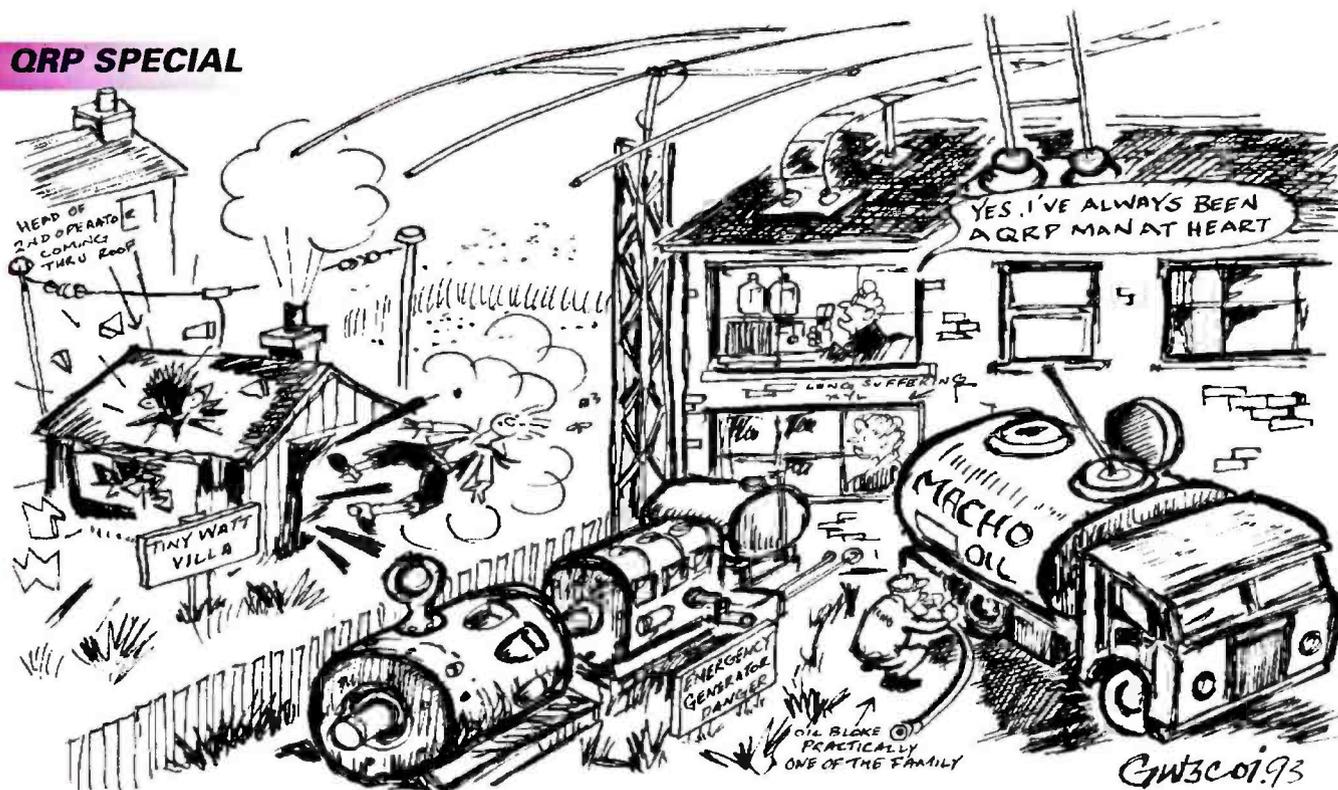
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Unfortunately, the vast majority of amateur radio stations use excessive power unnecessarily.....!

# THE WORLD OF QRP

*Leighton Smart GW0LBI is a keen QRP operator and regularly contributes to the PW 'HF Bands' column. Leighton's advice compliments that of Frank G3YCC's in 'The Challenge Of QRP', and he's determined to try to encourage you to have a go too!*

The casual listener to the amateur bands today will undoubtedly be enthralled when they hear Australia, North and South America, Japan and so on. But, most of these stations will be running powers of anything between 100 and 1500W. So, as far as the amateur operator or s.w.l. is concerned, it's not really surprising that such stations can be heard thousands of miles from their source.

It is however, more than just possible to work stations around the world using much lower power levels. Unfortunately, the vast majority of amateur stations use excessive power unnecessarily.

The high power leads to high levels of QRM on the bands. Because of this, there's more difficulty in hearing or working that elusive DX.

Many newly licensed amateurs seem to think that you need towers, beams and huge amounts of r.f. to work DX. But how wrong that assumption is!

Frank Lee G3YYC in his article shows has shown you the figures for power and the received S-reports. So, why not use the minimum power that's needed to maintain reliable radio communication? That, it seems, is the thousand dollar question. This leads us to the subject of QRP!

## Official Limit

The 'official' international QRP limit has been set at 5W and less for c.w., and 10W for s.s.b. As Frank G3YCC says in 'The Challenge Of QRP' (and surprising as it may seem) it is possible to work great distances using powers within these limits.

Long distances are not only possible, but they can also be done regularly. Contacts over thousands of miles are made every day by stealthy QRP operators, including me!

When operating on the lower h.f. bands, I

usually run 10W p.e.p. on s.s.b. I find this quite adequate to work in and around the British Isles. So, to increase my output would serve no purpose, on c.w., I can use even lower power to maximum effect.

Among the stations worked from my station using QRP power levels are: W8ELL on 21MHz using 500mW and a dipole antenna, 5H1HK on 18MHz (s.s.b.) using 5W and a dipole, and TA2AU/P on 28MHz (s.s.b.) with 1W. So why don't YOU try turning down the power now and then?

There's no need to try 5W straight away. Start with 30W or so, and gradually reduce the transmitter output until you reach the QRP level.

You never know, you may be pleasantly surprised at what you can achieve using just a handful of watts! And remember, whichever mode you use, it's your operating skill and expertise that make you a good DXer, not your power output. Power is no substitute for skill.

## Totally Bored

I became interested in low power after working 100 countries on high power, and then becoming totally bored with the ease of working DX in this manner. There seemed to be no challenge in working DX or new countries by using power levels of around 100W.

However, on 5W and less, the feeling of achievement is immense. It has to be experienced to be believed.

My intention in writing this article was to introduce PW readers to QRP operation through my experiences, and to encourage you to try QRP for yourselves. So give low power communication a try, remember that even Europe is DX if you are QRP. I think that you may be surprised by the potential of low power operating.

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A50-5 .....6m 5 Element Beam  
17B2 .....2m 17el Boomer  
13B2 .....2m 13el Boomer  
124WB .....2m 4el Boomer  
ARX2B .....2m Co-linear  
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TH2mk2 .....20-15-10m 2el Beam  
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14AVQ .....40-10m Vertical  
88DX .....6m 6el Beam  
64DX .....6m 4el Beam

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6M5 .....6m 5el Beam  
2M16LBX .....2m 16el Beam  
2M13LBA .....2m 13el Beam  
2M22C .....2m 11XY Oscar  
2M14C .....2m 7XY Oscar  
432-30 .....70cm 30el Beam  
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432-9WL .....70cm 28el Beam  
EB432 .....70cm Eggbeater  
23QM35 .....23cm 35el Beam  
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2M4P .....2m 4w Power Divider  
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B1016G .....2m 10-160w g/f rx  
B2516G .....2m 25-160w g/f rx  
D15N .....70cm 2-20w  
D26N .....70cm 2-60w  
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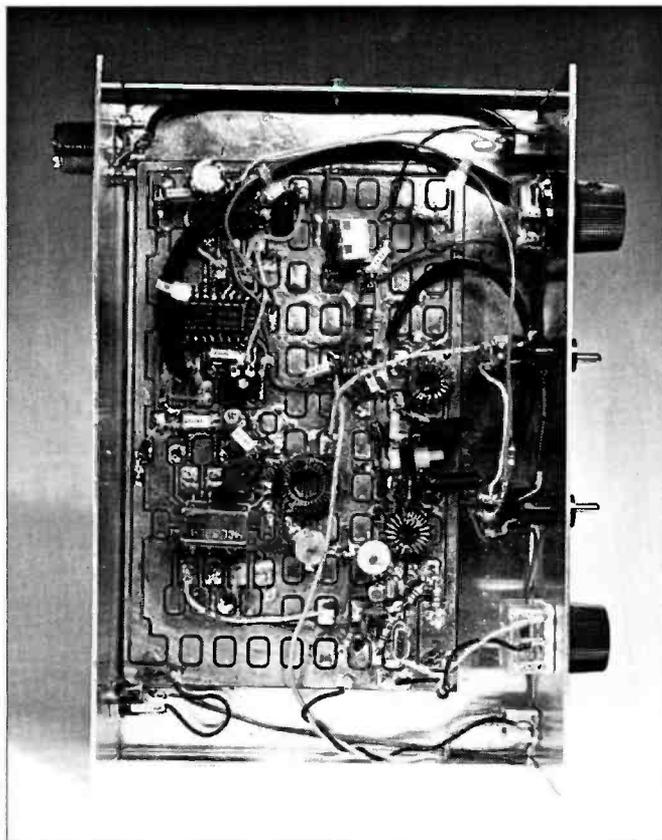
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# THE QUEENSBURY 7MHz TRANSCEIVER

Steve Ortmayer  
G4RAW, has come up  
with a delightfully  
simple little transceiver  
for the 7MHz bands, and  
it's great fun to use!



The *PW* prototype  
'Queensbury'  
transceiver as built by  
Clive Hardy G4SLU,  
using the Howes  
Communications  
'Speriboard' system.

"I have a four year old daughter and a demanding job so I like simple projects that I can get going easily". These remarks struck a chord with me as I sat in St Aidan's Church, at Rochdale, Lancashire during the October 1992 G-QRP Club's Mini Convention.

The Editor Rob Mannion G3XFD, was holding a *PW* feedback discussion. The remark about simple projects came from one of the eager participants.

I have three children, and my job as a Civil Engineer demands a lot of re-study. Brunel and Telford were lucky, as they didn't have to wrestle with the Unified European Code for reinforced concrete! So, I have had lots of therapeutic fun with the simple projects.

The 'Queensbury' 7MHz transceiver is a variable crystal oscillator rig. It takes some r.f. from the crystal oscillator of a simple transmitter, and mixes it with the signal to produce audio in the well tried direct conversion manner.

## UNIVERSAL TRANSMITTER

The transmitter, Fig. 1, is our old friend the 'Universal QRP Transmitter' from *Solid State Design for the Radio Amateur*. It's similar to the *PW* 'Challenger' transmitter, with the added switching transistor.

An r.f. feed is taken from the emitter of Tr1, and is mixed in an SBL1 double balanced mixer to produce audio. The audio is amplified by Tr4 and IC1, with the output fed to the headphone jack socket. Sidetone is provided by IC2.

I constructed the prototype on plain

perforated board. I prepared the board by drilling support holes in the four corners and bolting a solder tag to them. A 22s.w.g. tinned copper wire is then soldered around the perimeter to the tags and forms the earth busbar.

My method is to build a bit, and test it even with a simple project like this. I started with Tr1 up to T1, and checked for r.f. output with a diode probe and a meter. I didn't bother with the variable crystal oscillator capacitor C2 at this stage, adding it later.

Next, the transistor Tr3, and associated parts can be added and the output checked across a 50Ω dummy load. I managed 2W with a 12V supply, and 3W with a 13.8V supply. The switching transistor Tr2 can now be added and checked for 12V on its collector when the key lead is grounded.

The variable crystal oscillator capacitor can now be fitted. I got a 7kHz swing from 7.029 to 7.036MHz using the QRP calling frequency crystal of 7.030MHz.

The receiver can be built a bit at a time. Start with the audio i.c. by testing into some headphones. The usual test of a finger on the input should give a loud buzz in the 'phones. After adding the pre-amplifier transistor, Tr4, the buzz should be louder.

The mixer and input coil, T2, can now be added to complete the board. Adding the 12dB attenuator helped with noise and BC breakthrough.

The whole board can now be tested and hopefully all will be well. The changeover and switching wiring can now be added.

## ON THE AIR

My first try on the air had me in QSO with a DL from near Düsseldorf, who gave the little rig a 579 report. I have also had some QRP-QRP QSOs with G-QRP members, and have been pleased with its performance.

I soon learned to tweak C14 for weaker signals. But the variable capacitor, C2, required a little care to know where the rig was transmitting in relation to receive frequency. The best way is to ask a friend to answer your CQ. Then you will know where to place the variable crystal oscillator (VXO) in relation to an incoming signal.

These simple VXO rigs usually shift a small amount between receive and transmit. On the prototype it was down about 150Hz. Knowing this, by tuning the receiver on the high side of the received signal, with a very low c.w. note, I could be heard by the other station.

I hope you enjoy using the *PW* 'Queensbury' (named after the town near my home) as much as I did. Have fun - QRP (Queensbury) rules!

## BUILDING THE QUEENSBURY TRANSCEIVER

Keen constructor Clive Hardy G4SLU built the *PW* prototype 'Queensbury' and tried out another construction method, using the Howes 'Speriboard' system.

The prototype 'Queensbury' transceiver was built on plain perfboard. But when I was asked to build one, 'Speriboard', a new p.c.b. type product from Howes Communications immediately came to mind.

Speriboard is a single-sided p.c.b. system etched with lands, and it's very useful for the prototype builder. A review of Speriboard by Tex Swann G1TEX, appears in the December 1992 issue of *PW*. The boards measure 160 x 100mm.

## CONSTRUCTION TECHNIQUE

My construction technique follows the same philosophy as that of Steve Ortmayer G4RAW. Build a bit then try a bit!

Mail order produced those components I couldn't find in the junk box. The layout of the circuit on the Speriboard was arrived at by using that high level design technique - trial and error.

The two 8 pin i.c.s are fitted back-to-back on one of the two i.c. areas of the board. I used a single 16 pin dual-in-line socket, as using a socket makes changing an i.c. a lot easier if faults occur.

The 50pF air spaced capacitor used in the crystal oscillator can be an expensive item to buy new. So I tried a miniature a.m. tuner capacitor, which has a 59pF section and costs just over £1 from the Maplin Electronics catalogue.

The crystal I used, swung from 7.029 to 7.032MHz. Different crystals cut for the same frequency may well swing more.

Practical Wireless, July 1993

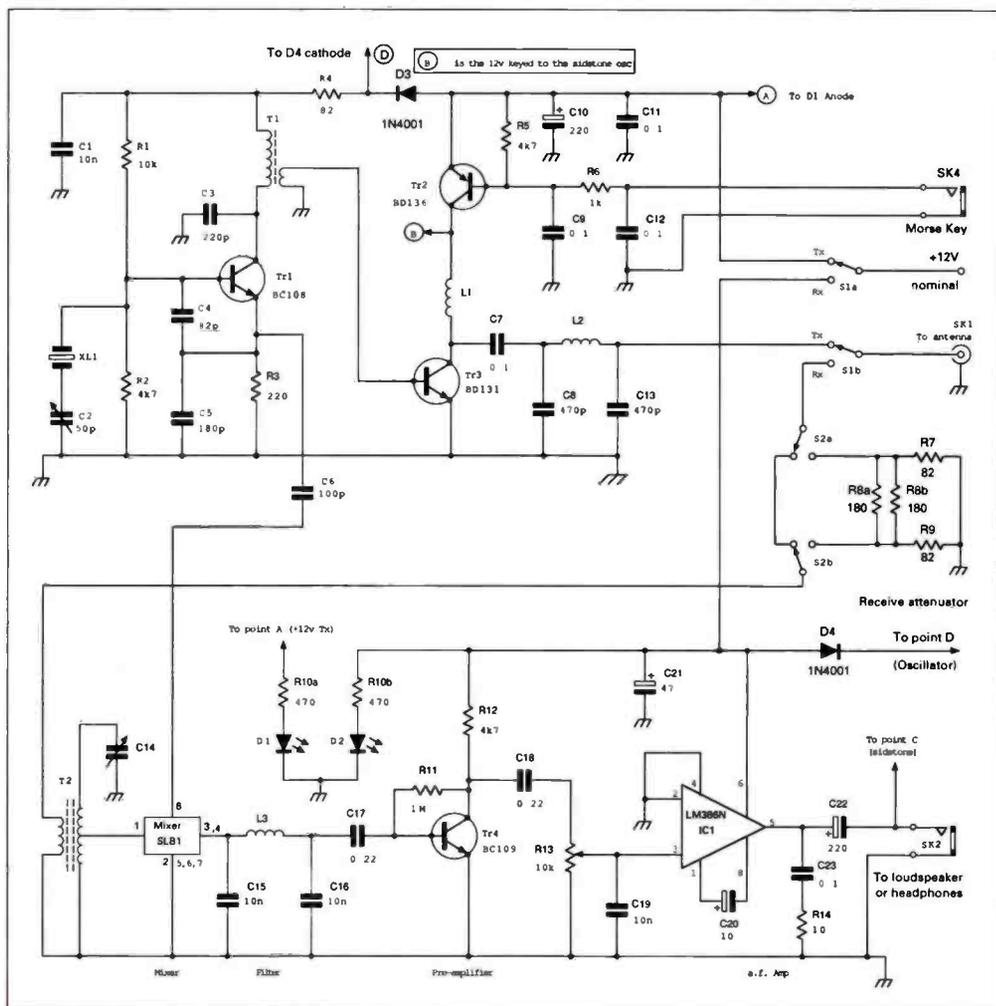


Fig. 1: The circuit diagram for the 'Queensbury' 7MHz c.w. transceiver.

Next to be fitted was the p.a. and switching transistors. I didn't get nearly as much power out with the BD131 as Steve. So I exchanged it for a BFY51 and got about 1W out.

Further down the junk box I found a 2SC495 transistor which produced 4W into a 50Ω dummy load at 13.8V, and so was left in place. A 2SC495 equivalent is the BD139. Both the BD139 and BD131 transistors are TO126 types.

It's likely that numerous transistors are suitable for use in the p.a. Any transistor which produces a 1W or more is fine. The switching transistor used is a BD140, an equivalent to the BD136.

## THE RECEIVER

When building the receiver, the pin spacing of the SBL1 makes it difficult to solder it directly to the d.i.l. pads on the board. So, I made up a piggy-back board from a piece of scrap Veroboard and Veropins.

With an antenna connected and C2 adjusted, signals could be heard from all around Europe. My version suffered from a high pitched whistle from the loudspeaker. It was cured with the addition of a 0.1μF ceramic capacitor (shown as C25) across the audio output between and earth. The trimmer, C14, is adjusted for best results on receive before boxing up.

Fitting the board into the box was very simple using double-sided adhesive foam pads. Wiring up the various sockets was also straight forward.

When the rig was fixed in the box and all the sockets fitted the output power went right down.

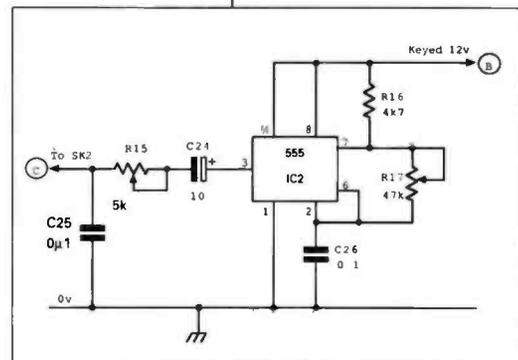
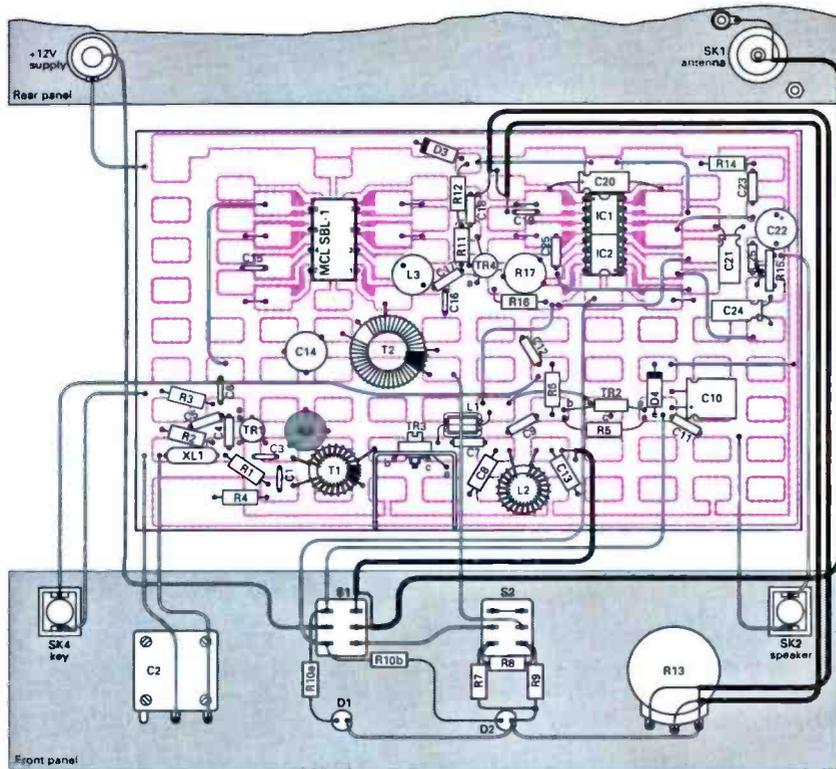


Fig. 2: The transceiver sidetone circuit.



**Fig. 3: Layout design using Howes Communications 'Speriboard' universal p.c.b. system.**

I found that a 100pF trimmer capacitor (shown as Cx) across C2, in Fig.3 allowed the circuit to be brought into resonance, and so restore sufficient drive to Tr3. A further 22pF capacitor may have to be added as the 100pF trimmer was initially fully meshed at resonance.

Don't ask me what caused the problem! And although it might not happen to you, it's worth noting that in the original ARRL circuit a variable capacitor is used.

The whole project only took a couple of evenings to construct. There was much soldering and de-soldering whilst component positioning were decided. However, the Speriboard's lands stayed firmly attached to the board, despite the abuse to which it was subjected.

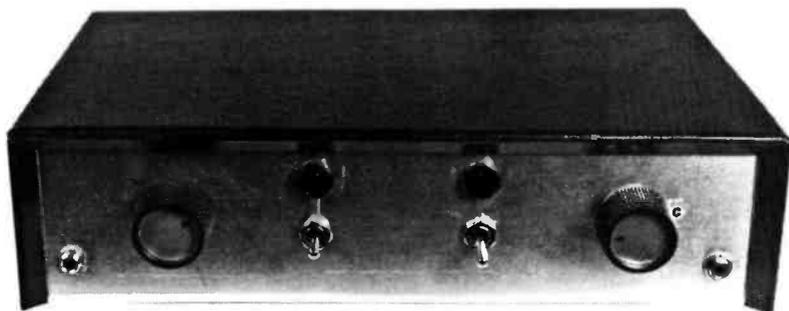
### ON THE AIR

I went on the air, and managed a quick local contact to check that the rig was performing correctly. Then I rushed it over to Rob Mannion G3XFD who was itching to have a play with it!

In one afternoon, with over 2W going into the antenna, G3XFD obtained a 589 from DJ2OD and QSOs into several other European countries. He also worked Gus G8PG, the well known QRP operator. Both Rob and I think Steve has designed a nice little rig, which works well and should give hours of fun.

The total cost for my version, buying everything new and via mail order, worked out at about £43 including post and packing. Careful selection of supplier, bargain hunting at rallies, and a good junk box will reduce costs significantly!

**Fig. 4: The PW prototype built by G4SLU, awaiting application of panel transfers.**



### SHOPPING LIST

#### Resistors

Carbon Film 0.5W 5%

10Ω	1	R14
82Ω	3	R4, 7, 9
90Ω	1	R8 (2x 180Ω in parallel)
220Ω	1	R3
470Ω	2	R10a, 10b
1kΩ	1	R6
4.7kΩ	4	R2, 5, 12, 16
10kΩ	1	R1
1MΩ	1	R11
<i>Miniature Rotary (Panel mount)</i>		
5kΩ	1	R15
10kΩ	1	R13
47kΩ	1	R17

#### Capacitors

Miniature Disc Ceramic 10%

220pF	1	C3
470pF	2	C8, 13
10nF	4	C1, 15, 16, 19
0.1μF	7	C7, 9, 11, 12, 23, 25, 26
0.22μF	2	C17, 18

Miniature Polyester 5%

82pF	1	C4
100pF	1	C6
180pF	1	C5

Miniature Electrolytic 16V working (axial)

10μF	2	C20, 24
47μF	1	C21
220μF	2	C10, 22

Miniature Film Rotary

36pF C14

Miniature Panel mounted Rotary

50pF 1 C2 (see text by G4SLU)

**Inductors** (e.c.w. = enamelled copper wire)

L1	8t (0.2mm e.c.w.) on a small ferrite bead
L2	40t (0.5mm e.c.w.) wound on a T68-2 toroidal core.
L3	1mH pre-wound inductor with a ferrite core
T1	Primary 18t (0.5mm e.c.w.) wound on a T50-2 toroidal core Secondary 3t (0.5mm e.c.w.) wound over the primary
T2	Primary 3t 0.5mm e.c.w.) wound over the secondary Secondary 40t (0.5mm e.c.w.) centre tapped wound on a T68-2 toroidal core

#### Semiconductors

BC108	1	Tr1
BC109	1	Tr4
BD131	1	Tr3
BD136	1	Tr2
LM386	1	IC1
NE555	1	IC2
SLB1	1	Mixer (or any other similar diode mixer)

#### Miscellaneous

Crystal 7.030MHz, and holder, knobs to suit the various controls, Speriboard SF04S, two l.e.d.s (colours to suit), interconnecting wire, a box for the project. Suitable socket for the various coaxial connection to suit (at this frequency and power, phono plugs/sockets are adequate).

# Basic QSOs In Spanish

This month Gareth Roberts GW4JXN, has enlisted the help of Ildefonso Sevilla EA7BWV to get you off in the right direction as he introduces Spanish in the 'Basic QSOs' series.

## Part 1

Regular readers will probably now be familiar with the aim and general purpose of this short series of articles. They're written to give radio amateurs the simple linguistic tools for a basic QSO in commonly-used world languages.

Many radio amateurs will have already come into contact with Spanish during their holidays. However, our aim is not to tell you how to order coffee on the Costa del Sol! We're aiming to give you enough Spanish to catch the DX and enjoy a QSO with a the Spanish speaking operator.

Spanish is a very important world language. The language is of course spoken not only in Spain (EA) but has been taken from there into the New World. To help identify Spanish-speaking countries, we've prepared Table 1.

Many of the Spanish-speaking countries in the table, are 'catches' in terms of DX. But remember, that Spanish is not the official language of Brazil, whose language is Portuguese.

### System Of Location

A look at the excellent RSGB *Amateur Radio Operating Manual*, will show that many countries have a system of location within their call sign. And in fact, mainland Spain itself is divided into nine areas, EA1-9.

Let's look at EA9, as an example. This call area is Southern Spain.

Generally, the lower the number the nearer the area is to us in Great Britain. The prefix EA1 is used in the North West and Basque area of Spain.

Contacts on 144MHz are possible from GW4JXN's QTH in North Wales under lift conditions. Locations in North and Central Spain are usually worked on 14MHz. Southern Spain can be worked on 21 and 28MHz - depending on propagation conditions.

### South American Systems

Most of the Southern and Central American countries have a basically similar system to that used in Spain, and have up to nine different call areas. Maps showing the different call areas can be found in the *Amateur Radio Operating Manual*. Most countries use numbers, although in Uruguay the first letter denotes the province.

Four of the countries - Guatemala, Honduras, Nicaragua and Venezuela permit third party traffic. But the licensed amateur in the UK is reminded that our licensing conditions permit only contact with other licensed operators, not third parties. Your contact in these countries would be committing no breach of his licence conditions. However, the UK based radio amateur speaking to third parties might bring themselves into conflict with the Radiocommunications Agency.

Table 1

CE	Chile	HK	Colombia	TI	Costa Rica
CM, CO	Cuba	HP	Panama	XE, XF	Mexico
CP	Bolivia	HR	Honduras	YN	Nicaragua
CX	Uruguay	KP4	Puerto Rico	YS	El Salvador
HC	Ecuador	LU	Argentinian	YV, 4M	Venezuela
HI	Dominican Republic	OA	Perth	ZP	Paraguay
		TG	Guatemala		

To help you identify towns in Spain, a detailed atlas with its full index of place names is recommended.

### Spanish And English

As you'll probably now realise, Spanish is a truly international language. Because of this, the Spanish-speaking radio operator has advantages over other amateurs.

The Spanish-speaking operator, provided he has suitable equipment, is almost assured of getting good contacts. Some of them will be from rare locations, and there are about 50 000 radio amateurs in Spanish-speaking America.

Therefore, unlike amateurs from many other countries, the Spanish-speaking operator does not feel the same pressure to learn English. Because of this, it's possible to find stations in mainland Spain coming back to you, who speak no English at all or only have one or two words, especially on v.h.f.

There are many Spaniards of course, who speak good English. And of course there are many others who have enough English for a QSO.

So, in fact there are many Spanish operators who will be in a similar position to the non-Spanish speaker, and they'll have practically no knowledge of the other person's language. This means that even a few words of Spanish from you will help, and perhaps that will encourage you to have a go!

### South And Central America

When working into South and Central America, a knowledge of Spanish can lead to some good DX. Although you might find you have to fight off stiff American competition for contacts!

Finally, don't forget that the Spanish of America differs from that of mainland Spain. The difference is similar to the way American English differs from British English.

With Spanish from South America, there are also differences in pronunciation. For example, the Castillian li (Li) becomes almost an English 'y'. And in the countries around the River Plate and part of Southern Spain, it becomes the 'si' as in the English word 'invasion'.

### Accurate Castillian

Although we have used the word Spanish until

now loosely, it would be more accurate to use the word Castillian instead. Castillian is the approved Spanish used for speaking to foreigners, and it's the standard Spanish forming the basis of the written language.

As in Britain, the geographical areas of Spain differ in dialects in their pronunciation. The letter c before e and i is pronounced as 'th' in thank in Castillian but as s in other dialects.

Spanish is more like French and Latin than German. This means that many of the technical words look very similar to English technical words, and are easy for us to remember - and to try out! Also, there's a great resemblance between the pronunciation of Spanish and the written form.

### Notebook Prompter

It's a good idea to start with your own notebook prompter. This can even be a prepared sheet with a very basic QSO, including a signal report, name, QTH and weather conditions.

Even five short phrases can be sufficient to help the Spanish-speaker in the QSO. If the QRM is bad, then you can try the bi-lingual speaking method suggested in the previous articles. This is the method where you speak Spanish, which is easier for your contact, and he uses English which is easier for you.

### Pronunciation Of Spanish

Pronunciation of Spanish is fairly straightforward. The five vowels - a e i o u (w) - are sharp vowels with no tendency to being drawled as in English.

The diphthongs are pronounced like two vowels together. Spanish consonants that need attention are r which is rolled, 'ch' which is pronounced as 'tsh' in church, 'll' as 'li', 'y' or 'zi' according to dialect, 'c & e' as 'th' or 's' according to dialect.

There's also 'b' and 'v' which are pronounced with the lips touching, 'g & e' together with 'g & i' which are pronounced as 'ch' in the Scots 'loch' and 'j' as 'ch'.

As noted in the previous articles, individuals speaking Spanish will differ as to the number of Anglicisms which they will readily use or accept in their language. They will also vary in their use of amateur radio terms and Q codes.

Enjoy speaking your basic Spanish. Good luck and good DX!

# Basic QSOs In Spanish - Part 1

English

Spanish

Pronunciation

## Making a Call

<p>CQ CQ. general call. This is (own callsign) calling on 10, 15 20 metres and standing by.</p>	<p>CQ CQ. Llamada general. Aquí (own callsign) que llama en 10, 15, 20 metros y queda atento.</p>	<p>Saycoo saycoo liamadha cheneral . Akee (own callsign) kay liama en dee-ehz, keensay, vehinteh metros ee kuaydha atento.</p>
<p>(EA7 ... ) This is (G4XYZ) replying/this is (G4XYZ) calling you. This is British/English/Welsh/Scottish/Irish/Australian/American/Canadian/New Zealand/South African station. The Spanish speaking station this is ...</p>	<p>(EA7 .... ) Aquí (G4XYZ) retornando/aquí (G4XYZ) que le llama. Aquí la estación británica/inglesa/galesa/escocesa/irlandesa/australiana/americana/canadiense/neozelandesa/sudafricana. La estación de habla española aquí ...</p>	<p>(EA7 ... ) Akee (G4XYZ) rayornando/akee (G4XYZ) kay lay liama. Akee la estathion britanika/inglaysia/galaysa/escotthesa/irlandaysa/australieeana/amerikana/canadeeaynsay/nayozaylandaysa/swdafreekana. La estathion day abla espaniola akee ...</p>

## After Someone has Replied to Your Call

<p>I heard more than one station replying. Go ahead (XYX). Try again (XYZ). Please wait. This is (own callsign). Good morning/afternoon/evening old man. Thank you for returning my call. I think this is the first time we have worked each other. I think we have worked before. The name is ... I'll spell it for you phoenetically. I repeat. The location is ... I'll spell it for you, in the county/state of ... in North/South/West/East England/Wales/Scotland/Ireland/Canada/USA etc. The location is in the centre of ... on the island of ... In the small/big town/city of ... In the seaside town of ... About ... kilometres from ... The longitude and the latitude is ... degrees - minutes North/South, degrees - minutes East/West. The QTH locator is ...</p>	<p>Hay mas de una estacion que me llama. Adelante (XYZ). Por favor llame otra vez (XYZ) . Por favor espere. Aquí (own callsign) Buenos dias/buenas tardes/buenas noches estimado Colega. Gracias por responder a mi llamada. Creo que es el primer contacto que tenemos. Creo que hemos tenido contacto anteriormente. El nombre del operador es ... Se lo voy a codificar. Se lo repito. Mi ubicación es ... se lo codifico, en el Condado de/Estado de ... en el Norte/Sur/Oeste/Este de Inglaterra/Pais de Gales/Escocia/Irlanda/Canada/USA etc. Mi ubicación es en el centro do ... de la Isla de ... En la pequeña/grande ciudad/Capital de ... En la ciudad/Costera de ... Cerca de ... kilometros de ... La longitud y la latitud es ... grados - minutos Norte/Sur, grados - minutos Este/Oeste. Mi localizador QTH es ...</p>	<p>Hay mas day oona estathion kay mee liama. Adaylante (XYZ). Por favor liamay otra veth (XYZ). Por favor ayspavray. Akee (own callsign). Booenos deas/booenas tardays/booenas notshes estimadho colayga. Grathias por responder amee liamadha. Crayo kay es el primer contacto kay tenaymos. Crayo kay haymos tenidho contacto anteriormente. El nombrray del operadhor es ... Say lo voy a kodifikar. Say lo raypieto. Mee oobecathion es ... say lo kodiefiko, en el kontadho day/estadho day ... en el Nortay/Soor/Oeste/Este day Inglatayray/Pays day Gales/Escothia/Irlanda/Canada/OOES AAh etc. Mee oobicathion es en el thentro do ... de la Isla day ... En la pekwaynia/granday kweewdhadh/Capital day ... En la kweewdhadh costayra day ... Therca day ... kilometros day ... La longitudh ee la laitudh es ... gradhos - minwtos Norte/Swr, gradhos - minwtos Estay/Oesstay. Mi lokalithadhor CuuJay He es ...</p>
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## Signal Report

<p>You are five and nine in ...          Your signal is variable, very weak, weak, strong, very strong, excellent.          There is no interference. There is a lot of local interference.          Your signals are fading.          Your modulation is good/bad.          I can understand you very easily.          I can understand you only with great difficulty.</p>	<p>Su señal cinco-nueve en ...          Su señal es variable, muy floja, floja, fuerte, muy fuerte, excelente.          No tiene interferencia. Hay mucha interferencia local.          Sus señales se pierden.          Su modulación es buena/mal.          Puedo comprenderle fácilmente.          Solo puedo entenderle con gran dificultad.</p>	<p>Soo senial thinko nway vay en ...          Soo senial es variablay, moosee flocha, flocha, foortay, indicativo day liamahda.          No tee-enay interferentia. Hay mootsha interferentia lokal.          Soos seniales se pee-erden.          Soos modoolathion es booenal/mala.          Pooaydho comprenderlay fathilmente.          Solo pooaydho entenderlay con gran difikwitadh.</p>
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## Asking for Information and Commands

<p>Please state your name/your location/your call sign.          What is your country?          Please spell your name/location/call sign phonetically.          Please can you give me a report?          Please repeat.          Please speak more slowly.          Do you have a lot of interference?          Are my signals fading?          Have we worked each other before - on this band/on another band.          I'm sorry I do not understand you.          I do not understand/speak Spanish very well.          Please stand by.          Please go again.          Do you copy?          How do you copy?          Is this frequency free/occupied?          This frequency is in use old man, I'm sorry.          I have a sked.          Can we change frequency? How about 10kHz up/down, if the frequency is free.          How about S19?          Can we go simplex?          I shall see you on the ... repeater.          Shall we try sideband?          How about Morse?          I'll give a report on the next over.</p>	<p>Por favor digame su nombre/su ubicación/su indicativo de llamada.          ¿Cual es su país?          Por favor codifique su nombre/ubicación/indicativo de llamada.          Por favor digame mis señales          Por favor repita.          Por favor hable mas despacio.          ¿Tiene mucha interferencia?          ¿Se pierden mis señales?          Hemos hecho contacto anteriormente - en esta banda/u otras bandas.          Lo siento, no le comprendo.          No comprendo/hablo Español muy bien.          Por favor esté atento.          Por favor adelante de nuevo.          ¿Me copia?          ¿Como me copia?          ¿Esta la frecuencia libre/ocupada?          Esta frecuencia está ocupada, lo siento.          Tengo cita.          ¿Podemos cambiar de frecuencia? ¿Que le parece 10kHz arriba/abajo, si está libre?          ¿Que le parece S19.          ¿Podemos hacerlo en simplex?          ¿Le verá en el ... repetidor.          ¿Probamos en banda lateral?          ¿Que le parece en Morse?          Le dare su reportaje al proximo cambio.</p>	<p>Por favor deegame soo nombre/soo oobikathion/soo indicativo day liamahda.          Kwai es soo pies?          Por favor kodeefeekway soo nombre/oovikathion/indicativo day liamahda.          Por favor deegame mes seniales          Por favor raypeata.          Por favor ablay mas despathio.          Teanay mootsha interferentia?          Say playirden mis seniales?          Aymos etsho contacto anteriormente - en esta banda/ ootras bandas.          Lo siento no lay comprendo.          No comprendo/ablo espaniol moosee be-en.          Por favor este atento.          Por favor adayiantay day nwayyo.          Me copia?          Como me copia?          Esta la frekwentia libre /okwaphado?          Esta frekwentia esta okopahdo, lo see-ent.          Tengo theeta.          Pohdaymos kambiar day frekwentia? Kay lay paraythe dee einth kiloherts arreeva/abacho, see esta leebro?          Kay lay parethay S dee ehti noohve?          Pohdemos atherlo en simplex?          Lay veray en el ... raypethdor.          Probamos en banda lateral?          Kay lay paraythe en Morse?          Lay daray soo reportache al proximo cambio.</p>
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# Basic QSOs In Spanish - Part 2 to follow

# THE CHALLENGE OF QRP

*Frank Lee G3YCC thinks that one of the saddest advertisements to be seen, is one saying all the station equipment is for sale as the licensee is going QRT. Frank believes this could be because they've missed the challenge and pleasure of QRP operating.*



**Author Frank G3YCC operating his QRP station.**

*Courtesy of F. Lee G3YCC.*

There are often good reasons when it may be necessary for someone to go QRT. They may be going abroad or perhaps getting married for example!

However, it's often a case that the initial interest in amateur radio has gone. Or they may say "I haven't been on the bands much recently. I don't seem to have the time nowadays for radio".

Unfortunately, what they really mean to say is that they just don't feel the inspiration to go on the air, communicate, experiment or do practical work connected with the hobby. They have nothing to inspire them.

Much effort will have been involved in obtaining the licence, passing the c.w. test, setting up the station, installing antennas and masts, etc., often at considerable expense. By then the magic, the challenge of amateur radio has probably waned. This is a great pity.

## BUY EVERYTHING

Nowadays, you can go out and buy everything you need to set up an amateur station. Equipment, antennas, keyers, etc., with the only limitation being your credit limit.

Perhaps if we had to work at acquiring all we need, our attitudes would be different. That's why I believe in retaining the Morse test. It's a hurdle only hard work will surmount. If a thing is worth having, it's worth working for.

Obviously for some, to go out and buy the necessary equipment is the only way. There's nothing wrong in this, providing they really use it to the full.

Try adding up the cost of all your gear and dividing it by the number of QSOs in a year. Is the price per contact high?

Then again, one hears the more heartening news that 'old Fred has got back on the air after so many years being QRT'. More news comes that he's taken up with RTTY, or packet, satellites, home brewing and so on.

You hear that Fred never seems to be off the

air now, and he rushes home from work and dives straight into the shack. Can't wait to get on! The magic, the challenge has come back.

I'm not suggesting for one moment that the QRP challenge is for everyone. There are so many facets of amateur radio that you can enjoy whether it be data transmission, using home made gear, experimenting with antennas, or portable operation....the list is almost endless.

What I **am** saying, is that for myself and many others, the challenge that keep us going, is the fascination of operating at low power levels, or QRP. This fact is self evident, in the growth of the G-QRP Club.

## THE G-QRP CLUB

Started by the Rev. George Dobbs G3RJV, Fig.1, (well known to *PW* readers as a regular contributor) over ten years ago, the G-QRP Club membership has risen to over 6000. Membership is still rising.

No-one, especially George, expected the interest to be so profound and popular! Apart from the G-QRP Club, which has members from all over the world, there are several other clubs and societies interested in low power operating.

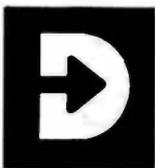
There are QRP clubs in the USA, Russia, Australia and Eastern Europe, etc. So, just what is QRP?

The term QRP represents the use of low power operating, and is defined usually in terms of output power. The internationally agreed limits are 5W c.w. or 10W p.e.p.

However, there are those who would consider these limits as high power as they use milli or even microwatts! This very low power is sometimes referred to as QRPP. It's really surprising what can be achieved with these levels of r.f., but more of this later.

You may ask what can be worked with QRP? My reply to this question would be simple. You can work almost anything with QRP you can

Practical Wireless, July 1993



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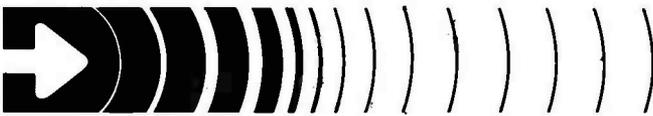
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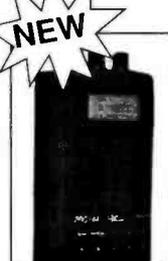
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### 100 Channel Scanner £199.99

Netset PRO-46. Covers 66-88, 108-136.975 (AM), 137-174, 406-512 and 806-956 MHz. LCD display with backlight, search, priority, lockout, scan-delay, memory backup circuit. Belt clip. Requires 4 "AA" batteries or Adaptor. 20-9305



### 50 Channel Scanner £149.99

Netset PRO-44. Covers 66-88, 108-136.975 (AM), 137-174 and 380-512 MHz. LCD display with backlight, search, lockout, scan-delay and keyboard lock. Memory backup circuit for changing batteries. Belt clip. Requires 6 "AA" batteries or AC/DC Adaptor. 20-9304

### 200 Channel Scanner £219.99

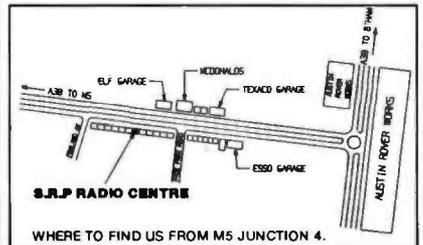
Realistic PRO-39. Covers 66-88, 108-136.975 (AM), 137-174, 380-512 and 806-960 MHz. Hyperscan search and scan, 10 channel monitor back, priority, lockout, scan-delay, LCD display with backlight. Memory backup circuit. Belt clip. Requires 6 "AA" batteries or AC/DC Adaptor. 20-9303



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**Fig. 1: The G-QRP Club founder, Rev. George Dobbs G3RJV, presenting a QRP award to Randy AA2U at the Dayton HamVention in 1991.**

*Courtesy of G. Dobbs G3RJV.*



**Fig. 2: Chris Page G4BUE, is a keen QRP operator who has achieved tremendous results with ultra low power.**

*Courtesy of G. Dobbs G3RJV.*



with QRO (high power). Tremendous distances can be crossed with a few Watts, and there are awards to be won for those 'thousands of miles per Watt'.

Obviously, there are times when QRP will fail. For example, it can fail when band conditions are difficult or QRM levels are particularly high.

You have to be prepared to work that bit harder. You must be patient, and most importantly be absolutely sure that the gear is working to the maximum efficiency.

An efficient antenna system must be used. Only minimum losses can be tolerated by the QRP'er. Of course, this applies to all amateurs!

Many of us would benefit a lot by attending to the most important part of the station, i.e. the bit outside. You can avoid pumping more and more r.f. into an inefficient antenna system, and the received signal will also benefit from antenna system improvements.

And, there's nothing incompatible with a QRP'er operating into a multi-element antenna array. After all, they're only trying to get their precious flea power r.f. to go where it's intended.

### THE TECHNIQUE

The other important point when using QRP is technique. I have often worked DX stations by putting the call sign in just once, when the wolf-pack dies down.

Adding the suffix QRP to the callsign can attract attention. But, please note that signing G3YCC/QRP is not permitted, but G3YCC (space) QRP is permissible.

I remember a Korean station hearing my call with the QRP suffix added. I was among many other stations calling but he asked the rest of the world to stand by while we had a QSO, because he was interested in QRP. And this was in the middle of a contest!

Let's take a look at power and the effect of reducing it, with respect to received reports and illustrate what can be expected:

Power (Watts)	Report (RST)
100W	S9
25W	S8
6W	S7
1.5W	S6

These figures bear out what was learned for the RAE. Namely, that for an increase of one S-point, we have to increase power by a factor of four. The reverse is of course, also true.

Many amateurs have achieved remarkable results with even less power than 2 or 3W. Even with

microwatts, it's possible to work thousands of miles.

I haven't gone down to really low power levels myself. It isn't always easy to measure such levels or even to reduce the transmitter low enough. But I have 'crossed the pond' a few times using an input power of 100mW and approximately 40mW out. This works out at over 90 000 miles per Watt.

One keen 'milliwatter', Chris Page G4BUE, Fig.2, has had tremendous results with ultra-low power, worldwide. And DXCC has been achieved by many QRP'ers. For example, there's George GM30XX, who has worked over 100 countries with 1W using simple wire antennas and Randy AA2U who has worked well over 200 countries with low power.

### AWARDS FOR ACHIEVEMENT

There are several awards for QRP achievements, especially organised by the G-QRP Club. The DXCC is one, as is the Worked All Continents award.

My own score stands at 120 countries worked. Once you start keeping a record of countries worked, you will find it of great interest and stimulation.

It's worthwhile noting the QRP calling frequencies. On c.w. these are 3.560, 7.030, 14.060, 21.060 and 28.060MHz. They are the most likely spots for you to hear QRP stations calling.

Although c.w. is the preferred mode for QRP, don't exclude the use of s.s.b. The 28MHz band is excellent when it's open and you can work great distances on low power.

Recently, I've contacted two VKs, JA and A92 in Bahrain using my TS-130V barefoot at 10W p.e.p. into my doublet antenna, which is used on all bands.

The 7MHz band is probably the most fruitful for inter-G QRP working, especially at the weekend. The QRP contests organised by the RSCG, G-QRP Club etc., are a good chance to QSO other low power stations, even if contests do not particularly suit you. Reports from s.w.l.s are of particular value to the QRPer, so there's plenty to interest listeners.

**POWER DOWN**

For a start on QRP, there's nothing wrong with just turning the power down on your QRO transceiver. This of course helps reduce the possibility of TVI and BCI. But in due course the appeal of home brewing may tempt you into making a dedicated QRP transmitter or transceiver.

There are many firms now advertising suitable kits, and constructional articles often

appear in *Practical Wireless* and other magazines. Jandek, Howes, Malsor, Kanga and Lake Electronics are examples of firms specialising in QRP kits to suit all pockets.

Of course *Sprat*, the magazine of the G-QRP Club is full of such information. Anyone interested in building say a simple rig should have no trouble finding all the information needed. Home brewing a simple rig is one of the aspects that endears QRP to many amateurs.

**COMMERCIAL RIGS**

There are also commercial low power rigs obtainable. For example there are the TS-120V, TS-130V, FT-77S, Ten Tec Argonaut 515 sets. And Heathkit products such as the HW8 and HW9, are still available on the second hand market, and well tried and tested transceivers.

In conclusion, I would recommend QRP to all who fancy meeting a new challenge. Perhaps your local club could organise a competition for members to encourage QRP activity. One idea could be to see how many countries can be worked in say one month.

**But please remember - QRP is addictive! PW**

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**Radio Diary**

\*Practical Wireless & Short Wave Magazine in attendance.

**June 13:** The Royal Naval ARS have their Annual Mobile Rally on the Sports Field at HMS *Collingwood*, Fareham, Hants. Doors open at 10am to 5pm There will be dozens of trade stands, Bring & Buy tent, on-the-spot QSL printing, flea market, large arts & craft exhibition, radio controlled power boats, local radio clubs & repeater groups, vintage fire engine, two grand raffles, amusements for youngsters and refreshments, making this a great day out for all the family. Talk-in on 144 & 430MHz, free parking, no dogs except guide dogs. Cliff Harper G4UJR, 34 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.

**June 20:** Denby Dale & DARS Annual Mobile Rally will be held at Shelley High School. Doors open 11am (10.30am for disabled visitors). Ample parking, traders, Car Boot Sale, food. Talk-in on S22 & SU22. Philip G4FSQ on (0484) 644827.

**June 27:** The 36th Longleat Amateur Radio Rally (follow the brown signs for 'Longleat House' from Warminster, Wiltshire). Extensive trade show, RSCG bookstall, large number of local & national societies exhibiting. Display of The Journéaux Historic Wireless Collection, large craft fair, camping & caravanning facilities by the rally for the whole weekend. Licensed bar and catering on site. Shaun G8VPG, QTHR on (0225) 873098.

**July 4:** The King's Lynn Amateur Radio Club will be holding its fourth Radio Rally at The Cattle Market, Hardwick Narrows, King's Lynn (just off the A10/A47 Hardwick roundabout). Doors open at 10am (9.45am for disabled visitors). Admission £1, children under 14 free. Bring & Buy, Car Boot, family Car Boot near by, free parking. Talk-in on S22. Derek Franklin G0MQI on (0553) 841189 or Ian Cooper G0MBS on (0553) 765614.

**July 4:** Newport Amateur Radio Society will be holding their Junk & Boot Sale at Brynglas CEC, Brynglas Road, Newport, Gwent NP9 5QU. Doors open at 10.30am to 1pm (10am for disabled visitors). Admission 25p. Talk-in by GC1NRS on S22. Kevin GW7BSC on (0633) 262488, QTHR or via Packet at GB7IMB #41.GBR.EU (Bristol).

**July 4:** The York Radio Rally will be held in the Tattersall Building, York Racecourse, Knavesmire, York. Doors open at 11am. Admission £1. Amateur radio, electronics and computers, arts & crafts, Morse tests. Ample free parking, licensed bar & cafe. Talk-in on S22. Andy Suter G0GXI on (0904) 708164.

**\*July 10:** The Cornish Rally will be held at Penair School, Truro. Barrie Thomas G0NNR on (0872) 862046.

**July 11:** Galway Experimenters Club will be holding its Annual Radio & Computer Rally at Newtownshree, Galway. Doors open at 12 noon, large trade show, Bring & Buy, free parking & refreshments available. Talk-in on S22. E17DIB on 091-53592.

**July 12:** The Sussex Amateur Radio & Computer Fair will be held at Brighton Racecourse. Doors open at 10.30am to 4pm. Trade stands, Bring & Buy stall, picnic area, refreshments & car parking. Free Bus service to Brighton Sea Front. (0273) 501100

**July 25:** Colchester Radio & Computer Rally (including Car Boot Sale), will be held at St. Helena School, Sheepen Road, Colchester. Frank G3FJ on (0206) 851189.

**July 25:** Norfolk Amateur Radio Club & Hewett School Radio & Electronics Group will be holding their Rally at the Hewett School, Hall Road, Norwich. Doors open 10am. Admission £1 adults, OAPs/disabled/children 50p. Free parking. Trade stands, Bring & Buy, displays. Sheila G0KWP on (0603) 618810.

**August 1:** The 10th McMichael Rally & Car Boot Sale will be held at the Haymill Youth & Community Centre, Burnham Lane,

Slough (nr. Burnham Railway Station). Doors open 10.30am, admission is £1.50. Car boot sale is £6 per pitch on the day. Free parking on site & talk-in on S22. Neil G0SVN on (0628) 25952.

**August 8:** Derby Mobile Rally will take place at the Littleover Community School, Pastures Hill, Littleover, Derby. Usual attractions, including the famous monster junk sale. It is hoped to provide improved facilities for disabled visitors in 1993. Martin Shardlow G3SZJ on (0332) 556875.

**\*August 8:** Flight Refuelling ARS Hamfest will take place at the Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. Doors open 10am to 5pm. Usual mix of traders, Bring & Buy, craft exhibitors, Car Boot Sale & field events. Overnight camping facilities available for Saturday 7th. Talk-in on S22. Richard Hogan G4VCQ on (0202) 691021.

**August 29:** Castle Hall Computer, Electronics & Radio Rally will be held at Castle Hall Exhibition Centre, Stalybridge, Cheshire. Doors open at 11am to 4pm (10.30 for disabled visitors). Over 200 stalls, Bring & Buy, refreshments available. Talk-in on S22. Enquiries to 061-681 0569.

**August 30:** Coleraine & District ARG Radio Rally & Bring & Buy will be held in The Golf Links Hotel, Portrush. From 12 noon to 5.50pm. Traders welcome free of charge, food & refreshments available. Admission £1. Talk-in S22. Raymond G14MFM on (0266) 558230.

**August 30:** Huntingdonshire Amateur Radio Society will be holding their Annual Bank Holiday Monday Rally at St Germain Street, Huntingdon (easy to find, drive around the ring road until you find us!). Doors open at 10am, admission £1, free car parking. Talk-in on S22. David Leach G7DIU on (0480) 431333.

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

# THE BOURBON QRP 3.5MHz TRANSMITTER

## PART 1



The Bourbon transmitter uses surface mount technology to pack a lot into a small space.

The Bourbon can provide over 200mW of c.w. or d.s.b. into a 50Ω load. It can be a QRP

transmitter, or as a driver for a small linear amplifier.

The project uses the NE602 mixer oscillator i.c. This famous chip is now available in a surface mount (SO8) package.

The NE602 is a double balanced Gilbert Cell mixer. It gives some 15dB of gain with a local oscillator and buffer on the same chip.

I've used the NE602 in several successful s.m.d. (surface mount device) receiver projects. So, I thought it was time to see what it would do in transmitter applications.

The 'Bourbon' is easy to set up, and runs on a supply of 6 to 15V. Carrier suppression is around 40dB.

### THE CIRCUIT

The circuit is shown in Fig. 1. You can see that the NE602 has a good deal of support from other components, even though simplicity was the aim. Although the circuit is not the simplest, the extras offer a very worthwhile unit for the QRP'er.

You'll also see that the NE602 has two mixer inputs, pin 1 and pin 2, and two differential outputs pins 4 and 5. To produce d.s.b., an audio in out and a carrier is needed.

The audio signal is provided by a frequency selective amplifier centred on Tr1. The gain of this stage may be optimised by R4 to match a particular microphone. The design is intended for a miniature electret type ECM10 or similar, for which bias is provided by R1

An audio signal of up to 2V peak to peak appears at pin 1 for an input of about 0.5V peak to peak. The carrier is generated in an external Colpitts oscillator Tr4.

Varicap tuning is shown and this results in adequate frequency stability. Pins 6 and 7 of the NE602 are the base and emitter of the on-chip Colpitts oscillator transistor.

*Bill Mooney G3VZU describes his neat little design for a 3.5MHz c.w. or double sideband suppressed carrier transmitter, which uses surface mount techniques and components.*

The oscillator is fed to the internal buffer amplifier accessible via pin 6, leaving pin 7 unconnected. The stability of the oscillator to 'pulling' is excellent.

A minimum r.f. voltage of 0.5V peak to peak is required at pin 6. The circuit shown achieves a comfortable 1V peak to peak.

You'll now have audio and carrier, and can pick off d.s.b. at pin 4 or 5. However, c.w. is also required.

A signal at pin 1 or 2 of the NE602 will produce sum and difference frequencies at pin 4 or 5. To get c.w. out, you have to apply a signal to pin 2 which will mix with the local oscillator. This signal needs to have amplitude of about 0.5V and zero frequency, in other words - a d.c. bias.

The zero frequency signal is derived from R11 and is switched in or out using Tr2. This transistor is normally switched off, and the collector appears open circuit.

If the cold end of R12 is connected to a positive stabilised supply (Vs) Tr2 is switched on. The c.w. mode is thus selected by transferring the slider voltage on R11 to pin 2, with minimal loss.

The result is a carrier of the same frequency as the v.f.o. appearing in pin 4 and 5. The amplitude of this signal is proportional to the d.c. bias from R11 within certain limits.

### MIXER PRODUCT

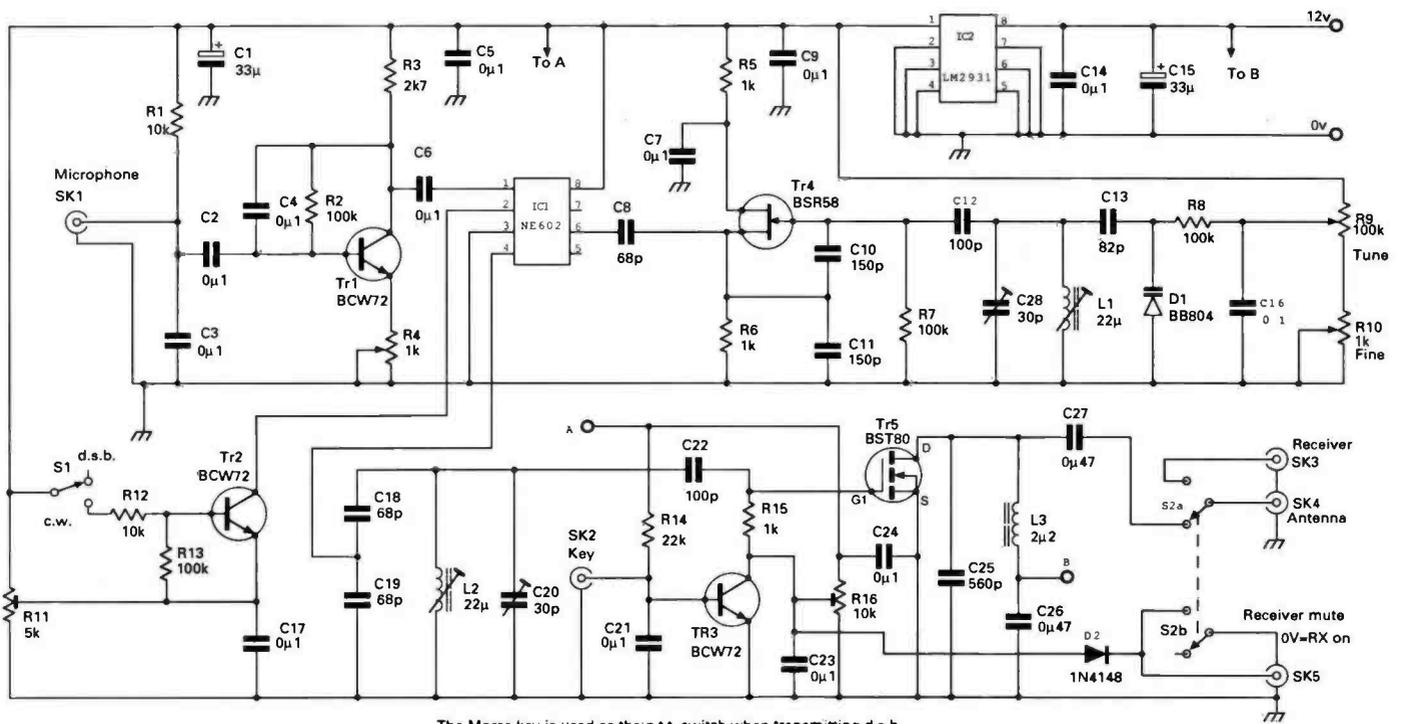
The required mixer product is selected by the parallel tuned circuit around L2. It's applied directly to the gate of the output transistor Tr5.

The transistor, Tr5 is an enhancement type power m.o.s.f.e.t. (v.f.e.t.) device in a SOT89 s.m.d. package. It operates in class AB in the Bourbon, allowing us to switch the output off by removing the bias.

The turn-on bias for Tr5 is derived from R16. It's usually about 2.6V d.c., depending on the required drain bias current selected.

The transistor Tr3, is normally held in the switched on state by R14, and the gate is clamped to 0V in the key-up position. With the key down, the base of Tr3 is grounded turning the transistor off and removing the clamp from the gate.

Of course, the key-down condition should be arranged for the d.s.b. mode. The c.w. keying



The Morse key is used as the p.t.t. switch when transmitting d.s.b.

characteristics are determined by the components around Tr3.

The output circuitry of Tr5 consists of a low Q parallel tuned circuit made up of L3, C25 and the stray capacity of the heatsink. The heavy damping of the 50Ω load reduces the Q to about 20, and the whole band is covered without the need to tune.

The output stage should always be connected to a lowish 50 or 100Ω non reactive load, or narrowing of the bandwidth will result. More importantly, there's no neutralisation and under certain circumstances some instability may result.

The d.c. supply for the output stage is taken direct from the unstabilised supply. This can vary widely (5.5V to 15V) because all bias and low level stages are supplied from the 5V regulator.

The i.c., IC2, provides a steady voltage of about 5V, removing the need for large decoupling capacitors. The capacitors on the in-out and output of the LM2931 are essential to keep the regulator itself stable.

Next time, I'll be describing the construction and setting up stages of the construction of the Bourbon along with the p.c.b. and associated overlay.

PW

**Circuit diagram of the 3.5MHz d.s.b. and c.w. transmitter.**

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**HOW MUCH?**

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 2.7kΩ 1 R3  
 10kΩ 2 R1, 12  
 22kΩ 1 R14  
 100kΩ 4 R2, 7, 8, 13  
 Surface mount trimmer  
 1kΩ 1 R4  
 5kΩ 1 R11  
 10kΩ 1 R16  
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**Inductors**

- Toko 5CD SMD variable type  
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 Chip inductor  
 2.2µH 1 L3

**Capacitors**

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 68pF 3 C8, 18, 19  
 82pF 1 C13  
 100pF 2 C12, 22  
 150pF 2 C10, 11  
 560pF 1 C25  
 Type 1206, COG Dielectric chip capacitor  
 100nF 13 C2, 3, 4, 5, 6, 7, 9, 14, 16, 17, 21, 23, 24  
 470nF 2 C26, 27  
 Tantalum surface mount 16V working  
 33µF 2 C1, 15  
 Trimmer surface mount TZB04 type  
 6.5-30pF 2 C20, 28

**Semiconductors**

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 BB804 1 D1 (dual SOT23 package)  
 BCW72 3 Tr1, 2, 3 (SOT23 package)  
 BSR58T 1 Tr4 (SOT23 package)  
 BST80 1 Tr5 (SOT23 package)  
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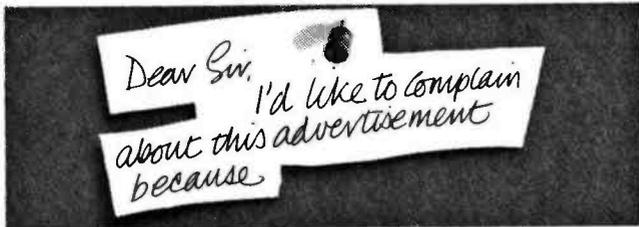
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In the second and final part of his article, Dr. Jim Lycett GOMSZ shows you how to start work on the pivot block for a high quality home brew Morse key.

# Making Traditional Morse Keys Part 2

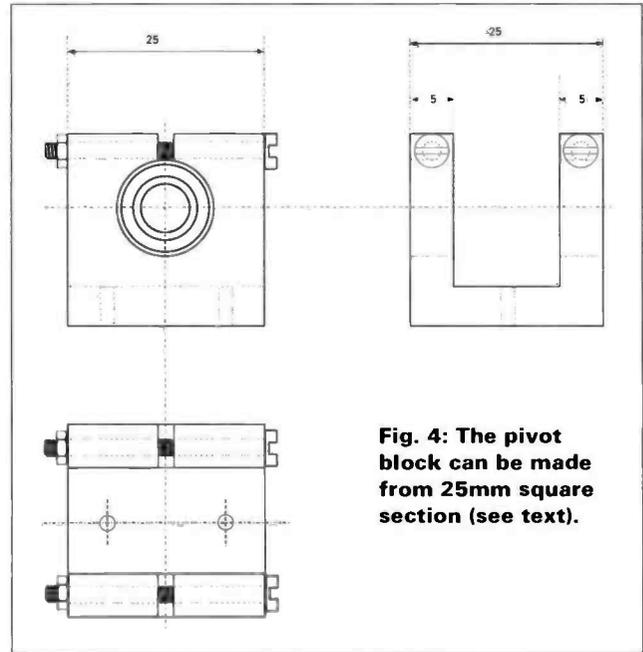
Hopefully, you've accepted the GOMSZ homebrew key challenge. Take my word for it, you'll find the effort is very worthwhile. So, let's get on with the next stage - making the pivot block.

The pivot block, Fig. 4, can be made from 25mm square section or 'U' channel brass bar and of a length to suit the type of bearing selected. Cut a slot  $\frac{9}{16}$  in wide centrally by  $\frac{1}{4}$  in deep in the square section block to accommodate the  $\frac{1}{2}$  in square section arm.

The slot should be cut parallel and square to the faces of the cube. Decide now on the type of bearing you prefer and cut the section to size (1 in long for ball races  $1\frac{1}{8}$  in long for taper and parallel pins).

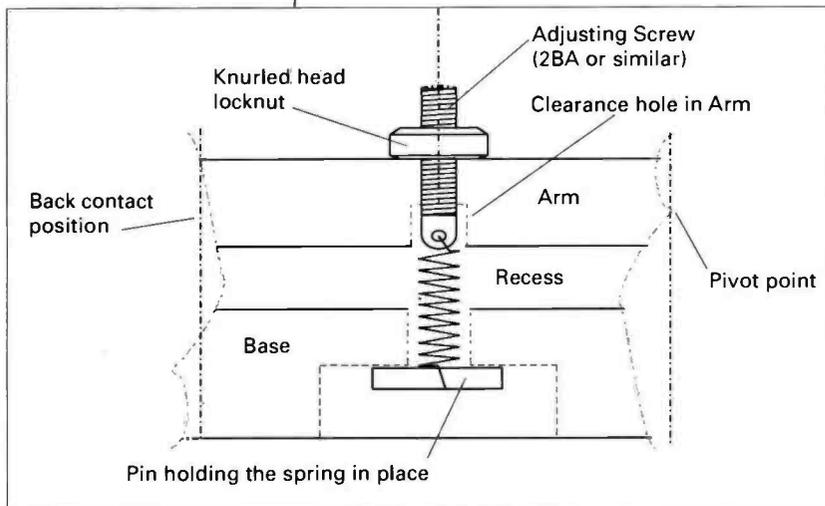
A sealed ball race will provide an excellent bearing. However, some of the fine early examples of hand keys used taper pins.

The taper pin enables speedy strip down and permits adjustment for wear. When fitting a taper pin you'll need to obtain the appropriate taper reamer, ensuring the taper on the reamer is the same as that on the pin, and that your minimum starting diameter is correct.



**Fig. 4: The pivot block can be made from 25mm square section (see text).**

**Fig. 5: The simplest form of tension adjustment, using studding and knurled nut.**



the block as shown in Fig. 4, and nip the bearing with a small screw.

### Spring Adjustment

Although many methods have been used for spring adjustment, I've chosen to present three. The simplest consists of a tension spring positioned between the pivot and the back contact, the adjuster being a piece of studding and a knurled nut as shown in Fig. 5.

The stud passes through a clearance hole in the arm. The spring is looped through a hole in the stud and is retained at the bottom by a pin.

The second simple method, uses a compression spring positioned between the front contact and pivot. Here, the arm is threaded for the adjusting screw, and the underside is counter bored to take the spring and compression washer, Fig. 6.

Method three, shown in Fig. 7, consists of a tension spring, tensioning pin, and adjusting screw with a specially shaped head. The shaped head engages a groove cut in the

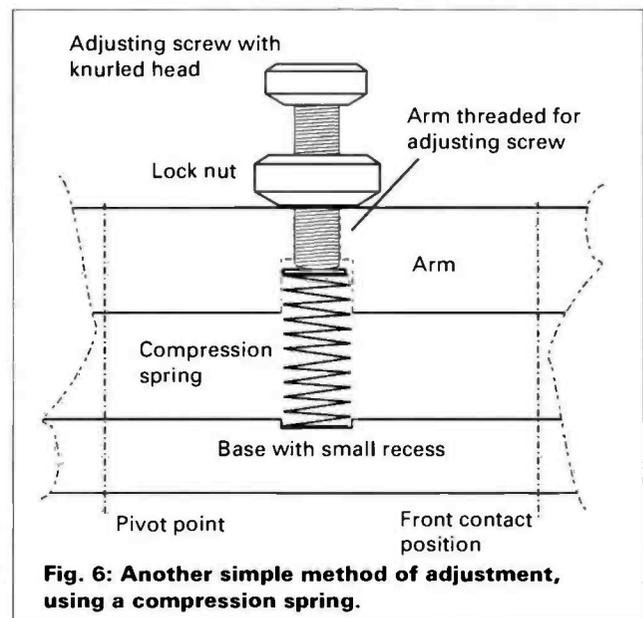
Standard taper pins are available such as  $\frac{7}{32}$  in diameter with a standard taper of  $\frac{1}{4}$  in in 12 in, etc. Both the arm and block should be reamed together with shimming washers to provide the desired gap.

The taper pin is locked into the arm, and the bearing surface is in the pivot block. The parallel pin on the other hand has no adjustment for wear, and care is needed in fitting this type of pin.

Self-lubricating bushes can be inserted into the block, providing bearing surfaces. The bushes can be replaced as they wear. A good bearing is essential for any serious key working.

In the key down position the arm can be considered to pivot about the front contact. The bearing holes should be bored or at least bench drilled.

The bearing holes are the most important holes in the key. Extra care should be taken both in marking out and drilling. Sealed ball races must be held in place, unless you have been able to bore precision holes. I prefer to cut a slot in



**Fig. 6: Another simple method of adjustment, using a compression spring.**

tensioning pin, so that as the screw is rotated the pin is drawn through a clearance hole in the bar, tensioning the spring.

The adjusting screws in general are turned from brass bar. However, in my key the tensioning pin and screws are made of steel, gun 'blued' and oiled.

## Electrical Contacts

Electrical contacts may be obtained from the suppliers listed, these are usually very cheap. I recommend silver contacts, of between  $\frac{1}{8}$  to  $\frac{1}{4}$  in diameter. These will be more than adequate for keying even the most demanding amateur valve transmitters.

Contacts are fitted into the ends of the adjusting screws and into the fixed contact bases. The back contact and its adjusting screw can be identical to the front contact.

Adjusting screw threads around  $\frac{1}{4}$  in diameter with a fine pitch 40 t.p.i. (turns per inch) will ensure precision adjustment. However, 2BA or metric equivalent is just acceptable. Locking nuts are absolutely essential on all adjusting screws.

The fixed contacts on the base consist of a contact holder, made from a 0BA or similar brass machine screw and a contact. The contact is mechanically fitted into the head of the screw, Fig. 8, shows typical contact and adjuster arrangements.

## Solid Base

A solid base such as marble makes the key easier to use. I can vouch for this, having tried materials including wood, chipboard, steel, and brass.

It may simply be the psychological effect of having a good looking base. But one thing is certainly clear, a solid marble base to my mind feels better than wood.

However, rather than restrict constructors, I list other practical alternatives. Solid (dense) hardwood, marble, granite, ebonite, etc., are suitable for making bases.

Marble can be easily obtained (look under 'Monumental Masons' in the 'Yellow Pages') and makes an impressive base. It's fairly easy to work, but remember that it's a natural material and can split, chip or crack.

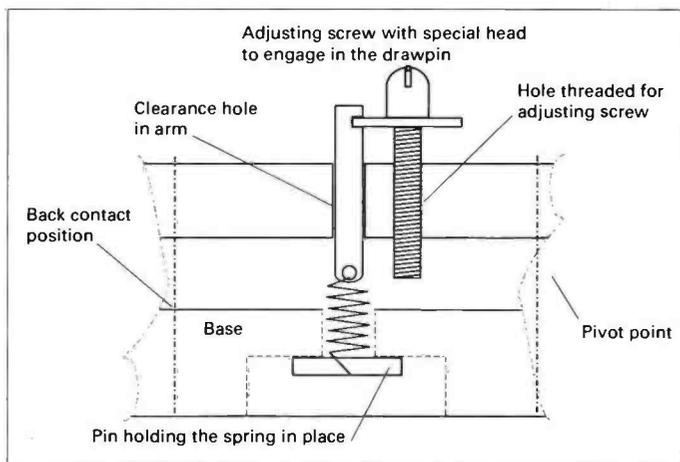
Conventional metal cutting tools can be used to cut and drill marble. A beautiful finish can then be obtained on raw edges by filing and sanding with various grades of 'wet and dry' paper.

It's best to make an accurate drilling template before drilling the holes in the base. The template should at least ensure that the key will fit.

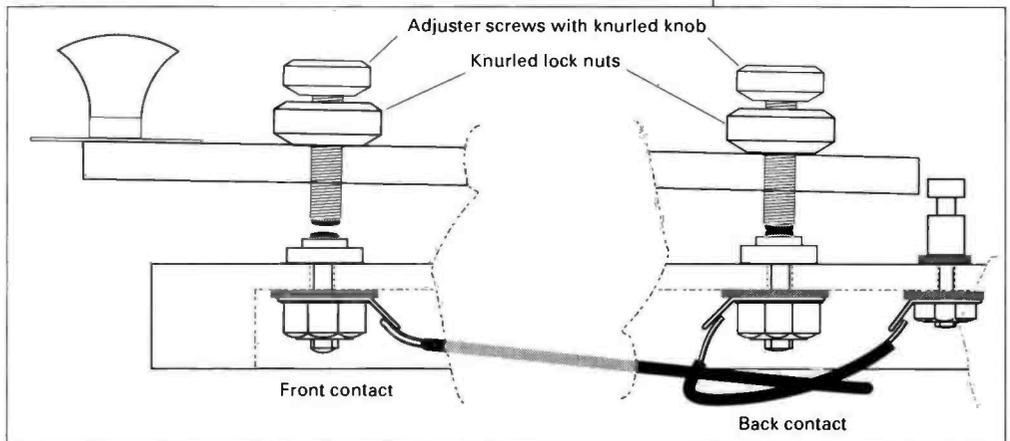
Wood on the other hand, will need some additional weight 'setting in' on the underside. One method involves casting lead into the shape required, attaching it to the base underside. A minimum base size of  $9 \times 3 \times \frac{3}{4}$  in for a key arm of 8in is recommended.

## Choosing Terminals

When choosing terminals, I prefer brass terminal posts. Not



**Fig. 7: The final method of tension adjustment described by GOMSZ, uses a tension spring, tensioning pin and an adjusting screw with a specially shaped head (see text).**



**Fig. 8: A typical contact and adjuster arrangement (front and rear contacts), with lock nuts.**

only do they give a good robust connection, they also enable the key to be stored or displayed neatly.

Various sizes of terminals are available. A practical size for the key design I've provided is 2BA. The fitting of 4BA terminals (or the metric equivalent) look small, whilst 0BA give that definite chunky appearance.

An ideal position for the terminals is at the back edge of the key base, centrally positioned, Fig. 9. It's best to include a copper braid connection from the arm to the pivot block, providing a good electrical contact (avoiding relying on the bearing only).

## Summing Up

In summing up, I've aimed at presenting a basic design which may be individually tailored for your use. The performance of the key will not be significantly effected when the alternative methods described are incorporated.

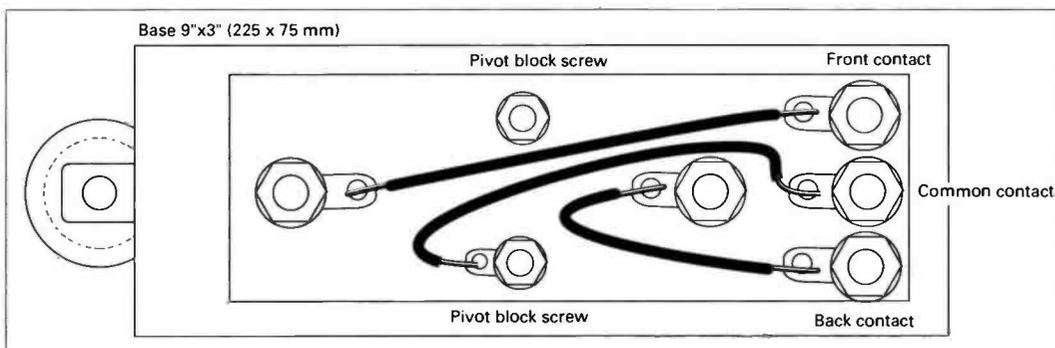
No doubt, you'll spend much time finishing off, burnishing the brass parts, sanding the marble edges or French polishing the wooden base. There seems little point in making a key without putting the finishing touches to it!

A useful criterion to apply is 'will it be acceptable in my living room?'. Like the Fabergé Egg, the key has been designed to give pleasure both to the user and the observer.

Finally, I strongly recommend you not to compromise on the arm and bearing block assembly. Don't forget, that a thing of beauty is a joy forever. **PW**

## Material Suppliers

Unfortunately, K.R. Whiston of New Mills, Stockport in Cheshire, Jim Lycett's main source of supply for brass, bearing and contacts, etc., have ceased trading. Other suppliers may be able to help and Homle Dodsworth Ltd., of 59 to 69 Heaton Part Road, Newcastle-upon-Tyne, tel: 091-265-9077 are willing to supply small quantities of brass. Jim Lycett also discovered that AALCO, with stores around the UK (look in the 'Yellow Pages' directory) can order material. Finally, Peter Jones Engineering, Chapel Road, Smallfield, Surrey RH6 9NR, tel: 034-284-3555, may be able to assist with material and specialised machining.



**Fig. 9: An ideal position for the terminals is at the back edge of the key base, centrally positioned.**

# Antenna Workshop

*Peter Dodd G3LDO, looks at the importance of squeezing that little bit of extra efficiency from an antenna system for QRP. Peter also describes ways of improving the effectiveness of simple antennas.*

When using low powers, every small increase in antenna efficiency is extremely useful. I've used one of the computer programs described in the May issue of *PW*, to explore the characteristics of some simple antennas at different heights above real earth.

I'll try and show how important positioning a simple antenna is, for it to become effective for any operation. The efficiency of these antennas is quite high. Most of the r.f. power fed to them is radiated as electromagnetic energy. I will not be considering antenna efficiency - only effectiveness.

## Antenna Required

Professionals engaged in communications use a chart to determine the type of antenna required for point-to-point h.f. communications. The antenna, with a suitable 'angle of radiation', is selected from charts and tables.

Amateurs usually want to achieve the greatest distance possible. We require the lowest angle of radiation available, which produces the longest hops possible.

## Standard Antenna

For the figures of the antenna being modelled, to have any meaning, they must be compared with those of some standard antenna. When mathematically modelling an antenna, it's convenient to use a theoretical antenna called an isotropic source.

An isotropic antenna is one which radiates equally in all directions. Its 3-D polar diagram is a perfect sphere.

Because the isotropic antenna is theoretical, we precisely define its field strength under theoretical conditions, making it constant for all considerations. Any antenna compared with an isotropic antenna should have its gain labelled 'dBi'.

The radiation field strength pattern of any antenna is three dimensional. The computer model displays a horizontal or vertical section through this radiation field. I'm only using the vertical, or elevation, pattern because this clearly illustrates the angle of radiation of the antenna.

In later articles I'll use the isotropic reference for computer models. When I make antenna measurements using a computer I'll use a real reference antenna, under very controlled conditions.

## Simple Antennas

First of all let's look at the simple dipole for 14MHz. One end of the antenna is fixed to the eaves of the house and the other to a post, to give a height of, say five metres.

Is a 14MHz dipole, 5m high ( $\lambda/4$ ) a good antenna for DX?

The three dimensional polar diagram (in vertical cross section) of this antenna. **Fig. 1**, plot 1, is door knob shaped (at 5m high).

The maximum gain (0dB line) is 5.6dBi greater than our isotropic reference. However, most of the transmitted energy is radiated vertically.

When used for receiving, the antenna picks up more high angle signals. This antenna is fine for short range QSOs to Europe but what about the DX?

The DX signals that are propagated around 5-15° above the horizon are 8-10dBs down on the maximum. They're difficult to work in the short skip QRM from Europe.

By raising the height of our dipole, one end on top of the chimney and the other end with a suitable mast, the dipole height can now be doubled to 10m. What do we now find?

The overall gain has increased

by about 1dB. However, low angle radiation gain is quite substantial.

In **Fig. 1**, plot 2, you can see that the low angle gain, 10 to 15°, has increased by about 6dB. This means that the DX signal will have increased by 6dB.

Furthermore, the reduction in high angle radiation is around 10dB. More importantly, this means that short skip QRM will be reduced by around 10dB. Working DX is about 16dB easier.

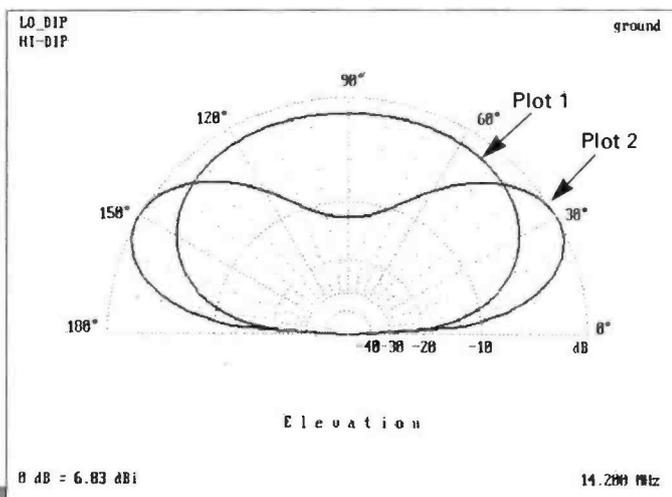
Additionally, the increased height reduces electrical QRM on receive. It also reduces the possibility of BCI and TVI on transmit. Having looked at a horizontal antenna, are there other simple antennas that perform well at lower heights?

## Vertical Antennas

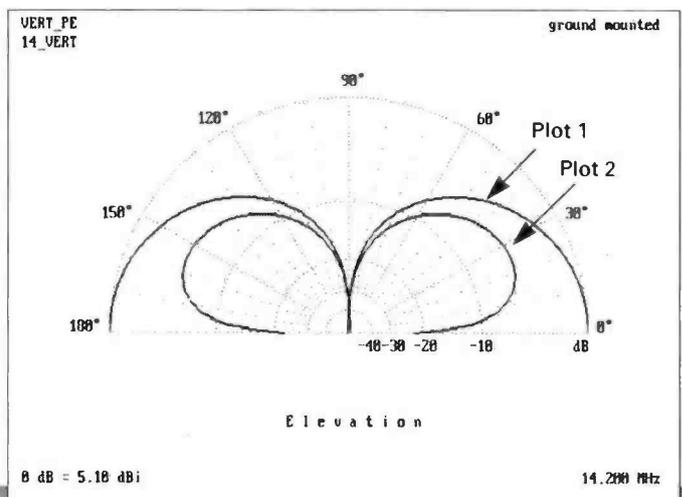
It's generally supposed that vertical antennas provide the best low angle of radiation. How true this is?

An elevation polar diagram of a vertical antenna is shown in **Fig. 2** (plot 1). This is the classic diagram of the vertical antenna. Sure enough, it has a very low angle of radiation with over 5dB gain over the isotropic reference.

**Fig.1:** The polar diagram of a horizontal 14MHz antenna at two levels above ground.



**Fig.2:** The polar diagram of a vertical antenna above a perfect and a more normal ground.



# Maximising Antenna Efficiency For QRP Operations

However, this model assumes that the ground for some considerable distance around the antenna is a perfect conductor.

Very few locations have earth characteristics that are anywhere near perfect. When the antenna is over an average earth, as in Fig. 2, (plot 2) shows that the picture is very different. The gain decreases by about 6dB at our 15° degree angle of radiation.

## The Ground

The ground's contribution to the gain of an antenna is determined by its dielectric constant and resistance. The higher the dielectric constant and the lower the resistance, the greater will be the effect of ground to the antenna performance, see Table 1.

All the models, with the exception of Fig. 2, plot 1, were computer modelled over average ground. The subject of ground effects on antennas is quite involved, and I hope to make it the subject of an article at a later date.

## All Directions

The horizontal pattern of a vertical antenna is a circle,

indicating that the antenna radiates equally (and some cynics say weakly) in all directions. This is assuming there are no obstructions to distort the pattern. The vertically polarised radiation is particularly susceptible to distortion from nearby house wiring.

Furthermore, radiation from house wiring appears to have a high vertical polarisation component making a vertical antenna susceptible to electrical noise.

The performance of the vertical antenna is affected considerably by its environment. This dependence on ground quality and environment, probably causes the disagreements, regarding the performance of vertical antennas, that exists among radio amateurs.

The horizontal pattern of a dipole is a figure-of-eight with some gain, compared with an

isotropic source. The diagram, Fig. 3 (plot 1) ( $\lambda/4$  wave vertical antenna) is shown compared with plot 2, a 10 metre high 14MHz dipole.

The dipole has a clear lead in the low angle of radiation. Although it must be said that it was plotted against the dipole's plane of greatest gain.

Up until now I have only looked at antennas at 14MHz. An antenna 10 metres high on 7MHz would only be about quarter of a wavelength high. Will a vertical antenna outperform it?

The vertical and the quarter wave high dipole are compared in Fig. 4, with the vertical antenna is shown in plot 1 and the dipole in plot 2.

The computer model shows that the gain of the vertical is slightly greater at lower angles of radiation, and the attenuation of the higher levels of radiation is fairly good. However, there's a

tendency for this modelling program to give inflated gain figures of horizontal antennas close to the ground. So the relative performance of the vertical may be better than indicated.

## Summing up

In summing up, on 14MHz and above, the horizontal antenna at more than  $\lambda/2$  above ground, appears to be an effective antenna for working DX. Increasing the height will increase the gain, and additional gain may be achieved by making the antenna longer than half a wavelength.

A multiband antenna, centre fed with open wire feeder, is an effective DX antenna provided it can be erected more than 13 metres high. However, if you want to work 3.5 or 7MHz DX in the approaching low sunspot years, a vertical may be the answer!

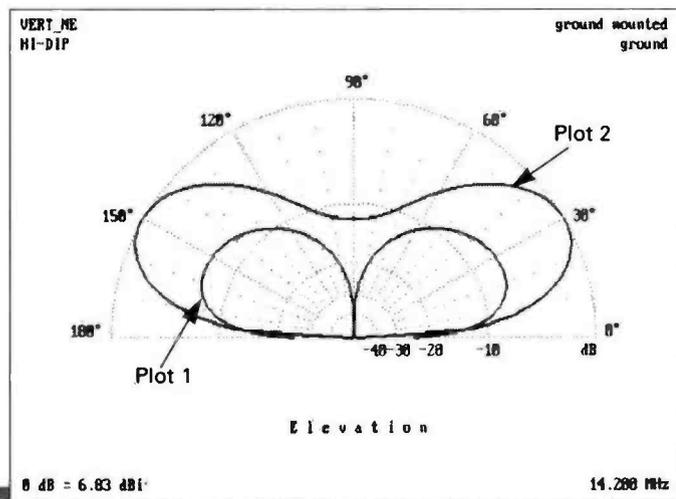
I've not discussed or considered beam antennas. A beam increases the gain in one, or more, desired directions and reduces the signal from undesired directions. I'll describe simple beams, capable of giving useful gain, in later 'Antenna Workshops'. Cheerio for now.

**Table 1:**

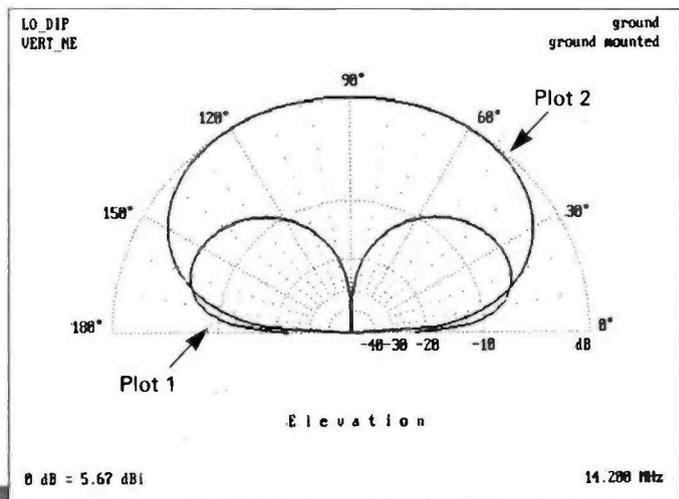
Conductivity and Dielectric Constant for Common Types of Earth

Surface Type	Diel. Const.	Resistance. Ohms/Metre
Salt water	81	0.0002 (Excellent)
Pastoral, low hills, rich soil	20	0.03 (Very Good)
Pastoral, medium hills, clay soil	13	0.2 (Average)
Cities, industrial areas	5	1.0 (Very Poor)

**Fig.3: A comparison of the polar radiation patterns of a horizontal dipole ( $\lambda/2$  above ground) and a vertical antenna.**



**Fig.4: A comparison of the polar radiation patterns of a horizontal dipole ( $\lambda/4$  above ground) and a vertical antenna.**



# Valve &

It's time again for Ron Ham to open the *PW* vintage wireless shop, and this month he starts with a letter mentioning a very famous name in the history of radio design.

Let's open up the 'shop' this time with a letter from **Eric Rowe** (Wirral, Merseyside). He writes: "My brother and I have been interested for a number of years in the sets designed by John Scott-Taggart.

Eric lists models as the ST 200, 300, 400 and 500. There's another, the 900, which, as yet they have not found.

Among my own collection of early books Eric, I've the first editions of Scott-Taggart's *The Manual Of Modern Radio* and *The Book Of Practical Radio* published in 1933 and 1934 respectively, published by 'The Amalgamated Press', London. They're of great interest and worth buying.

A Scott-Taggart 300, including the cabinets for the set and loudspeaker have been reconstructed by **John Tye** (Dereham, Norfolk). Rather than squeeze it up, I hope to feature the photograph John sent, very soon.

**George Shankie** (Hawick, Scotland) has written to tell me about the American station heard on his one valve (O-V-O) receiver made by HAC ('Hear All Continents'). He followed this with an O-V-1 and a 1-V-1, Eddystone 640, Hallicrafters S20R, HRO and an R1155.

## Detailed Research

Although I'm always pleased to hear from readers, I'm sorry, but I do not have time for detailed research. However, I trust that the following general information, from my memory, will help **Leslie Hewitt** (Aberystwyth, Wales) with his particular project.

Generally speaking Leslie, the British Army mainly used Wireless-Sets (WS), WS-18 (back-pack), 38 (side-pack) and 19 (installed in armoured cars & tanks). Each of these had the transmitter and receiver inside the same metal case.

The WS-18 and 38 were run from large dry batteries. But the WS-19, **Fig. 1**, used the vehicle's own (12 or 24 volt) supply, via a rotary transformer. The WS-18 and 38 covered 6-9MHz, and the WS-19, 2-8MHz.

## Clandestine Operations

Both **Leslie** and **Richard Williams** (Deddington, Oxfordshire) asked if I had any information about the sets used in clandestine operations by allied agents during the Second World War.

Actually, there were a variety of sets for special operations like the 'A' and 'B' series. I suggest you try your library, or book shop, for a copy of *Secret Warfare* by Pierre Lorain, from Orbis publishing. (ISBN 0-85613-586-0). The book has a green cover with a 'Boyes Rifle' on the front and covers much of the equipment used by the resistance movements. Another among the many books dedicated to clandestine operations is *The Secret War Of Charles Fraser-Smith* (ISBN 0-7181-2035-3).

## Knickebein Beams

Leslie also asked about Knickebein, a system of navigation beams used by the Luftwaffe to guide their bombers. I can't remember the title but I feel sure a BBC producer, **Brian Johnston**, researched and produced an interesting book about Knickebein (*Battle of the Beams*?). There are also books such as *Most Secret War*, by Professor R.V. Jones, ISBN 0-241-89746-7, (**Highly recommended: Editor**) and *War Planes Of The Third Reich* by **Graham Green**.

Don't forget readers that in addition to your public library, establishments like The Royal Signals Museum at Blandford in Dorset (they've got a comprehensive collection of 'spy' sets), The Royal Air Force museum at Hendon and The Imperial War Museum in London are good sources for research material.

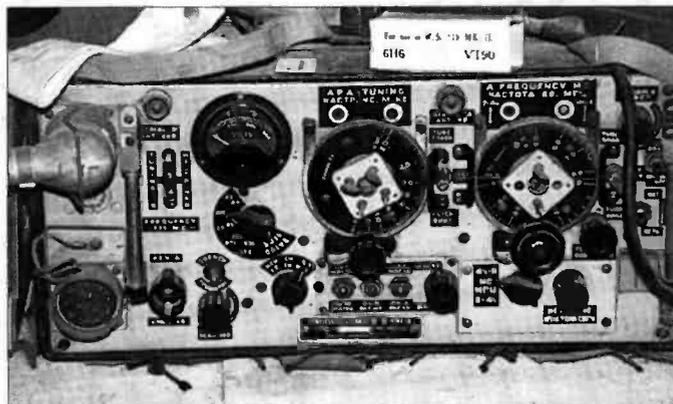
## Air Ministry Manual

My thanks go to **Mike Turnbull** (Whitley Bay) for sending me an original Air Ministry manual for the

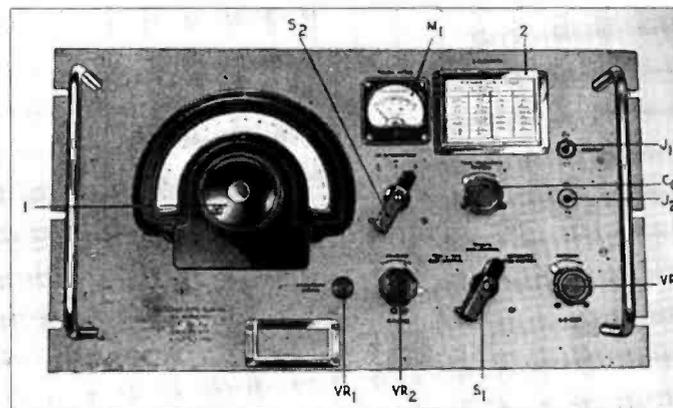
v.h.f. communications receiver R.1132A, **Fig. 2**. I'll pass this document on to the wireless library at the Amberley museum in due course Mike.

Firstly, although this manual was published in June 1945, the valves

two chrome handles; was designed for standard rack mounting. This straightforward superheterodyne receiver has two VR65 (r.f. amplifier and frequency-changer respectively) and a VR66 (local oscillator) in the front end. A VS70



**Fig. 1: The famous 19 set.**



**Fig. 2: The 1132A, one of the few v.h.f. receivers available during the Second World War.**

are listed under their service numbers and not the CV equivalent. During the Second World War tuneable v.h.f. receivers were rare. Hallicrafters made the S-27 and S-36 for air to 'carrier' communications for the United States Navy and the R.1132 was built, in the UK, for the RAF's air to ground communications.

The R.1132A measures 748 x 413 x 413mm and, complete with

neon stabiliser is used to supply the local oscillator. The intermediate frequency, around 12MHz, is amplified by three VR53s followed by a VR54 double-diode for signal and a.g.c. rectification.

The 1132's main chassis is rugged to say the least, and well laid out. The three-valve front end has its own screened compartment with an Eddystone coupler to connect the tuning capacitor shaft to

# Valve Vintage

By Ron Ham

the dial mechanism spindle. The b.f.o. unit, using another VR53, is also self-contained in a screened box.

The audio signal from the VR54 is fed to an octode valve VR57 (CV1057) Mullard EK32. It's then fed to a triode VR67 (CV1067) Osram L63 or American 6J5G. The triode feeds a 600Ω impedance output transformer.

While we're on the subject of v.h.f., take another look at the WS-19 in Fig. 1. You'll see a thumb-wheel dial to the lower left of the meter movement and immediately below that, a Pye coaxial socket. The former is scribed 'Tuning B' and the latter 'Aerial B'.

Whereas the two main dials on the right of the meter are for tuning the 2-8MHz transmitter and receiver, the 'B' set is a v.h.f. transceiver, using a CV6 (DET20) valve, working on 235MHz. This was designed for short range communications between tanks in action with minimal risk of their conversations being overheard.

## Pilot Receivers

Although the manufacturer Pilot made a wide-variety of radio and television broadcast receivers most people's minds go back to the popular 'Little' and 'Major' Maestro series of sets.

The 'Little Maestros' were frequently seen on a kitchen shelf or on the bedside table while the 'Major' was the family set in the living room. Pilot used both Bakelite and wooden cabinets and utilised most of the popular ranges of valves.

'Valve & Vintage' reminded Mr H. Hughes that he had a Pilot 'Major Maestro' stored in his loft. He purchased this Five valved superhet in 1949 when he moved to a house with a mains supply.

The 'Major Maestro' long-medium and short wave receiver has a Bakelite cabinet and a typical valve layout of the period. It had a 6K8G (frequency changer), 6K7G (i.f. amplifier), 6Q7G (double-diode triode), 6V6G (output) and a

6X5GT (rectifier). These particular valves were the 'work-horses' of radio for many years and proved themselves very reliable.

## Octal Valves

Incidentally, the difference in the international octal range of valves is denoted by the letters 'G' and 'GT'. The letters refers to the physical shape and size of the glass (Glass or Glass Tube.

(double diode triode), 7C5 (output valve) and 7Y4 rectifier.

## Dried Out

My mention of the Bush DAC90 recently, reminded B.M. Hugh (Poynton, Cheshire) of the old adage that if a set was unused for any length of time the electrolytic smoothing capacitors 'dried out' and became faulty. Like many of us, B.M. often ran a 100W lamp in

remembered 'wet' electrolytics? I most certainly do, they went on for years. He added, "I have seen one of these imbedded in a workshop ceiling 6ft above the chassis!"

## Amberley Museum

On a recent visit to the Amberley museum, I saw an old friend, Ron Weller (Worthing), Fig. 3. Ron was replacing an output transformer in a immediate post-war Philips receiver. Although Philips sets have a very high standard of reliability, some of the early valve models were not the easiest to handle when they required service.

Ron, a radio engineer for over 45 years, has carefully removed the chassis and loud-speaker from the cabinet and replaced the knobs on the spindles. This is a protection against losing the knob retaining grub-screws, and gives something to grip when checking the movement of the controls.

Care must be taken not to disturb the dial drive assembly. This is important on receivers with 'Bowden' type linkages, when removing the chassis for service.

## Hallicrafters Skyrider

Brook Verrall (London) is renovating a 'burnt out' Hallicrafters Skyrider SX28. He's already replaced the mains transformer.

Before you spend much more time on the SX28 Brook, have a close study of all the wave-change switch contacts. I say this because the last one of those I serviced, I couldn't complete the repair. After tracing the fault to the coil switching, I found a couple of segments on one of the inner contact wipers had broken away.

Unfortunately we've run out of space, and it's time to close the 'Valve & Vintage' shop. But you can be sure I'll be open again next month. Cheerio for now and keep writing to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 2HE.



Fig.3: Ron Weller working on a receiver in the Chalk Pits Museum.

Pilot's later models, released in the early 1950s, used octal based valves and a typical superhet comprised a 7S7 (frequency changer), 7B7 (i.f. amplifier), 7C6

series with the mains lead and left it on for several hours before connecting the set direct to the 240V supply.

Finally, B.M. asked if I

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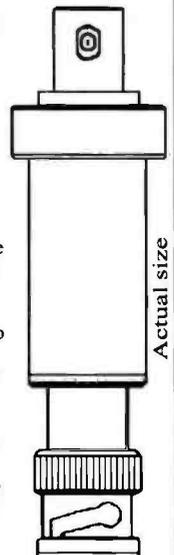
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*The Computer  
in Your Shack*

BITS & BYTES

*Peter Hunter GOGSZ has been surprised to find out how many 'Bits & Bytes' readers use the Amstrad PCW computer. He's also planning a new 'Program Listings Database' for all computers.*

Welcome to the July edition of 'Bits & Bytes'. You've certainly kept me busy with requests for the packet program I mentioned in the May PW. I had no idea that so many of you were using Amstrad PCW computers!

Many thanks go to our anonymous benefactor **John** for offering, and providing the program in the first place. I'm also grateful to **Ian G7HXI** for helping out with the copying of the 3in disks.

**Best Computer**

I've had a lot of letters and phone calls asking me "what's the best computer for the shack?". This is a bit like the famous question 'how long is a piece of string?'

Fortunately, with computers there's a simple answer. It's an IBM or compatible.

However, if you already

written in BASIC, they can often be suitably changed to run on the 'not so popular' computers.

However, your needs may be much more complex and varied than this. For example, you may wish to run a packet BBS, or a multi-satellite tracking station that controls your antennas as well as your receiving/transmitting equipment.

A lot of computers will meet your needs. But the flexibility and expandability of the PCs, as well as the availability of software, makes the PC the ideal choice.

**IBM Or Compatible**

Just mentioning the 'IBM or Compatible' (typically called a PC), frightens a lot of people. The main reason for this is the (supposed) cost.

However, if you go into

or (0850) 616050 (between 10am & 7pm). The TR stands for **Tim Rustige**. Tim specialises in 'second user' computers and peripherals at very low prices.

Here's an example of what TR can supply: an IBM XT with 640K RAM, one 5.25in 360k floppy drive, 10Mb hard disk, keyboard and green screen monitor, for just £115.

Or how about a '286 machine? These are available with a high density floppy drive, but no hard disk, for just £130, plus about £100 if you want to add a 40Mb hard disk. Tim informs me that, although his stock is constantly changing, this is an example of goods that are "constantly" available.

If you can't afford to build your own computer from a kit or individual components at the moment, (see the *Computing In Radio* supplement inside the May PW), then this could be an

especially with amateur radio programs, you can assume that they will work on most PCs

The sheer volume of software available for the PC is another good reason for this choice of machine. Apart from all the advertised commercial programs, there are thousands of others available under the shareware banner.

I was amazed at the number of CDROMs (compact disks to you and me) containing shareware. I'll be telling you more about this next month, but just to emphasise the software availability, I have a disk with over 200 megabytes of **AMATEUR RADIO ONLY** programs!

**Popular Demand**

Because of popular demand, I've decided to set up a 'Program Listings Database'. Let me know if you have any programs (for amateur radio) that you've written yourself, or have any that are in the Public Domain.

Either send me information about what you have, or the program listing (code) as a 'readable' printout. I'll pass this information, or a copy, onto anyone requesting it (s.a.e. with request please!).

The new facility is for **ANY** computer, in **ANY** (computer) language. I'll print a list of what's available, from time to time, in 'Bits & Bytes'

Don't forget I enjoy your letters, phone calls, and packet messages, so please keep them coming. So, until next month, 73 DE Peter GOGSZ.

**'Bits & Bytes' readers can contact Peter Hunter GOGSZ, at 2, Mayes Close, Bowthorpe, Norwich, NR5 9AR, tel. or FAX on (0603) 748338. Packet: GOGSZ @ GB7LDI.#35.GBR.EU.**



**The IBM compatible PC comes in all sizes, and prices to suit almost everyone and their pockets.**

own a computer (regardless of make or model) you want to use it for general tasks, (packet, RTTY, AMTOR, etc., Log keeping and mathematical calculations). Then your existing machine can be suitably adapted for any and all of those jobs.

There's an abundance of amateur radio-related programs for the more popular machines. And, as a lot of these programs are

your local W H Smiths or other good newsagent, and pick up a copy of the weekly **Micro Computer Mart** (it's like the famous **Exchange & Mart** and specialises in computers), you'll see pages and pages of adverts from people selling secondhand computers and computer bits.

You will also come across such companies as **TR Computers tel. (0565) 830475**

ideal starting point.

Unlike any other make of computer on the market, software written for the PC will run on virtually any PC. There are exceptions to this of course (before you all start writing to me, Hi!).

If a program was written specifically for the 80386 or '486 then you can't expect it to run properly, if at all, on an XT or '286 machine. But generally speaking,

**E N D**

Report

H F B A N D S

This month's DX tip. Be a listener! Be a reader!

By listening, you not only get hold of the 'pattern of the bands' but also get to know about the mistakes the 'bum ops' make and the way the savvy ones get the contact.

By reading, you get to know what is currently about. Everyone's 'wanted countries' list is different.

Those 'boring old lists of call signs' are in fact the very stuff you must analyse. If, for example ZZ1ZZ is resident in country Y and appears in every DX list, either s.w.l. or transmitter, then you know that if you look for ZZ1 at the appropriate times you will in due course come across the station.

Those long lists of calls are meant to help the newcomer - and other DXers - know what's about. Even an obituary notice can alert you that a country now has no resident amateurs, for example 9N1MM, until someone sets up an expedition there or a resident gets a 'ticket'.

Summing up I say that listening is the key to good operating. And your reading tells you if a particular country you want is available or not.

Try any or all of the following: the DX Column in *Radcom*; RSGB's weekly *DX News Sheet*, *The DX Bulletin*, the local DX-cluster network. Alas, this column is, by editorial decree, no longer useful to a serious DX chaser.

Your Letters

Now to your letters. Firstly, there's **John G3BDQ** (Hastings) who runs a TS-850S and TL-922 linear.

His TS-850S now has two 270Hz crystal filters fitted, and this can be followed up by an audio filter to give 30Hz bandwidth. To 'drive' such a 'sharp' receiver set-up needs very slow tuning, but it pays off.

For 1.8MHz, John uses a chicken-wire earth mat of several square metres, and over it an arrangement comprising a five-wire

grounded cage steeple, tri-wire top of some 25 metres, and single-wire feed.

On 3.5 and 7MHz the classic 3.5MHz doublet is fed with open-wire line, while for the 14, 21, and 28MHz band there is a G3KBR tri-band dipole at about 13 metres.

John's score on 1.8MHz is well over the 100 countries. While for 21MHz this month's pick were S21ZM, N9QQS/T5 and his buddy K30QF/T5 (both Mogadishu), and ET3YU on s.s.b.; plus 9G1AA on c.w. Turning to 28MHz, C91J was booked in...then the 'flu bug bit!

Our other transmitting reporter is **Eric GOKRT** (Worcester Park, Greater London). Eric has a Lake DTR7 with about 1W out on 7MHz (pictured in this column last month).

Up aloft is the upper half of the W3EDP design antenna, but the lower half is now a quarter-wave radial. If the latter is detuned by contact with snow or foliage no contacts result!

The best of the contacts SP7GIQ worked on a daylight path, and ON5AG for a two-way QRP contact. However, two new ones have been confirmed by way of cards from UB5JBB and W1KM.

**Luciano Marquardt** in Hereford has been pleased by cards from 5N00BA, AP2JZB, and ZB2JI. Luciano has logged 123 countries since the start of the year. For the current period, there are Europeans on 1.8MHz, while on 3.5MHz I see LU6FFL for South America, several parts of North America, and some ZLs. Perhaps the best on 7MHz was YS1AG.

Without a doubt, C31SD has to be favourite on 14MHz. Scrappy conditions didn't help on 21MHz where UZ9MYL, 3X0HLU and ZLs were heard.

Iceland is the place from

where **Geoff Crowley** now listens from Hafnarfjörður. He notes how the higher bands have clammed up, and the lower ones came into their own this time.

Geoff is now learning Morse with a view to a 'ticket' to join the 200 other TF call signs on the air. But perhaps the most interesting one for Geoff was hearing G4RQZ working ZP5XHP from his farm tractor - not bad, a hobby which lets you chat to Paraguay while you work!

Out of the past comes **Dennis Shephard** in Earl Shilton (Leicestershire). He has got hold of a Trio 9R59DS receiver.

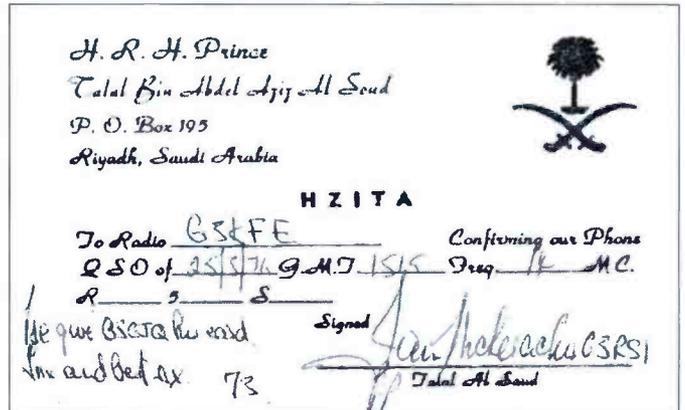
The antenna is a Windom arrangement, single wire fed, one third along the top. The length of the top is three half-waves (some 32m long) on 14MHz.

On 3.5MHz the Windom presented Dennis with a string of ZLs, ZP5JCY, YS1RRD, Z2ZJE for Africa, and a couple of TI stations. Over on 28MHz ET3DX was maybe the rarest. This and all the others being N-S oriented, show us how the sunspot level has deteriorated since the peak of the cycle.

Correspondents Puzzled

One or two correspondents were puzzled by SORASD. The S0 prefix for the West Sahara Republic. The route for cards is to the Lynx DX Group in

Paul Essery GW3KFE says conditions have been very up-and-down in recent weeks. Seemingly there is some restructuring going on in the sun, but he says no doubt we shall survive!



If you have an interesting QSL card or report, make sure you send it to Paul at 287 Heoly-Y-Coleg, Vaynor, Newtown, Powys, Wales SY16 1RA.

Spain(EA2JG). **Gordon Robertson** in Saltash (Cornwall) mentioned this one, heard between the hours studying for the RAE - Good Luck!

Another hearing of SORASD was by **Tim Allison**, also in Saltash, with his HF225. Tim listens to the Desert Storm Net on 14.280MHz, now at 1700Z on Tuesday and Saturday.

An Eddystone 870A is the tool used by **John Collins** in Birmingham. John is mainly a night-owl, listening from around 2300 onwards.

Our next two listeners have to be lumped together; **Andy Wright** is in Sawley, and has an R2000, a.t.u., 25 metres of wire, and a BP34 audio filter as back-up.

**Gerald Bramwell** in Swinton (Greater Manchester) is a dedicated s.w.l. and says he has no intention of taking a licence - but he certainly catches most of what's about, on sideband, f.m., RTTY, and c.w.

Finally, there's **Viv Franklin** in Swindon. Viv has occupied time since being made redundant rebuilding the shack in a box room. This is now done, and all continents are noted in the log with 3X0HLU possible the pick of the crop. I hope Viv is 'fixed up' as soon as possible. That's all for now, usual mid-month deadline, and address as in the picture caption above. 'Bye now!

E N D

*This month in his monthly look into the world of amateur radio in orbit, Pat Gowen G3IOR provides the latest MIR news and information on both current and coming amateur satellites.*

Scene

# SATELLITE

The Current MIR crew, Flight Commander Gennady Manakov U9MIR and Flight Engineer Alex Poleschuk R2MIR are active on 145.55MHz f.m. voice, and on packet as mailbox R2MIR-1. The 'digital memory microphone' built for them by DL2MDE has been in use. It's been putting out a greetings message recorded by Alex R2MIR every three minutes.

Although ESA now have control of MIR, the future plan is still for Vassily Zibliev R3MIR and Alexander Serebrov R4MIR to man the space station from 1st July to 24th November. For the first three weeks of this mission they will play host to visitor Jean-Pierre Haignere who will be using his French callsign.

The MIR crews will continue to use the on-board gear, including the Yaesu FT-290R 144MHz f.m. 2.5W and the Icom IC228A/H 5/25W transceivers. These work into the external hull-mounted ground plane antenna.

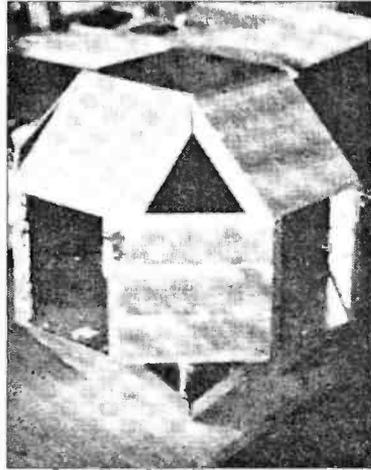
The crews will also have a TNC-PacComm HANDIPACKET packet controller (pictured in 'Packet Panorama') with an PC/AT Laptop. Also on board, there's the Austrian AREMIR system, a OJ-120 ALINCO transceiver, and a TNC-2 plus packet controller.

## More New Satellites

The AMSAT Argentina organisation are adding to their already operational LUSAT-1 with a new satellite AMSAT-LU-2. The new satellite, which should be launched by the end of this year, will include a programmable digitalker. This facility will provide up to two minutes of digital voice recording time.

The AMSAT-LU-2 will also carry an f.m. transponder repeater that will operate on Mode 'B', up-link in the 435MHz spaceband, downlinking in the 145MHz spaceband.

The satellite's beacon will downlink telemetry in



**Fig. 1: A mock up of the prosed PANSAT satellite**

standard 1200bps AX.25 packet format. The digitalker will also be very similar to AMSAT Brazil's 'Dove' OSCAR-17 and the Russo-German RS-14/OSCAR-21. The plan is to attach LU-2 to a Russian satellite primary mission.

Further details and frequencies will be published in 'Satellite Scene' as they are made available. But in the meanwhile any comments, suggestions, requests or proposals are welcomed by AMSAT Argentina. Packet mail sent to LU7AA @ LU7AA.CAST.ARG.SOAM will find them, or you can send it @LUSAT, @PACSAT or via UO-22.

## Navy Satellite

The United States Naval Postgraduate School (NPS) in Monterey California, is developing PANSAT. The acronym stands for 'Petite Amateur Navy Satellite'.

In effect PANSAT takes the form of yet another store-and-forward packet radio satellite, but this time with a difference. The difference is that the signals used to access the satellite will employ direct sequence modulation Spread Spectrum techniques.

The proposed PANSAT will be a 150lb weight, 19in diameter spacecraft, as seen in the mock-up in Fig. 1. It will run AX.25 1200bps with

full duplex facilities on 435.250MHz with 1MHz bandwidth. In addition to evaluating the performance of spread spectrum within the amateur radio community, PANSAT will investigate low jamming and low intercept possibilities while providing low cost over-the-horizon message exchange and orbital mailbox facilities.

## Transmitter Output

The PANSAT transmitter's output is planned to be some 5W (7dBW) to a 0dB gain tangential turnstile antenna. Intending users should

There's also a kit for a simple low cost modem and r.f. package under development

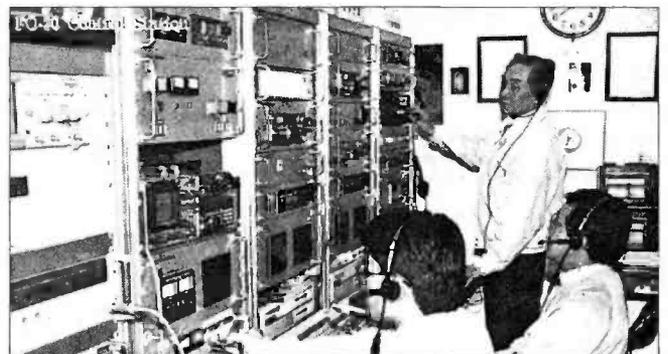
*Editorial reminder: See 'Spreading The Spectrum - Amateur Communications Of The Future?', by Phil Cadman G4JCP published in the April issue of PW.*

## Intermittent And Postponed Satellites

Leo Labutin UA3CR, reports that RS-15, the new amateur satellite expected to be in its 2300km altitude 67° inclination orbit by now, may now have its launch postponed to the end of this year. Well, as the old adage says, 'All good things are worth waiting for!'

The second Japanese 'FUJI' satellite, better known as OSCAR-20, has been intermittent in operation in both of its modes for many months. Now, with the eclipse period diminishing more transponder activity is possible.

In June FO-20 will be in full sunlight. The JARL FUJI Command station, pictured in Fig. 2, has every hope that the battery condition will then permit the simultaneous



**Fig. 2: The Japanese Amateur Radio League's (JARL) FUJI satellite command station**

require no more than 1W (0dBW) to a simple quarter-wave ground plane (2.15dBi). Or for even better results, a simple turnstile antenna should work well.

Because spread spectrum techniques are relatively unknown in amateur radio, NPS intend to make details available.

and continuous operation of both the 'JD' digital and 'JA' analogue transponders.

That's the lot for this look at amateur radio in orbit, see you next time.

**E N D**

Report

144MHz

*This month David Butler G4ASR has news of recent openings via tropo, aurora and Sp-E on the v.h.f. bands. There's also details about Sp-E propagation and how you can use it to make long distance contacts on the 144MHz band. If you're a 50MHz operator you can read about the many Russian expeditions taking place this summer.*

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During the period April 27-28 there was some good tropo conditions to Scandinavia and to the far north of the UK. But other than that, the v.h.f. bands have been generally uninspiring.

The operator at OZ1BUR (JO46) was reported to have worked over 100 G-stations on the 144MHz band during the evening of April 27. Conditions were also good on the 430MHz band and many contacts were being made into DL, ON and PA. Other notables included OZ9FW (JO65) and OZ9IT (JO46).

By the evening of April 28, the north-south path was giving the best results and v.h.f. operators in central England reported 'rock-crushing' signals on the 144MHz band from a number of GM stations including GM4IPK (IO99) and GM0ILB (IP90) up on the Shetland Isles. Over in the rare locator square of IO97 the stations of GM1TDU, GM4NHI and GM7EEY/M were kept busy giving away contacts.

**Auroral Openings**

I've had reports of a number of auroral openings during April. At my QTH I noted events on April 4, 5, 6, 8, 9, 13 and 21. The event on April 4 without doubt being the best of the period.

Reports indicate that the event started around 1600UTC. It continued for some four hours before fading out at 2000UTC.

A second phase commenced at 2200UTC.

This rumbled on through the night with auroral signals still being heard at 0700UTC the next morning

Activity during the main event was quite high with many QSOs being made on the 50MHz and 144MHz bands. Contacts were made all around the UK on the 50MHz band, and a number of operators also reported making contacts with OH3MF, SM3JGG, SM7BAE and SM7FJE.

Up on the 144MHz band, one of the loudest stations to be heard was GM4IPK (IP90) located on the Shetland Isles. He is using a group of four 9-element OZ5HF Yagis to good effect.

Highlight of the event however, was UZ2FWA (K004) who was putting in a tremendous c.w. signal. He was worked by many operators around the UK.

Other stations of note included LA2PHA (JO38), OZ8ZS (JO55), SM4HFI (JP70), and SM7ATL (JO86). There was also OH1AWW (KP10), OH2BNH (KP20), YL2MB (KO27) and the usual crop of DL, ON and PAs.

The event on April 5 was relatively unexciting. If you were prepared to dig deep, a small number of LA and SM stations could be found. Other events during the month were fairly weak and mainly of the 'Scottish' type.

"What luck!" reports **Gavin Stirling GM7LVI** (Edinburgh). Being a student in Aberdeen, Gavin normally misses most auroras but because of the Easter holidays he was fortunate to catch the event on April 4.

After dashing up the road to borrow a Morse key from a friend, he put out a call at 8p.m. and was immediately called by an OZ station. Unfortunately he was sending too fast and Gavin couldn't remember the Q-code for slow down. (It's QRS by the way).

By the time he had found the information (from a local station on f.m.) the OZ had disappeared. After a few CQ calls he got a reply from

GI40WA and his first ever c.w. auroral contact was in the log. Gavin says the bug has now bitten and the c.w. will be improved.

Good luck Gavin with the c.w. Keep it up and then you'll discover how easy it is to work the real DX!

**Sporadic-E**

During the summer months, especially between May to August, the E layer of the ionosphere becomes charged up. Patches or 'clouds' of ionised metals sporadically form (hence the name Sporadic-E) creating a reflecting 'mirror' at a height of approximately 110km.

Signals, sometimes as high in frequency as 220MHz, can be reflected off these clouds to create spectacular openings on the v.h.f. bands. When Sp-E appears on the 50MHz band, it's normal to find one-hop signals on an almost daily basis from stations up to 2000km away. The number of openings on the 144MHz band will be much less, but the skip distance will be generally the same.

On the 144MHz band most openings (but not all) will be to the south-east of the UK. So keep a look out for stations in EA, HG, I, IS, IT, YU and 9H. And, if you're lucky enough you might even hear Seghir 7X2DS (Algiers) who is now active on s.s.b. and c.w. from locator JM16SP.

Conditions on the 144MHz band during the 1992 Sp-E season were not very good. Despite this, there were many auroras to compensate.

Looking back in the log I noted only six openings at my QTH. Contacts were made with Italy on May 30, June 6 (two openings) and June 7.

On June 22 I made 103 s.s.b. contacts in 100 minutes with stations in 9 countries. These included 60 x YU, 17 x I, 12 x OE, 5 x DL, 4 x SP, 2 x HG, LZ, SV and YO.

On the following day c.w. contacts were made into Russia with RA3LW and UC2CBZ. Note the predominance of stations to the south-east. On the 50MHz band you'll hear signals from all over Europe, sometimes all at the same time!

If you're really clued up, you'll be looking for the real DX from other continents such as Africa, Asia, South America and North America. Looking at the log book I noted many Sp-E openings during June and July with stations around Europe.

Contacts were also made with stations in other continents. These included CN, EH9, OD, TA, VE, W, ZC4, 4X4, 5B4 and 9K2. So, don't forget to look out for mixed-mode propagation such as Sp-E extending into the trans-equatorial (t.e.p.) path. Typically, contacts can be expected with stations in Southern Africa and South America.

OK, so now you know what to expect. But when will it happen and what preparations should you make?

Although I'll concentrate on the 144MHz band, it's worth remembering that openings on the 50MHz band are exactly the same. However, they occur about 20 times more frequently and are of longer duration. The general exception to is the mixed-mode propagation path where openings can be quite short maybe 10 minutes or so.

As I've already mentioned, most openings will occur during the summer months of June and July. Statistically the best times to listen on the band will be between 1100-1300UTC and 1700-2000UTC.

**Seconds To Hours**

Openings can last literally from tens of seconds (most likely meteor enhanced though) through to a few

hours. Normally the opening will be 10-20 minutes in duration, giving you sufficient time to point the antennas in the right direction.

I've briefly mentioned already that most of the openings will be to the south-east of the UK. So, if you park your beam on a great-circle heading of 140°, you won't be far out.

However, always be aware that openings can be in totally different directions. The easiest way to sense this and to monitor the rise in maximum usable frequency (m.u.f.), is to listen on the lower frequency bands.

Start on the 28MHz band and note all the stations and beacons you can hear. This will give you a good idea in which direction (or directions) the propagation path lies.

Now move up to the 50MHz and/or 70MHz bands and repeat the exercise. Signals should be heard in the same general direction. While listening on the 28MHz and 50MHz, bands you should make a mental note of the location of the stations being heard.

As the m.u.f. rises towards the 144MHz band, the skip distance on the lower frequencies decreases. So, for example, if you initially hear 50MHz stations in OK, then DL and then PA you know that the m.u.f. is on the way up and it's time to listen on the 144MHz band.

Some people also like to monitor Band II f.m. frequencies and beacons on the 144MHz band. Personally, I think this is a waste of time and you won't go far wrong by monitoring the calling frequency on 144.300MHz.

Apart from directly monitoring the band, you may also find it useful to keep a note of the sun's geomagnetic activity. And keep an eye on the weather maps too.

Some 'experts' claim that a K index of 3 or less is required for the formation of Sp-E. Jet streams, upper ridge patterns and thunderstorms are weather features which, although at a much lower height (10km) than Sp-E (110km), have also been suspected as being a trigger for this mode of propagation.

## A Few Surprises

Normally most contacts will be made on s.s.b. But don't

discount using f.m., as this mode can provide a few surprises.

Not many operators use c.w. during these type of openings. Despite this, it's useful when working stations who can't speak English!

The important thing to

remember though, is that the distant station must understand what you're saying. You must be clear and concise and know what you want to say. Don't use 'fancy' phonetics.

Some operators like to tune around the band and then call any DX station they hear. Personally, I prefer to call CQ and see what comes back.

Even if you run low power I believe the latter method will give you more contacts. Try it and see!

## The 50MHz Band

Now it's time to look at 50MHz in detail. But, apart from the auroras that I've already mentioned, very little in the way of DX was reported on this band during April.

One solitary Sp-E opening on April 27 between 1430 to 1630UTC was all that appears to have occurred. **Terry Chaplin G1UGH** (JO02) reported making five s.s.b. contacts with stations in Malta, a similar number in Italy and S59AM in Slovenia.

**Dave Storrs G8GXP** (I093) worked a handful of Italian stations and was also fortunate to find SV10E. Many other operators also reported working 9A2MP in Croatia.

Now I've got news of some expeditions and other 50MHz activity that will be taking place this summer. Stations to look out for during Sp-E openings include C31HK (Andorra), JW5E (Svalbard), JX3EX (Jan Mayen), HV4NAC (Vatican City), OD5SK (Lebanon), RA3A (Russia).

Others include: UC2AAA (Belarus Republic), UL8GC/RL2B (Kazakhstan), and UWOST (Asiatic Russia). There's also 7X2KT (Algeria), 9K2USA, 9K2WR and 9K2ZR (Kuwait).

In addition to the fixed stations which I've just mentioned, there will also

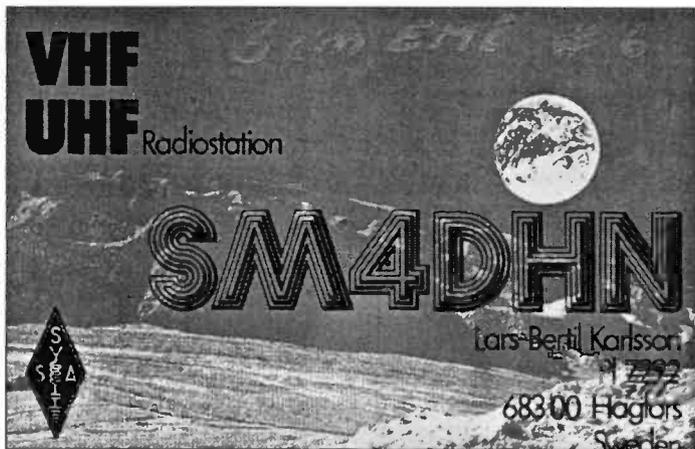


Fig. 1: A QSL card from Swedish station SM4DHN, who has been taking part with the e.m.e. tests in conjunction with G3WDG and G4ZKCG.

be a number of expeditions. Larry Khavronin UC2AAA will operate from the south-east corner of Belarus (K051) during early June using the call signs EW8/UC2AA (correct call sign!), UV8/UC2AAA and EV80.

Last month, I gave details of the proposed activity by DL5BAC and DL9YE from the Belarus Republic. This expedition is now scheduled to run between June 20 and July 3 on both the 50MHz and 144MHz bands.

It has been rumoured that the Ukrainian club station UT4UXU has applied for a 50MHz permit. They may possibly be QRV soon.

Finally, there's news from **Derrick Dance GM4CXP** who mentions that he has 'signed up' for a Lithuanian expedition LY93BDX between July 24 to August 4. Further news of this multi-band activity next month.

## Moonbounce

You'll recall the original 10GHz moonbounce e.m.e. tests (see May issue of *PW*) carried out by Charlie G3WDG and Petra Suckling G4KGC. Well, they've been at it again and a number of improvements have been made to the system.

Elevation and azimuth read-outs have been fitted to the 3 metre diameter dish. The antenna can now be controlled from the comfort of the shack.

A new low-noise amplifier, a waveguide version of the WDG004 preamplifier, has been fitted reducing the overall receiver noise figure to 0.85dB. Tests were carried out on April 2/3 when the moon was at perigee.

By the way, 'perigee' means the closest point a body orbiting the earth comes to the earth. The opposite of this is apogee

which is the most distant point from the Earth from a body orbiting the earth.

Signals are theoretically 2dB stronger when the moon is at perigee compared to apogee. That's not the full story of course, and the best e.m.e.

conditions are when full moon, night-time, perigee and a high northerly declination all coincide. Incidentally this won't happen until 1999/2000!

Charlie G3WDG reports that his own echoes (running 22W output) were much stronger at perigee. Charlie calculates that they should have been audible with only 10W output.

Following a brief c.w. QSO with SM4DHN on April 2, a long test was set up with WA7CJO (Arizona) on April 3. It was arranged that he would transmit at power levels of 300W, 100W, 50W, 25W and 10W.

During the tests, at the QTH of G3WDG/G4KGC signals could be copied down to the 25W level. The American station was barely detectable at 10W, nearly 15dB down on the 300W level. This means that it should be possible to copy WA7CJO on a 1.2M dish antenna.

**Well, that's the lot for this month. Don't forget that photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates etc. are also required. They will all be returned to you. Please send your news to me at: 'Yew Tree Cottage', Lower Maescoed, Herefordshire, HR2 0HP or via packet radio @ GB7MAD (the new BBS at Madley Satellite Earth Station) or via the DX Cluster system.**

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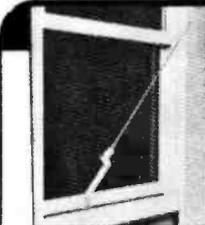
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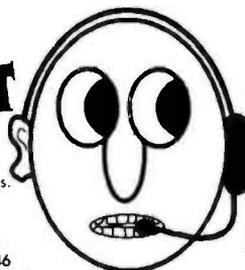
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# PACKET

*This month Roger Cooke G3LDI, looks at two new books before bringing you the latest news of another packet group.*

Two very good, tutorial style books about packet have been published recently. The first of these books is *NOSINTRO TCP/IP Over Packet Radio, An introduction to the KA9Q Network Operating System* by Ian Wade, G3NRW.

To the average packet user, TCP/IP has always been shrouded in mystique. Admittedly, it's a professional networking tool, and most amateurs have been dissuaded from trying it due to the lack of instructional information.

Look no further than this hands-on operational book. For the beginner, Ian describes all terms and operation. There's not one page of solid text in the book, as these can be quite discouraging to the newcomer!

Two chapters deal with the principles of NOS, including TNC parameters, clients and servers. Then there's a full hardware checkout of your own system. The third chapter, is installation of the software and then learning before going on-air.

## Jargon Explained

Jargon, such as FTP and POP, PING and HOP, are all explained in full. Once you're familiar with the system, Ian explains how to set up your own files and put the system on the air.

The book has 40 pages of appendices, containing valuable reference material. Ian's advice is to speed-read first, then take a more leisurely read, possibly making notes along the way.

The software is available from Ian. But **PLEASE** include a formatted 3.5 inch HD disk with return mailer **PLUS** return postage. This book providing information about a growing networking protocol, is available from the *PW* Book Service, at £11.50 plus £1 p+p UK (£17.50 p+p overseas).

The second book is *Basic Packet Radio* by Joe Kasser G3ZCZ/W3, (Joe is shown in Fig. 1). Printed and



**Fig. 1: Joe Kasser G3ZCZ/W3 with Jim Stone 4X1RU, and myself centre, seen at the last year's Amsat Colloquium at the University of Surrey.**

published in the USA, the book is now available from the *PW* Book Service, at £19.95 plus £1 p+p UK (£17.75 p+p overseas).

The book is practical and leans heavily toward Lan-Link written, of course, by Joe. There are some 150 pages devoted to the set-up and operation of Lan-Link.

The first few chapters describe how to get started, and to get the best from a BBS, and international mail. However, I feel that the F6FBB server could have been given more space. This software is rapidly gaining popularity and the servers are not used to their fullest extent.

Joe discusses DX-Clusters, some of the more commonly used servers, such as REQDIR and REQFIL. There is an area devoted to Elmer, a Smart-server supplied with Lan-Link. This is an interactive program, in which responses from the program allow the user to obtain information almost as if talking to the sysop.

Both books are a very valuable addition to

anyone's book shelf and I am very pleased to add them to mine.

## Kent Packet Group

The Kent and Essex Packet group (KEPAC) is the latest to be featured here. And it's thanks to Stan G4EGH @ GB7ICE for the information.

The initial aim of the group is to set up four nodes, at present two are in service. The node alias's represent KEPAC, N, S, E, or W.

The first node to go into service, was KEPS22 located near Wrotham in Kent, KEPE22 is located at Minster, on the Isle of Sheppey. Node KEPN22 is planned and awaiting equipment, and will be located in South Essex, some 100m above sea level. The other node, KEPW22, will be at Barnehurst, about 8km west of the south end of the Dartford tunnel.

The group is young, with the usual problem of funds. But there's no lack of enthusiasm, judging by the

progress so far...!

When the group has been formally adopted, the members will be consulted for requirements, in order to plan for the future. For the moment however, the efforts are being concentrated into supplying user links, as distinct from BBS mail forwarding routes.

The group is currently run by a 'caretaker committee'. This consists of Jim G6FCL, and the secretary is Kurt G7NCV.

## Unusual System

I've also had news of an unusual system that relies upon the 'Bratrush Six' transceiver. These transceivers run just 0.5W a.m. on the 50MHz band, and employ a super-regenerative receiver.

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**Well, that's it for another month. Keep the news coming, it really is appreciated. Contact G3LDI @ GB7LDI - QTHR - or (0508) 70278.**

**73 and Happy Packeting!**



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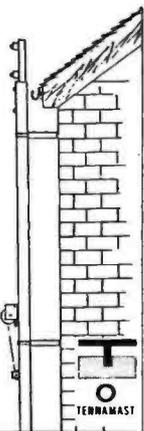
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73 from Dave G4KQH, Technical Manager.

Round-up

## BROADCAST

Peter Shore reports on the month's broadcasting on the short wave bands.

What benefits accrue to countries which spend the equivalent of millions of pounds on a broadcasting service which goes overseas? It's a question taxing several governments at the moment, notably those in Stockholm and London.

Radio Sweden faces a cut of up to one third of its operating budget of around 45 000 000 Swedish kroner (£4.5 million) which could severely curtail its output, including the ending of some of its language services such as French and Spanish. The station's English service has a reasonably faithful following, particularly to its weekly *Mediascan* programme, hosted by George Wood.

But does this following think highly of Sweden as a result of listening to the station, and can it influence opinion makers? The point is debatable, for while it is pleasant for listeners like you and I to tune in to find out what is happening in Sweden, I doubt whether Warren Christopher, US Secretary of State, or Douglas Hurd, the British Foreign Secretary, ever tune in.

So why should the Swedish government continue to support an English service, or any other service? There may be a case for retaining Swedish for Swedes abroad, and the Estonian and Latvian services, however, and these are unlikely to close.

Another station which can count listeners amongst cabinet ministers and prime ministers the world over is our own BBC World Service. Its budget, from the Foreign Office, is around £170 million.

### World Service Funding

World Service funding for the three years from 1994 to 1997 is currently being discussed. And, as part of

overall savings to be made by all government departments, the Foreign Office wants to lop somewhere between £8 million and £13 million from the World Service's annual budget.

Members of Parliament are protesting against the proposals and an unprecedented number - more than 260 - signed an Early Day Motion at the end of April. This action gained quite significant coverage in the British press, including some very supportive leaders.

As a result of one leader in the London *Evening Standard*, a Foreign Office Minister was moved to respond. The Minister stated that the World Service's budget has increased significantly in the past few years and that efficiency has improved so much that cuts of the order suggested would not make a great impact. Time will tell whether this is the case!

Radio Vilnius in Lithuania continues to have problems affording Russian transmitter hire as the price keeps going up! The station has now cut back considerably and mostly uses its own low-powered short wave transmitter which radiates just 50kW.

The current schedule of Radio Vilnius is: 1900-1930 in English on 9.71; 2100-2130 in Lithuanian on 9.71; 2130-2200 in English, also on 9.71; 2300-2330 in English, Monday to Friday only, on 11.75 MHz and 2330-0000 on Saturday and Sunday in Lithuanian on 11.75 MHz.

But it is not all doom and gloom this month, for there's news of a new English language service from the overseas service of Tajik Radio in the former Soviet Republic of Tajikistan. Radio Tajikistan already operated an overseas service in the Dari and Persian languages, and added English at the beginning of May.

The station announced that English would be heard at 2145 local time (1745 GMT), presumably on the

existing external service frequencies of 4.635 and 7.245 MHz. If you hear this station, please drop a line to me at the *PW* Editorial Offices.

### Radio Australia

Radio Australia's summer schedule has suggestions for listeners in Europe including 0730-0900 GMT on 21.595 MHz; 0900-1300 on 21.725; 0730-0830 on 15.24; 1430-1800 on 9.56 and 13.755 and 1800-2300 on 5.88 and 7.26 MHz.

Correspondent **Laurence Mason in Hassocks, West Sussex** reports good reception on the 13MHz frequency during the afternoon throughout the winter months. Perhaps this will continue during summer in the northern hemisphere.

Radio New Zealand has introduced a new frequency for the Pacific, using its new antenna array which can work on frequencies as low as 6MHz. The station now uses 6.035MHz between 1650 and 2130 GMT.

Bulgaria may soon be using two out-of-band frequencies following tests in April. Keep an ear on 15.675 and 15.72MHz during the European daytime for a signal from one of the 50kW transmitters the station owns.

Radio Korea is now being heard more clearly in Europe as a result of the introduction of relays from the BBC's Skelton transmitting station near Penrith in Cumbria. The programmes are fed from Seoul by satellite and then relayed on 6.035MHz between 2030 and 2230 GMT, with English heard daily at 2030, followed by French and then German.

English to Europe from Korea is also heard at 0800 on 7.55 and 13.67MHz, direct from Asia. Radio Korea is also relayed by Radio Canada to North America from the Sackville transmitting station.

### Changed Frequency

The World Service of the Christian Science Monitor changed some frequencies at the beginning of May. European transmissions are now heard at 0600-0800 on 9.87 and 9.84MHz; 0800-1000 on 11.705; 1400-1600 on 15.665; 1800-2000 on 17.51 and 15.665; 2000-2200 on 15.665 and 17.51 and 2200-0000 on 15.665MHz.

Radio Portugal, report that they have changed frequencies. The new frequencies are: Europe 9.870MHz at 1800UTC, Middle East 21.515MHz at 1430UTC, and Africa on 17.900MHz at 1900UTC. Services to the Americas are as previously announced.

A while ago I mentioned that basic equipment could often work very well for international reception, a view heartily endorsed by Laurence Mason. Laurence wrote to say that he has listened on less expensive domestic equipment for the last 40 years.

Laurence spent 20 years repairing the Soviet-made Astrad and Vega radios as a profitable hobby. He still has quite a collection of old sets and unused spare parts, together with circuit diagrams and p.c.b. plans. Laurence says that anyone seriously interested in these sets would be welcome to anything he has, as he is no longer able to undertake repair work. If you are interested, contact Laurence on (0273) 844414.

**And that wraps up this month's tour of the broadcast bands. If you have any comments or suggestions, please drop me a line at the *PW* offices and let me know. Until next time, good listening.**

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:

Practical Wireless,  
PW Publishing Ltd., Arrowsmith Court,  
Station Approach,  
Broadstone, Dorset BH18 8PW.

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.

## PW PCB Service

Enquiries, orders and remittances should be sent to:

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

envelope *PW* PCB Service. Cheques should be crossed and made payable to **Badger Boards**. When ordering please state the article title as well as the board number. Please print your name and address clearly in block capitals and do not enclose any other correspondence with your order.

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
WR314	UHF Pre-Amplifier	Dec 92
WR313	10MHz Transmitter	Nov 92
WR312	Receive/Mixer (Getting Started)	Nov 92
WR311	Oscillator BFO (Getting Started)	Sept 92
WR310	1.2GHz Pre-scaler	Aug 92
WR309	Volt Reg/Divide by 100	Aug 92
WR308	TTL 1MHz Oscillator (Getting Started)	July 92
WR307	Crystal Checker (Getting Started)	June 92
SET	WR303/304/305/306	Apr 92
	Inductance Bridge	
WR302	GDO (Getting Started)	Apr 92
WR301	Challenger Receiver	Feb 92
WR300a	OSCAMP Oscillator	Mar 92
WR300	OSCAMP Amplifier	Feb 92
WR299	Multivibrator (Getting Started)	Jan 92
WR297/298	Additional Beaver boards	
SET	WR295/296 PW Beaver	Oct 91
SET	WR292/293/294 Chatterbox	Aug 91
SET	WR290/291 Robin Freq. Counter	Aug 91
SET	WR292/293/294 Chatterbox	Aug 91
WR289	Meon-4 (Control)	Jul 91
WR288	Morse Master	Jun 91
WR286	Meon-4 (RF PA)	Jun 91
WR287	Morse (Speedbrush)	May 91
WR255	Meon-4	May 91
WR285	Scope Probe PSU	Apr 91
WR284	Scope Probe	Apr 91
WR283	Sudden Receiver	Mar 91
WR282	Repeater Toneburst	Feb 91
WR281	High Voltage PSU	Jan 91
SET	WR263/264 +WR276-80	Jul 90
	Marland Transmitter	Sep 90
WR272	NiCad Recycler	Jun 90
WR275	Low Voltage Alarm	Jun 90
WR273	Valve PSU	May 90
WR274	RX Attenuator	May 90
WR271	Product Detector	Apr 90
WR270	Badger Cub	Apr 90
WR269	Glynme	Feb 90
WR268	Irwell (RF PA)	Feb 90
WR264	Irwell (Relay)	Feb 90
WR263	Irwell (VFO)	Jan 90
WR267	PW 49'er	Jan 90
WR266	Tuned Active Antenna	Jan 90
WR265	Tuned Active Antenna (PSU)	Jan 90
WR199	Meon 50MHz Transverter	Oct 85
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CALL BADGER BOARDS ON 021-353 9326 FOR UP-TO-DATE PRICES

Please use the order form on page 65 for all items in the *PW* arcade.



# BOOKS

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Some titles are overseas in origin.

## HOW TO ORDER. PLEASE USE THE ORDER FORM ON PAGE 65.

**POST AND PACKING;** add £1.00 for one book, £2.00 for two or more books, orders over £40 post and packing free, (overseas readers add £1.75 for one book, £3.50 for two or more for surface mail postage) and send a postal order, cheque or international money with your order to **PW Publishing Ltd, FREEPOST, Arrowsmith Court, Broadstone, Dorset BH18 8PW.** Please make your cheques payable to PW Publishing Ltd. Payment by Access, Mastercard, Eurocard or Visa also accepted on telephone orders to Poole (0202) 659930. Books are normally despatched by return of post but please allow 28 days for delivery. Prices correct at time of going to press. Please note: all payments must be made in Sterling.

## LISTENING GUIDES

### AIR BAND RADIO HANDBOOK (4th Edition)

David J. Smith  
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

### AIR TRAFFIC RADIO 8th Edition

Compiled by Ken Davies  
Completely revised (early 1992) to make this a comprehensive guide to UK airband communications. Frequencies and abbreviations used in UK air traffic control. Where to listen for tower, ground and radar control in civilian and other airports. Includes a section on off-shore oil related use. 72 pages. £4.50

### VHF/UHF SCANNING FREQUENCY GUIDE (THE)

This book gives details of frequencies from 26MHz to 12GHz with no gaps and who uses what. Completely revised and enlarged (February 1993), there are chapters on equipment requirements as well as antennas, the aeronautical bands, as well as the legal aspect of listening using a scanner. 156 pages. £9.95

### DIAL SEARCH 1992/94

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

### GUIDE TO FACSIMILE STATIONS

12th Edition  
Joerg Klingenfuss  
This manual is the basic reference book for everyone interested in FAX. Frequency, callsign, station name, ITU country/geographical symbol, technical parameters of the emission are all listed. All frequencies have been measured to the nearest 100Hz. Included are 300 sample charts and their interpretation. 416 pages. £18.00

### GUIDE TO UTILITY STATIONS 11th Edition

Joerg Klingenfuss  
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

meteo schedules. There are 11800 changes since the 10th edition. 534 pages. £24.00

### HF OCEANIC AIRBAND COMMUNICATIONS 4th Edition

Bill Laver  
HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies. 31 pages. £3.95

### INTERNATIONAL RADIO STATIONS GUIDE BP255

Peter Shore  
As in 'Broadcast Roundup', his column in PW, Peter Shore has laid this book out in world areas, providing the listener with a reference work designed to guide around the ever-more complex radio bands. There are sections covering English language transmissions, programmes for DXers and s.w.l.s. Along with sections on European medium wave and UK f.m. stations. 266 pages. £5.95

### INTERNATIONAL VHF FM GUIDE (THE)

7th Edition.  
Julian Baldwin G3UHK & Kris Partridge G8AUU  
This book gives concise details of repeaters & beacons world-wide plus coverage maps & further information on UK repeaters. 70 pages. £2.85

### MARINE UK RADIO FREQUENCY GUIDE

Bill Laver  
A complete guide (reprinted January 1993) to the UK s.w. and v.h.f. marine radio networks. Useful information, frequency listings and the World Marine Coastal Phone Stations. 62 pages. £4.95

### NEWNES SHORT WAVE LISTENING HANDBOOK

Joe Pritchard G1UQW  
A technical guide for all short wave listeners. Covers construction and use of sets for the s.w.l. who wants to explore the bands up to 30MHz. Also covers the technical side of the hobby from simple electrical principles all the way to simple receivers 276 pages. £15.95

### POCKET GUIDE TO RTTY AND FAX STATIONS (THE)

Bill Laver  
A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in ascending frequency order, from 1.6 to 26.8MHz. 57 pages. £3.95

### RADIO LISTENERS GUIDE 1993

Clive Woodyear  
This is the third edition of this radio listener's guide. Simple-to-use maps and charts show the frequencies for radio stations in the UK. Organised so that the various station types are listed separately, the maps are useful for the travelling listener. Articles included in the guide discuss v.h.f. aeriels, RDS, the Radio Authority and developments from Blaupunkt. 56 pages. £2.95

### SHORT WAVE INTERNATIONAL FREQUENCY HANDBOOK

Formerly the Confidential Frequency List and re-published in April 93, this book covers 500kHz-30MHz. It contains duplex and channel lists, callsigns, times and modes, broadcast listing and times. 192 pages. £9.95

### SOUNDS EASY The complete guide to Britain's radio stations

Compiled by Ken Davies  
A guide to the numerous local radio stations throughout the UK. If you do a lot of travelling this book is invaluable. Itemised by areas, it makes finding your kind of sounds easy. 52 pages. £2.95

### VHF/UHF AIRBAND FREQUENCY GUIDE 4th Edition

A complete guide to civil & military airband frequencies including how to receive the signals, the frequencies and services. VOLMET, receiver requirements, aeriels and much more about the interesting subject of airband radio are included. 123 pages. £6.95

### WORLD RADIO TV HANDBOOK 1993

Country-by-country listing of l.w., m.w. & s.w. broadcast and TV stations. Receiver test reports, English language broadcasts. The s.w.l.s 'bible'. £15.95

## ANTENNAS (AERIALS)

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### ANTENNA EXPERIMENTER'S GUIDE (THE)

Peter Dodd G3LDO  
Although written for radio amateurs, this book will be of interest to anyone who enjoys experimenting with antennas. You only need a very basic knowledge of radio & electronics to get the most from this book. Chapters include details on measuring resonance, impedance, field strength and performance, mats and materials and experimental antennas. 200 pages. £8.90

### ANTENNA IMPEDANCE MATCHING

Wilfred N. Caron  
Proper impedance matching of an antenna to a transmission line is of concern to antenna engineers and to every radio amateur. A properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input. There is no mystique involved in designing even the most complex multi-element networks for broadband coverage. 195 pages. £11.95

### ARRL ANTENNA BOOK (THE)

16th Edition  
A station is only as effective as its antenna system. This book covers propagation, practical constructional details of almost every type of antenna, test equipment and formulas and programs for beam heading calculations. 789 pages. £14.50

### ARRL ANTENNA COMPENDIUM (THE) Volume One

Fascinating and hitherto unpublished material. Among the topics discussed are quads and loops, log periodic arrays, beam and multi-band antennas, verticals and reduced size antennas. 175 pages. £9.50

### ARRL ANTENNA COMPENDIUM (THE) Volume Two

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 COMPENDIUM (THE) Volume Three

Edited by Jerry Hall K1TD  
As the title suggests, this book is the third in the continuing series on practical antennas, theory and accessories produced by the ARRL. The book reflects the tremendous interest and activity in antenna work, and provides a further selection of antennas and related projects you can build. 236 pages. £9.50

### BEAM ANTENNA HANDBOOK

W. I. Orr W6SAI & S. D. Cowan W2LX  
Design, construction, adjustment and installation of h.f. beam antennas. The information this book contains has been compiled from the data obtained in experiments conducted by the authors, and from information provided by scientists and engineers working on commercial and military antenna ranges. 268 pages. £7.50

### G-QRP CLUB ANTENNA HANDBOOK (THE)

Compiled and edited by P. Linsley G3POL & T. Nicholson KASWRI/GWOLNO  
This book is a collection of antenna and related circuits taken from *Sprat*, the G-QRP Club's journal. Although most of the circuits are aimed at the low-power fraternity, many of the interesting projects are also useful for general use. Not intended as a text book, but offers practical and proven circuits. 155 pages. £5.00

### HF ANTENNA COLLECTION (RSGB)

Edited by Erwin David G4LOI  
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.

### INTRODUCTION TO ANTENNA THEORY (AN) BP198

H. C. Wright  
This book deals with the basic concepts relevant to receiving and transmitting antennas, with emphasis on the mechanics and minimal use of mathematics. Lots of diagrams help with the understanding of the subjects dealt with. Chapters include information on efficiency, impedance, parasitic elements and a variety of different antennas. 86 pages. £2.95

### NOVICE ANTENNA NOTEBOOK

Doug DeMaw W1FB  
Another book from the pen of W1FB, this time offering "new ideas for beginning hams". All the drawings are large and clear and each chapter ends with a glossary of terms. It is written in plain language and you don't need to be a mathematician to build and erect the support structures that are presented in this book. 124 pages. £6.95

### PRACTICAL ANTENNA HANDBOOK

Joseph J. Carr  
As the name suggests, this book offers a practical guide at everything to do with antennas, from h.f. to microwaves. It also has sections on propagation, transmission lines,

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Dr James. L. Lawson W2PV  
This book is a polished and expanded version of a series of articles first published in *Ham Radio* following on 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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# E R V I C E

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**Mark Francis**  
Updates for the Novice Licence. Designed to make you proficient in Morse code in the shortest possible time, this book points out many of the pitfalls that beset the student. 84 pages. £4.95

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### NEWNES GUIDE TO SATELLITE TV

**Oerek Stephenson**  
This book, the 2nd edition, is a hard bound volume, printed on high quality paper. The author is a satellite repair and installation engineer and the book covers all information needed by the installation engineer, the hobbyist and the service engineer to understand the theoretical and practical aspects of satellite reception with dish installation and how to trouble-shoot when picture quality is not up to anticipated reception. Mathematics has been kept to a minimum. 284 pages. £17.95

### SATELLITE BOOK (THE) - 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 (THE) 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 about how 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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**John Breeds**  
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### WEATHER SATELLITE HANDBOOK 4th edition

**Dr Ralph E. Taggart WB8QQT**  
This book explains all about weather satellites, how they work and how you can receive and decode their signals to provide the fascinating pictures of the world's weather. Plenty of circuit diagrams and satellite predicting programs. 192 pages. £14.50

## AMATEUR RADIO

### ALL ABOUT VHF AMATEUR RADIO

**W. I. Orr W6SAI**  
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.

### AMATEUR RADIO CALL BOOK (RSGB) 1993 Edition

Over 60000 callsigns are listed including EI stations. Now incorporates a 122-page section of useful information for amateur radio enthusiasts and a new novice callsign section. 444 pages. £9.50

### ARRL HANDBOOK FOR RADIO AMATEURS (THE) 1993

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 (THE)

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)

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

### ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL (THE) Various Authors

A truly excellent manual for the keen microwave enthusiast and for the budding 'microwaver'. With contributions from over 20 specialist authors. Chapters covering techniques, theory, projects, methods and mathematics. 446 pages. £14.50

### COMPLETE DX'ER (THE) CD

**Bob Locher**  
This book covers equipment and operating techniques for the DX chaser, from beginner to advanced. Every significant aspect of DXing is covered, from learning how to really listen, how to snatch the rare ones out of the pile-ups and how to secure that elusive QSL card. 204 pages. £7.95

### HINTS AND KINKS FOR THE RADIO AMATEUR

Edited by **Charles L. Hutchinson and David Newkirk**  
A collection of practical ideas gleaned from the pages of QST magazine. Plenty of projects to build, hints and tips on interference, c.w. and operating and snippets of information from amateurs who've tried and tested the idea. 129 pages. £4.95

### HOW TO PASS THE RADIO AMATEURS' EXAMINATION (RSGB)

**Clive Smith G4FZH and George Benbow G3HB**  
The background to multiple choice exams and how to study for them with sample RAE paper for practice plus maths revision and how to study for the exam. The majority of this book is given to sample examination papers so that candidates can familiarise themselves with the examination and assess their ability. 88 pages. £6.70.

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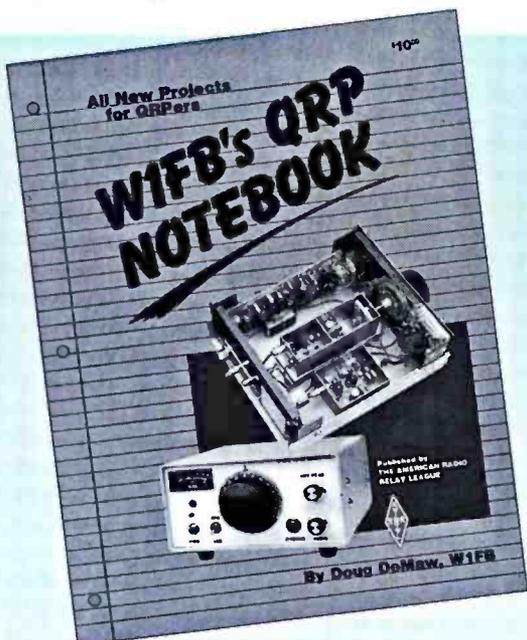
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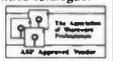
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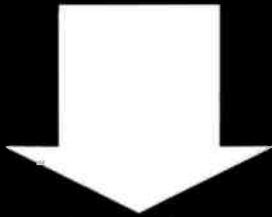
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## ADVERTISERS INDEX

AERIAL TECHNIQUES .....58  
A. H. SUPPLIES.....56  
AMATEUR RADIO COMMS.....43  
AOR (UK) .....50  
BIRKETT .....24  
CIRKIT.....50  
COLOMOR.....58  
DATONG .....37  
DEWSBURY ELECTRONICS .....37  
EASTERN COMMUNICATIONS .....67  
GROSVENOR SOFTWARE .....58  
HAYDON COMMUNICATIONS .....29  
HEATHERLITE MICROPHONES .....56  
HOLDINGS AMATEUR ELECTRONICS67

HOWES, C.M.....58  
ICOM (UK).....COVER III, 8  
J & P ELECTRONICS .....50  
KANGA PRODUCTS.....50  
KENWOOD .....3  
KEY SOLAR SYSTEMS .....56  
LANGREX SUPPLIES .....43  
LEE ELECTRONICS.....2  
LOWE ELECTRONICS .....6 & 7  
MAPLIN.....COVER IV  
MARTIN LYNCH .....14,15  
NEVADA .....18,19  
PHOTO ACOUSTICS .....27  
QUARTSLAB.....42

RAS NOTTINGHAM .....58  
REG WARD .....24  
REMOTE IMAGING GROUP .....56  
R.F. ENGINEERING .....56  
RSGB .....56  
SISKIN ELECTRONICS .....43  
SMC.....COVER II  
SOUTH ESSEX COMMS .....42  
SPECIALIST ANTENNA SYSTEMS.....29  
SRP TRADING.....37  
SUREDATA .....24  
TENNAMAST .....58  
WALFORD ELECTRONICS .....24  
WATERS & STANTON.....4,5

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