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practical
Wireless

JANUARY 1994 £1.90

HOMEBREW SPECIAL

New Hands Electronics
TCV/7 Kit Transceiver
Built And Tested by G3RJV

Plus - Kits & Bits And Lots More!

The Kenwood TS-850S

Plus

The New Ten-Tec Scout 555 Transceiver
If Kenwood's TS-50S wasn't the world's smallest H.F. transceiver, it would still be a mighty impressive piece of equipment.

Its maximum output of 100W, combined with 100 memory channels, gives its operators a versatility that other, bulkier H.F. transceivers struggle to match.

The multi-function microphone, menu system and user-friendly "fuzzy logic" Direct Digital Synthesiser makes it simple to operate on the move. And a host of features, from Advanced Intercept Point to switchable AGC circuit, means that although the TS-50S is small, its performance is a big talking point.

Your local Kenwood specialist dealer has the full technical story. So all that remains to add is the price: around £1000.

After all, the Kenwood TS-50S may be the world's smallest H.F. transceiver. But you don't need the world's biggest bank account to own one.
JANUARY 1994 (ON SALE DECEMBER 9)
VOL. 70 NO. 1
ISSUE 1042
NEXT ISSUE (FEBRUARY)
ON SALE JANUARY 13

9 Guest Keylines
Rob Mannion G3XPD steps down from the Keylines chair to make way for guest contributor Donna Vincent.

14 Novice Natter
Elaine Richards G4LFM dedicates her column to all Novice licensees - past, present & future.

20 Review - The Kenwood TS-850S HF Transceiver
Ed Taylor G3SOX takes a look at the well established Kenwood TS-850S.

24 Review - The Ten-Tec Scout 555 HF Transceiver
Peter Barville G3XJS tries out the newly-introduced Ten-Tec Scout 555 1.8 - 28MHz transceiver.

26 Kits And Bits
Tex Swann G1TEX explains where you can find those kits and building blocks for projects.

28 Review - The Hands Electronics TCV/7 CW Transceiver Kit
The Rev. George Dobbs G5RJV encourages you to have a go by trying out a transceiver kit from Hands Electronics.

30 Back To The Drawing Pin Board
Steve Ortmayer G4RAW has come up with a simple 7MHz receiver using his practical drawing-pin board method.

32 Communications In The Red Zone
Adrian Knott G8KSH explains his rather novel approach to amateur communications using electromagnetic waves in the infra red zone.

39 Review - The Howes Communications ASL5 Audio Filter Kit
Tex Swann G1TEX has been busy building an interesting filter kit from the C.M. Howes Communications range.

40 Static Control And The Constructor
Steve Best G6E1L looks at the causes and problems caused by static charges and provides tips on how to minimise the problems in your workshop.

41 Specifications - The Mysteries Explained
Ian Pooie CSYWX unravels the mysteries of equipment specifications. He starts his series of articles by dealing with receiver selectivity.

42 Book Review
PW reviews The ARRL Handbook For Radio Amateurs 1994 Fresh In from 'Stateside.

60 Special Offer
The Marine UK Radio Frequency Guide on offer at a very special price.

Other Regular Features
68 Advert Index
50 Antenna workshop
50 Arcade, All PW Services under one roof
61 Bargain Basement
56 Broadcast Round Up
45 Bits & Bytes - The Computer In Your Shack
16 Club News
14 HF Bands
12 News '94
11 Packet Panorama
42 Radio Diary
10 Receiving You
53 Satellite Scene
46 Valve & Vintage
58 VHF Report

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<td>Yaesu Bell type Twist and switch control</td>
<td>£109.00</td>
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<td>G-400C</td>
<td>Yaesu Bell type Round meter 360 degrees</td>
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<td>RCS-1</td>
<td>Yaesu Bell type Round meter 360 deg.</td>
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<td>Yaesu Bell type Round meter 360 deg.</td>
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<td>G-200C</td>
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<td>Yaesu Bell type Round meter 360 deg.</td>
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<td>Yaesu Bell type Round meter 360 deg.</td>
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<td>Yaesu Bell type Round meter 450 deg.</td>
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<td>G-500A</td>
<td>Yaesu Elevation Meter 0/-90 degrees</td>
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<td>GS-065</td>
<td>Rotary Bearing Takes 2' mast</td>
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<td>Lower Mast Clamp for G-400, 600, 800</td>
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<td>CK46</td>
<td>Rotary Bearing 1.5 - 2.5' mast</td>
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<td>MG1</td>
<td>Lower Mast Clamp for RC5 series</td>
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<td>1.6-150MHz</td>
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<td>CN101LN</td>
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<td>CS201</td>
<td>Coaxial switch 2 way</td>
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<td>PS120MIA</td>
<td>PSU 3-15V Variable 9/12A</td>
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<td>PSU 1-15V Variable 32A/40A</td>
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<td>LA2080H</td>
<td>2m 1.5-5W in 30-80W out</td>
<td>£159.95</td>
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<tr>
<td>DL2A80H</td>
<td>2m/70cm 0.5-25W Input auto select 80W 2m 60W 70cm out</td>
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**Practical Wireless, January 1993**
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- RF sensing
- 1.6W input
- Ideal for FM

2 metres 30 Watts on the move. It's factory fresh from the importers! The P335 is the latest in a series of high-performance mobile amplifiers from ALINCO. Ideal for DX work and ideal for those who don't have all the frills and the expense. Get the best for your money.
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- 100W HF All Mode Transceiver<br>- £1899.00 D

**TH-26E**

- 100W HF All Mode Transceiver<br>- £1899.00 D

**TH-28E**

- 100W HF All Mode Transceiver<br>- £1899.00 D

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- 100W HF All Mode Transceiver<br>- £1899.00 D

**TM-531E**

- 100W HF All Mode Transceiver<br>- £1899.00 D

**TM-441E**

- 100W HF All Mode Transceiver<br>- £1899.00 D

**TR-751E**

- 100W HF All Mode Transceiver<br>- £1899.00 D

**TS-690S**

- 100W HF All Mode Transceiver<br>- £1899.00 D

**TS-450S**

- 100W HF All Mode Transceiver<br>- £1899.00 D

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- 100W HF All Mode Transceiver<br>- £1899.00 D

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- 100W HF All Mode Transceiver<br>- £1899.00 D

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- 100W HF All Mode Transceiver<br>- £1899.00 D

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- 100W HF All Mode Transceiver<br>- £1899.00 D

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**Practical Wireless, January 1994**
Guest Keylines - Donna Vincent News 
& Production Editor

PW

As promised in the December 1993 'Keylines' Rob Mannion G3XFD has stepped aside from writing this column for this month and next. This month it is my turn to 'Guest' in the Keylines chair.

Firstly, let me introduce myself. I am Donna (Toad) Vincent, News & Production Editor for PW. This means that as well as looking after the News and Production on the magazine, I have the task of keeping both Rob G3XFD and Tex GITEX in line, which is the hardest part of my job!

Many of you, who I've had the pleasure of meeting or talking to over the telephone have asked why I have the nickname of 'Toad'. The nickname came about because of Rob's eating habits. As a lot of you know Rob is a little on the large side with a rather healthy appetite and at one time in the editorial office we had a tuck shop run by Elaine Richards G4LFM. One day Rob, who was supposed to be on a diet, asked me to go and buy him a bar of chocolate. Now Elaine knew that Rob was meant to be dieting and after watching me deliver the chocolate to him, promptly threatened to tell his wife! It was at this point that Rob turned to me and said "You're a real Toad, fancy telling Elaine it was for me", and that was it, the name stuck and has been with me ever since, along with the various Toad items which include a mug with a resident toad. So that's the story of my 'Toad' nickname, it's not because I have webbed feet!

Another editorial mystery that I've been asked to explain is why Rob takes forever to answer the letters that arrive at the PW offices. The reason for the delay in letter answering is that Rob tends to know a lot of people, places and train stations and if you fall into any of these categories your letter is likely to be on the personal reply pile of letters. This means that not only will you get an answer to your query but a chatty letter with Rob explaining any connections he has with you or your area! Of course we do try to reply to letters as soon as possible but the sheer volume of mail we receive, added to the fact that we are trying to stick to our publishing schedules, all adds to the backlog. So please bear with us.

Finally I would like to on behalf of the PW team wish you all a Merry Christmas and a Happy New Year and who knows, as I am currently studying for my RAE maybe I'll work some of you on the air in years to come.

Next month PW's Technical Projects Sub-Editor, Tex Swann GITEX takes over the Keylines chair.

Our Donna

COMPETITION CORNER
Spot The Difference

Mark the ten differences between the two cartoons, showing Donna 'Toad' Vincent in our Editorial Office in Broadstone, as visualised by our 'tame' cartoonist John Worthington GW3COI.

FIRST PRIZE: 1 YEAR SUBSCRIPTION OR £20 BOOK SERVICE VOUCHER.
SECOND PRIZE: 6 MONTH SUBSCRIPTION OR £10 VOUCHER.

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Name..........................................................
Address.....................................................
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Send your entry (photocopies acceptable with corner flash ) to: Competition Corner, Spot The Difference Competition, January 1994, 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 21 January 1994.

GOOD LUCK!

Practical Wireless, January 1994
**STAR LETTER**

**Practical Wireless Rediscovered**

Dear Sir

I was pleasantly surprised to discover your address recently, and to learn that *PW* is very much alive!

Throughout most of the 1960s and the mid 1970s, when I was employed in the Far East, I used to eagerly await my copy of *PW* each month, and I must say, I was never disappointed by the quality of its contents.

However, having moved to California in 1978, I must regretfully admit that I lost touch with *PW*, which was if I remember correctly, undoubtedly one of the best publications, for enthusiast and professional alike!

Having said that, I would like to add, this serendipitous discovery of your address has prompted me to want to resume my subscription to *PW*. Therefore, I would appreciate very much if you would kindly let me know how I may set about doing this with economy and despatch!

If I am not asking too much of you Sir, I would also like to take this opportunity to find out how best I can lay my hands on a copy of *PW* that had a project titled 'World's Smallest Radio' based on the Ferranti ZN414 a.m. i.c. (I believe it was sometime between 1973 and 1976). I shall be indebted to you, if you would let me have a back copy of this issue or a reprint of this particular project or even just a photocopy of this article.

I have hunted high and low here in the USA for back copies of *PW* and particularly a copy of this issue, but alas, to no avail! I am looking forward to my next copy of *PW* and let me thank you in advance for your co-operation. Long live *PW*!

Mark Rasiah
California USA

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**Self Training**

Dear Sir

With reference to the letter from Colin Kendrick G0STW in the July 1993 issue of *Practical Wireless*, when it comes to hobbies, the important thing is not to take them too seriously. But, where amateur radio is concerned, surely we must pay at least passing attention to the 'self training' aspect stipulated in our licence.

Of course we can't all drone on about radio all the time, but the letter from Colin Kendrick really takes the cake!

Trivia quizzes, crosswords, bingo? Surely these belong more in the local pub or on CB than on our valued amateur bands? What is happening to our hobby - hardly anyone makes anything anymore, very few talk about radio, and now Mr Kendrick advocates the playing of silly games on the air. Far from 'use it or lose it', it will soon be a case of 'abuse it then lose it'.

I can only comfort myself with the thought that this kind of 'opera- tor' usually doesn't last long before returning to CB, which is after all, where this type of rubbish belongs. There! I've said it. Now wait for the reaction!

Andy Howlett G1HBE
Cheshire

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**Scottish Complaint**

Dear Sir

It is not all that often that I feel the need to write to *PW* and complain, but on this occasion, I feel that I must.

With reference to Club News, *PW* March 1993, pages 19 and 20 and *PW* April 1993, pages 16 and 17. Why are the Scottish Clubs all lumped together under the general heading of 'Scotland'?

All the other British Clubs are listed under their counties, so why treat Scotland differently?

Why put Aberdeen (Grampian), Dundee (Tayside), Stirling (Central) and Wigtownshire (Dumfries and Galloway) under a Country and not a County/Region heading?

I noticed in the March edition that the Wigtownshire club was mentioned twice, once under 'Scotland' and once (correctly) under Dumfries and Galloway. I have also noticed that in previous editions of *PW*, the Dundee Club was the only club to be wrongly headed. I suppose there might be room for confusion with the Club in Tayside and the Secretary's address in FIFE!

It has always been a pleasure to read *PW* and it's a pity to spoil it with something like this.

Wallace Shackleton GM0GNT
Tayside

Editor's reply: Sorry to cause offence, Wallace. It's all down to a question of space, and as the former GM3XFD (Ross-Shire, Highland Region) you'll appreciate I know the geography and administrative areas of Scotland well. We'll try our best to avoid the problem in future.

---

**Standard Of Operation**

Dear Sir

I have been an avid listener since 1953 when I was six. Over the years I have noticed that as the RAE becomes easier, the standard of operation drops.

Almost every time I tune in, I hear somebody causing somebody else problems. I think that in this present time with the use of computer controlled rigs, it should be possible to give the make, model and serial number of a high speed data burst which could be after every transmission, my problem transmission could then be traced easier.

What is the opinion of your readers?

G. Bramwell
Greater Manchester
Second Childhood

Dear Sir

I am 84 and therefore in my second childhood...and harking back to my first. What has this got to do with Wireless?

Well, in those far off days I used to listen to Daventry, Eiffel Tower and the BBC...on a crystal set.

Now I am wondering if it is possible to recreate such a set and whether it would receive f.m.?

If so, are there any ancient firms that have still got the parts necessary and give guidance regarding coils and condenser values?

If you don’t know, could I put a small advert in that might ring a bell - in somebody’s attic!

There is no Mr Raymond in Lisle Street now but perhaps your files go back to those days - I seem to remember Practical Wireless and certainly Popular Wireless and Wireless World, the last was my guide to valve sets.

Gerald Carr
London

Editor’s reply: Various ‘vintage style’ wireless sets, with modern receivers are available now Gerald, particularly in London. However, I’ve no doubt readers might have some other ideas for you.

June And July Practical Wireless

Dear Sir

I have been meaning to write and congratulate you on the two latest issues of PW, namely the June and July issues. Although I hold a Class A licence, I confess at not using the mode of c.w., preferring to use ‘phone. But the special c.w. issue and the fact that it came out close to National Field Day has made myself (and at least one other Class A to decide to get our speed back to NFD level). I also know of at least one Class B who also wants to get the c.w. for next years NFD.

I also enjoyed the QRP issue as I am a member of the G-QRP Club and I now find that the block of flats where I live has a piped TV system and I now find that I am breaking through, (along with p.m.r., 27MHz etc., signals), so I have built a 50dB switched attenuator, in 1dB steps, which goes between the final and drive so reducing power from 100W to approximately 10mW, so I am, able to work h.f. still.

I am not able to run outside antennas and I am looking forward to reading the next PW ‘special’ issue on antennas, which might give me some ideas. I am currently running a home made trapped dipole run dog-legged around the loft with separate dipoles for 14, 21 and 28MHz from the same feeder as I was not happy with the v.s.w.r. on those bands. I am looking for an aerial which would work, reasonably on all bands so therefore maybe a multi trapped dipole?

Finally, has PW considered ‘sponsoring’ a low power c.w. event on h.f. to increase the usage of c.w. by Gs on h.f. and to get us lowly people lacking in confidence in using the key?

Anyway, keep up the good work and maybe I may have a c.w. QSO with you.

Chris Baker G4LDS
Essex

Editor’s reply: We’re pleased you enjoyed the June and July issues Chris. The QRP h.f. idea is also interesting. Other readers’ comments are welcomed!

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

Lucrative Source Of Income

Dear Sir

Rallies: is this the right word to call what now has become a lucrative source of income to fund many of our clubs?

They are certainly a far cry from those of the late 1950s and early 1960s, but of course, it is only we of the long teeth that have those memories.

Gone are the top band mobiles with their home-brew rigs and aerials, some even with a top band horizontal on the roof! Now replaced, alas, with a slick commercial 114 or 430MHz mag mount complete with black box. Amateur Radio?

For all practical purposes, I think the word mobile can now be deleted from these so called rallies. In fact, why not just call them ‘markets’ for this is what they have degenerated into.

Toys, trinkets and toffee among other things now being on sale. Profit seems to be the driving force, entrance fees, unthought of in the 1950s, are now being pushed up and up, but the last straw is this never ending quest for profit in the charging, to put items on the Bring & Buy stall. If the item remains unsold, then you lose the £1 or whatever it was to enter it in the first place.

Amateur Radio?

Very few events cater for the comfort and well being of their visitors. It is becoming very difficult to find a suitable place in which to relax and chat with friends. A family outing? Totally out of the question, unless they are all in the rugby business!

Of the many events which I get to in the year in this Northern territory, one stands out for its friendly and comfortable atmosphere, the QRP Mini Convention at Rochdale. The promoters here have got their priorities right. Others please note!

I suppose these alleged Rallies serve a purpose, but we are living in a fast changing world and I am afraid that hoping for past memories to once again come alive is wishful thinking.

Let us hope therefore that organisers of the future will be more thoughtful and caring for their many visitors, who, after all, are the ones that keep the show on the road.

J. G. Openshaw G2AYG
Lancashire
Send in your news, photographs and product information to Donna Vincent at the editorial offices in Broadstone.

**Coming Soon - New Mainline Catalogue**

Mainline Electronics, the largest broadline component distributors in the UK, have recently informed *PW* that they are currently preparing their new catalogue.

The new 128-page catalogue will contain components from Avantek, Hewlett Packard, Watkins Johnson and ITT Selectro to name a few. There will also be new v.h.f/u.h.f. transverters, 10GHz transverters and 1691 Meteor Satellite kits available.

Watch this space for more details on the New Mainline Catalogue.

**Ten-Tec Revival**

Waters & Stanton Electronics have, as a result of the recent Ten-Tec revival, available a video produced by the manufacturers. The video contains a ten minute introduction to the Ten-Tec brand, as well as a demonstration of the functions and facilities of their top range Omni VI transceiver.

Waters & Stanton feel that the video would be ideal for radio clubs to borrow to show to their members. Any club that would be interested in borrowing a copy of the Ten-Tec video should get their secretaries to send a self addressed label to Jeff Stanton at Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS.

**Howes ATU Kit**

Dave Howes G4KQH has recently informed *PW* of his latest kit, the CTU150, added to the C. M. Howes Communications range.

The Howes CTU150 antenna matching unit kit has been designed for use with h.f. transceivers running up to 150W PEP. The unit covers 1.8 - 30MHz by using 12 switched inductance settings and two wide-spaced tuning capacitors in a 'T match' configuration.

All the a.t.u. components are mounted on a glass-fibre printed circuit board, which is screen printed with the part locations to aid accurate assembly. Howes can also supply an optional hardware pack, the HA150R, consisting of an aluminium case with printed and punched front panel, plus knobs and coax sockets to accompany the kit.

The CTU150 kit costs £49.90 plus £1.50 P&P and the HA150R hardware pack costs £16.90 plus £4 P&P and both are available from C. M. Howes Communications, Eydon, Daventry, Northants NN11 6PT. Tel: (0327) 60178.

**Rexon Handy Transceiver**

South Midlands Communications Ltd., have introduced the Rexon handy transceiver to their range of products. The Rexon is manufactured by the Rexon Technology Corporation in Taiwan and is available for 144 or 430MHz operation.

The RL-102 features include 20 memory channels, 5W output, selective tuning steps from 5 - 50kHz. There's also a back light keyboard, multi-function i.c.d. read-out and tone and code squelch.

South Midlands Communications have an introductory offer on the RL-102, for a limited time the transceiver is available for £179 including VAT (normal selling price £199).

For more details contact South Midlands Communications Ltd., S. M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY. Tel: (0703) 255111.

**Crash Course**

Just as *PW* was going to press we received details of a 12 week Radio Amateur Examination crash course being run in Nottingham. The course starts on Thursday 6 January 1994 at the Arnold & Carlton College, Nottingham in preparation for the May RAE examination.

For more details contact the course tutor, Alan Lake G4DVW on (0607) 382509.

**Jaytee To Distribute Vågårda Radio Antennas**

Jaytee Electronic Services, who are based at Herne Bay in Kent have recently been appointed sole UK distributor for the Vågårda Radio AB, Sweden, range of v.h.f/u.h.f. antennas.

The antenna range available consists of dipoles and yagis for the 50, 144 and 430MHz amateur bands. The antennas are manufactured from aluminium and are resistant to salt water, with all attachments being made from non-corrosive stainless steel, making them very well suited for harsh environments. Jaytee are also looking to set up a full dealer network of retail outlets with full technical support.

For more information on the full range of Vågårda antennas contact Lee Adams G4RKV at Jaytee on (0227) 375254 or Fax: (0227) 365104.
New Alinco Hand-Held

The latest hand-held to be launched by Alinco is the DJ-G1 and is said to be the first hand-held to feature a spectrum 'scope type of display.

The DJ-G1 is a conventional 144MHz hand-held transceiver that has the ability to receive on 430MHz. There is also, as with all Alinco hand-holds, the provision for expanding to the receive frequency including a.m. reception on the civil airband.

The newest feature of the DJ-G1 is the spectrum analyser, this means that the receiver not only monitors the frequency to which it is tuned but also monitors the three channels either side. This facility gives a total of seven channels being monitored at any one time. The channel activity is shown by a series of vertical bar graphs in the top part of the window display.

Other features on the DJ-G1 include 80 memory channels, DTMF squelch (DSQ pager), illuminated keypad, auto dialler and low power indicator.

Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 are supplying the Alinco DJ-G1 for £349 including VAT.

New Antenna Tuner Kit

Lake Electronics of Nottingham have recently produced the TU3 antenna tuner kit to add to their range. The TU3 has been primarily designed for the short wave listener who uses a long-wire type of antenna covering the 1-30MHz bands, although for the Novice and QRP enthusiast it can handle up to 20W of r.f.

The design for the TU3 is based on the L-Match and the circuitry can be arranged into three different configurations. This results in a versatile a.t.u. that is able to match a wide range of receiver, antenna and frequency combinations.

Measuring 170 x 140 x 50mm the unit is housed in an aluminium case, finished in matt black with a brushed aluminium front and back. The TU3 kit is also supplied with all the necessary components and hardware, including pre-punched panels and case.

Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX can supply the TU3 antenna tuner kit for £44 plus £4 P&P or ready made for £54 plus £4 P&P.

Successful Leicester Show

Frank Elliott G4PDZ organising secretary for the Leicester Amateur Radio Show committee has reported that the 1993 show held at the Granby Halls, Leicester was the most successful yet. Ticket sales for the show exceeded 8600 over the two day event.

The Leicester Show committee would like to offer their thanks to the members of the Leicestershire Radio Clubs and Societies for the time they gave up to steward the event. Thanks also go to all those who visited the exhibition.

Frank G4PDZ who retired early in 1993 from the amateur radio business, has been involved with the organising of the Leicester Amateur Radio Show for the past 11 years. This is a position that he hopes to hold for many more years to come.

New HF Mobile

Icom have recently produced a new h.f. all-band transceiver in the form of the IC-707. Icom say that due to the well thought out spacing of the switches, to avoid accidental input and the large function display they consider the IC-707 is the ideal rig for the newcomer to h.f. operation. The IC-707 measures 240 x 95 x 239mm making it convenient for use in a variety of locations.

The IC-707 features include 32 memory channels, 100W output power, general coverage on all bands ranging from 500kHz - 30MHz, a band stacking register and a noise blanker to help reduce pulse type noise. The rig also comes ready supplied with a HM-3 hand microphone.

The IC-707 is available for £895 from Icom (UK) Ltd., Sea Street, Herne Bay, Kent, CT6 8LD. Tel: (0227) 741741.

Amateur Amplifiers

Nevada Communications of Portsmouth have recently advised PW of their new range of v.h.f. amplifiers, which have been introduced into their range. The new range of amplifiers can provide 30-100W output for the 144MHz amateur band at low cost.

Of particular interest is the NBC-50R Docking Booster which can boost the output of your hand-held to over 50W. The unit is supplied with a built-in 18dB GaAs FET pre-amplifier and a range of five adaptors designed to fit most well known makes of hand-held.

Specifications for the NBC-50R include 144-146MHz, 1-5W, 13.8V d.c. and f.m. mode.

The NBC-50R booster is available for £99.95 from Nevada Communications, 189 London Road, North End, Portsmouth, Hants PO2 9AE.
Elaine Richards G4LFM starts this month with the phrase, "I dedicate most of this column to novice licensees - past, present & future", and says that the overwhelming topic in the post bag this month is the Novice Licence. Elaine hopes the following will help, R. Cahill and J. Collins amongst others.

**Becoming A Novice**

If you are thinking about becoming a novice, the first place to go for the information you need is to the Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. Tel: (0705) 659015.

I phoned them on a Monday morning asking for information. It arrived on Thursday morning, not bad!

I was sent a leaflet called Novice Licence Training Scheme, a copy of Di-Y Radio (a very enjoyable read that even had competitions in it), How to become a Radio Amateur by the Radiocommunications Agency and details of the exams, where they are held, who runs courses and the names of senior instructors. Altogether it is a really informative package.

A Novice Licensee has access to certain amateur bands using low power without having to go for the full Radio Amateur’s Exam. There are three steps to follow.

First you must successfully complete the Novice Licence Training Course. This is a practical training course run by the RSGB all over the country, so you shouldn’t have to travel too far. Your local radio club may be running a course, so it’s worth checking with them.

For step two you need to sit and pass the Novice Radio Amateur’s Examination. This is held four times a year and is just a single paper which should last about one and a quarter hours—there are 45 multiple choice questions to answer. The final step only applies if you want to use the frequencies below 30MHz. To do this you need to pass a 5w.p.m. Morse test.

Local radio clubs are very involved in the Novice Licence. But how do you find out about the local club? They aren’t likely to be listed in the ‘phone book.

There are several ways to contact a club, the RSGB can help yet again, or if you like, you can write to me and I can dig out of my files the nearest clubs to you. You’ll find that if you speak to the secretary of the club before you go, they’ll look out for you and make you very welcome.

Finally, the only other bit that I can tell you about is the cost of the licence. It’s £15 a year for those over 21, but if you’re under 21 once you’ve passed all the necessary exams, it’s free!

**Novice Meetings**

News on Novice meetings now. I’ve heard from Con GW0FJH, the secretary of the Pontypool & District Amateur Radio Society. Every 2nd Wednesday of the month between 7 and 9pm they hold a meeting especially for holders of Novice Licences.

At each meeting there are at least two licensed members present to supervise the use of the Club Station. Or they are on hand to help with any practical or theoretical problems the Novices may have.

The only drawback to these meetings is that Novices need to become members of the club— but if you’re under 18 that means 20p per visit, so it’s hardly a king’s ransom! And that’s the only downside I can find from the project they are running. The Pontypool Community Education Centre (The Settlement), Pontymoile, Pontypool. If you live in the area and would like to know more, contact Con on (0495) 762604.

I’ve also heard from Eileen Mainwaring 2W1BPS, her husband is a local instructor in Llandeilo. So far her log has just three QSOs in it, but I’m sure that will change once she gets her hands on a better rig.

Eileen’s husband has sent in a tip for a little circuit to add to S-meter, but I’ll have to make space for that next month.

**Awards**

Since mentioning the BARTG Quarter Century Award the other month, I’ve received details of other awards available from them.

The British Amateur Radio Teledata Group (BARTG) Members Award is available if making contact, or hearing, 25 different BARTG members. There are further endorsement stickers available for every subsequent 25 members worked or heard.

The contacts can be on any of the amateur bands although you can get an ‘all 80m’ award, for example, if you work all the members on just one band.

You must send either the QSL cards for the 25 contacts (they are returned to you) or alternatively, you can photocopy both sides of the card. You must be able to see both call signs to show that two-way contact took place.

If you belong to a radio club, then there is an alternative. You must get a check-list of the BARTG members worked, showing the date, time, band, call signs, BARTG membership number, RST, etc., and get this signed by two officers (or committee members) at your local club.

Finally, if you log or work the 25 stations during a BARTG contest, then your contest log is sufficient.

The cost of the award is £1.50 in the UK, US$5 or 30 recent IRCs if you’re overseas. The update stickers cost either 20p for the UK, US$1 or 3 recent IRCs. If you send QSL cards, you should add 50p or 5IRCs for their return.

Claims should be sent to: BARTG Awards Manager, Nigel P. Roberts G4KZZ, 6 Park End, Forsbrook, Staffordshire ST11 9DR.

**Looking At Antennas**

Let’s now look at antennas. One problem when you’re starting out in any hobby is there never seems to be enough money for all the things you want. Often after buying the ‘rig of your dreams’ there’s not enough money left to get an antenna.

I’ve received details of some very reasonably priced h.f. antennas from Waters and Stanton Electronics. The single band antennas are helical whips with adjustable resonators, with one available for each of the bands between 1.8 and 28MHz (160 and 10m). The price for these antennas starts at £19.95.

A 5-band version with auto switching is also available. The power rating for these antennas is 250W p.e.p. More details from Waters & Stanton Electronics, Tel: (0702) 206835.

**And Finally****

I would like to introduce keen Novice Ned. He’ll often have a message for you! Also I’d like to take this chance to wish all the readers of PV a Merry Christmas and Happy New Year and look forward to lots more of your letters in 1994.

Unfortunately due to the pressure of schedules I am unable to bring you the answers and winners to last month’s questions but all being well these will appear next month.
**CHRISTMAS OFFERS**

**STANDARD C5608D TWIN BAND MOBILE**

For only **£575.00** (Limited Quantity)

- True Twin Band
- 40 Memory Channels
- Simultaneous RX & TX
- Solid-State Construction
- Flexible Car-Installation
- 50W/40W (VHF/UHF) RF Power
- High 0.158 μV Sensitivity

normally 24hr despatch but please allow 7 days for delivery.

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**STANDARD C558**

Dual band with AM.
20 channels
£429 inc nicads and charger

£499 cell case only

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**STANDARD C528**

Dual band simultaneous transmit/receive
20 channels. Now includes nicad and wall charger
*£420*

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**STANDARD C188-2M**

Special Offer
£279 inc nicads and charger

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**THE NEW STANDARD C408**

The latest in the "standard" range is probably the smallest set yet produced.

It has 230 MW R.F. output from 2 x AA cells – ideal for local Q.S.O’s and repeater working. An idea that comes to mind for those of you with dual banders that will act as a repeater, is that you will have a portable microphone anywhere around the house.

We are waiting for full specs and leaflets.

The projected price is just under £200.

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Due to the fluctuating exchange rate, prices may vary

Please phone before ordering

Lee Electronics

Practical Wireless, January 1994
Bedfordshire
Bedford & DARC. Tuesdays, 8pm. Club Shack, Church End, Ravensden, Bedford. December 14 - TV Licensing, 21st - Xmas Festivities. M. G. Reeves G6YNW on (0234) 349004.


Cheshire

Cornwall
Poldhu ARC. Tuesdays and Fridays, Wednesdays HF Net. 7.30pm. (0208) 290638.

Derbyshire

East Yorkshire
North Ferriby United ARC, Fridays, 8pm. North Ferriby Utd., FC Social Club, Church Road, North Ferriby, East Yorkshire. December 10 - Amateur Television by Clive GBE0Z. 17th - Xmas Social, Secretary on (0736) 327431.

Essex
Braintree & DARS. 1st & 3rd Mondays, 8pm. The Clubhouse, Braintree Hockey Club, Church Street, Bocking. December 13 - Cheese & Wine Party, January 3 - WIDGETS 2, 10th - Club Nat. J. F. Button G1WQO c/o G4JXG, 88 Coldnailhurst Avenue, Braintree. Essex CM7 3PY or Publicity Secretary on (0737) 769130.

Greater Manchester
Rockdale & DARS. Mondays, 8pm. The Cemetery Hotel, 470 Bury Road, Rochdale, Lancs. December 20 - Xmas Talk. Brian on 0706-352052.

Hampshire
Basingstoke ARC. 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. December 27 - 144MHz Direction Finding Competition. (0256) 25517.

Kent


South East Kent ARC. Wednesdays, Duke Of Yorks School, Guston, Nr. Dover.

Silvertown RC. Fridays, 7.30pm. The Chingford Community & Adult Education Centre, Friday Hall, Simmons Lane, Chingford, London E4 6JH. December 10 - Night On The Air, 17th - Xmas Party. Andrew Mowbray G0LWS on 081-529 4465 between 5.30 & 6.30pm weekdays only.


Hertfordshire
Dacorum AR & TS. 1st informal & 3rd formal Tuesdays, 8pm. The Heath Park, Cotterelles, Hemel Hempstead. December 21 - Club Xmas Dinner. Nicholas Camp, 48 Northfield Road, Harpenden, Herts AL5 5HZ.


Bedfordshire
Bedford & DARC. Tuesdays, 8pm. Club Shack, Church End, Ravensden, Bedford. December 14 - TV Licensing, 21st - Xmas Festivities. M. G. Reeves G6YNW on (0234) 349004.


Cheshire

Cornwall
Poldhu ARC. Tuesdays and Fridays, Wednesdays HF Net. 7.30pm. (0208) 290638.

Derbyshire

East Yorkshire
North Ferriby United ARC, Fridays, 8pm. North Ferriby Utd., FC Social Club, Church Road, North Ferriby, East Yorkshire. December 10 - Amateur Television by Clive GBE0Z. 17th - Xmas Social, Secretary on (0736) 327431.

Essex
Braintree & DARS. 1st & 3rd Mondays, 8pm. The Clubhouse, Braintree Hockey Club, Church Street, Bocking. December 13 - Cheese & Wine Party, January 3 - WIDGETS 2, 10th - Club Nat. J. F. Button G1WQO c/o G4JXG, 88 Coldnailhurst Avenue, Braintree. Essex CM7 3PY or Publicity Secretary on (0737) 769130.

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Basingstoke ARC. 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. December 27 - 144MHz Direction Finding Competition. (0256) 25517.

Kent


Medway AR & TS. Fridays. Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham, Kent. Visitors & new members welcome. December 17 - Xmas Social, January 7 - The VIP Quiz by John G6VIP. Mrs Gloria Ackerley G7OV. 40 Linwood Avenue, Strood, Rochester, Kent ME2 3TR. Tel. (0634) 710023.

South East Kent ARC. Wednesdays, Duke Of Yorks School, Guston, Nr. Dover.

**Lancashire**

Bury RS, Tuesdays, 8pm. The Mosses Community Centre, Cecil Street, Bury, Lancashire. December 14 - AGM, 22nd - Ragchew & Xmas Preparation. Steve Gilbert G3DAG on 061-581 1850 or Colin Fox G3HII on (0204) 882312.

Hesketh ARC. Every other Tuesday, Birkdale, Southport. December 10 - Club Xmas Dinner. Bernie G7DEM on (0704) 63434.

**Leicestershire**


**Lincolnshire**

Grantham RC. 1st & 3rd Tuesdays, 8pm. Kontak Sports & Social Club, Barrowby Road, Grantham. December 21 - Cheese & Wine Evening, January 4 - Intruder Watch by Dave G4DIJ. John Kirton G8WJJ on (0476) 85743.

**Merseyside**


**Norfolk**

Fakenham ARC. 1st Tuesdays, 7.30pm. Trinity Church Room, Hempston. January 4 - Microwaves by John G4TV. (0485) 526833.

King's Lynn ARC. 7.30pm. The King's Lynn Scout HQ, Chequers Lane, North Runcton, Nr. King's Lynn. December 16 - Xmas Social. Derek Franklin G5OML on (0553) 841189.

Norfolk ARC. Wednesdays, 7.30pm. University Arms, South Park Avenue, Norwich. December 15 - Xmas Party, January 5 - Club Quiz, 12th - Real Radio Evening. Dale Simkin on (0603) 37393.

**Nottinghamshire**

Mansfield ARS. 2nd Mondays, 7.30pm. Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. December 13 - Xmas Social. Mary G0NZA on (0623) 755268.


**Scotland**

Grampian

Banff & DARC. 1st & 3rd Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB45 1DL. December 17 - Club Quiz Night. Martin Andrew GM6VXB on (03465) 82061.

Tayside


**Shropshire**

Salop ARS. Thursdays, 8pm. Oak Hotel, Shrewsbury. December 9 - Annual Construction Competition Advice by Terry Hall G8DIQ. January 13 - EGM at Beauchamp Blumfield GOSST on (0743) 361935.

Worcestershire

Worcester ARS. Thursdays, 7.30pm. The Community Lounge, King Arthur's Community Centre, Windmill Lane, Windrush Road, Worcestershire. December 21 - General Meeting. February 21 - Xmas Meeting. Don Darkes G8HRI on (0512) 424465.

**South Yorkshire**

Barnsley & DARC. Mondays 7pm. Three Horseshoes, Barnsley Road, Brierley, Nr. Barnsley, South Yorkshire. J. P. Caledon-Scott G4LRS on (0226) 203448.

Sheffield ARC. Mondays 7.30pm. Firth Park Pavilion, Firth Park Road, Sheffield. December 13 - Xmas Dinner at the Devonshire Arms, 20th - Xmas Toast. (0742) 464282.

**Suffolk**


**Surrey**


The Kingston & DARS. 3rd Wednesdays, 8pm. Alfriston, 3 Barrylands Road, Surrey KT5 8RB. December 15 - Christmas Special. Ray Fuller on 081-398 1128.


**Warwickshire**

Mid-Warwickshire ARS. 2nd & 4th Tuesdays. December 14 - Xmas Meeting. Don Darkes G5HRF on (0926) 429445.


**West Midlands**

Solihull ARS. 3rd Thursdays. The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. December 16 - Xmas Party. (0827) 53344 daytime.

**West Sussex**

Mid-Sussex ARS. Thursdays, 7.45pm. Sofia Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. December 17 - Grand Xmas Dinner, January 13 - AGM. Chris Coward G3YTU on (0444) 458992.

**West Yorkshire**

Halifax & DARS. 1st & 3rd Tuesdays, 7.30pm. December 21 - Xmas Social. David Moss G0DLM on (0422) 202306.


Spen Valley ARS. Thursdays, 8pm. Old Bank Working Men's Club, Mirfield. Alternate Thursdays - 'Noggin & Natter Nights'. December 16 - RAFARS by Peter G0JJKW. Tony Galvin G0KID on (0532) 534437.

**Wiltshire**

Trowbridge & DARC. 1st & 3rd Wednesdays, 7.30pm. December 21 - Xmas Social. J. P. Caledon-Scott G4LRS on (0226) 203448.

Merry Christmas and a Happy New Year to all my regular contributors and readers. This column will continue to support Radio Clubs around the UK in 1994.
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PERTH 2.1m long, 300W, 80 thru' to 10m. £199.95
PERTH (T) As above but inc. top band........ £235.00

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50W (2m) £38.50
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* Complete with 40m band module
* Legendary QSK and superb electronic keyer
* Multi function signal meter
* Easy plug-in band module (inc. WARC bands)
* Superb sensitivity and dynamic range
* Full range of optional accessories available
* Electronic keyer employs "Curtis type B chip"
* No need for expensive optional filters
* Simple, affordable and fun to use

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 Tokyo KH-740 £1095
 Tokyo HT-115 £195
 Yaesu FT-60 £1095
 Yaesu FT-7200 HF £475

Handhelds

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 Alinco DJ-80 £385
 CTER Snake 145 HF handheld £159
 Kenwood TS-22D £175
 Kenwood TS-200 £475
 Kenwood TS-230 £1195
 Kenwood TS-240 £1395

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 Kenwood IC-222 £215
 Standard 4500 £195
 Kenwood TS-58 £255
 Ten-Tec Scout 450 (mobile) £499
 Yamaha F-77 £205
 Yamaha F-78 £205
 Yamaha F-79 £275

Scanning Receivers

Alinco D-1 £195
 AOR 2105 £225
 Standard 6000 £205
 Kenwood TS-58 £255
 Ten-Tec Scout 450 mob. £499
 Yamaha F-727 £205
 Yamaha F-730 £205

Shortwave Receivers

Drake RR-6 £750
 Icom IC-73 £675
 Kenwood TS-350S HF £895
 Icom IC-718 £855
 Yaesu FT-120 £395
 Yaesu FT-121 £395
 Yaesu FT-122 £595
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 Microwave modules 2m transmit £35
 Microwave modules 40/2m transmit £50
 Morse VIC-1000 high power ATV £195
 Rycom NX-41 5/2m £875
 Victornik VC-300 £395
 Yamaha F-7200 HF amplifer £350

Call us now — even if we haven’t listed your radio, for what we know to be unbeatable P/X deals.
Review

The Kenwood TS-850S
1.8 to 30MHz h.f. transceiver.

There are advantages in reviewing equipment which has been available for a year or two. The first flush of excitement will have died down, and a more considered judgement is possible.

Another advantage is that existing users can assess reliability. Comparisons may also be made with competing equipment.

The TS-850S appeared in Britain during 1991, and has been popular since. It's an h.f. transceiver covering nine bands, operating from 12V, and is designed with many facilities and provides good value for money.

Clean Receiver

The TS-850S has a very 'clean' receiver. Even doing the '7MHz at night test', I kept the Advanced Intercept Point button (AIP) pressed all the time on the lower bands. This circuitry reduces the sensitivity of the rig, but provides improved handling on the noisy bands.

The filters are good, and on s.s.b. it gives a reasonable compromise between audio quality and selectivity. It's possible to switch in various filters at each of two IFs, giving an ever-narrowing passband.

Concentric Slope Tone controls cut the r.f. bandwidth from the upper and lower ends. This effectively reduces QRM in crowded conditions. However, for any reasonably serious c.w. operating, I think that one or more of the additional filters would be needed.

I also liked the dual-speed tuning knob. The normal tuning rate can be reduced to 1 kHz per revolution by pressing the Fine key, which is excellent for c.w. When you combine this with the VFO CH key (which lets you click up and down in 10kHz steps), the choices for rapid QSYs are very flexible.

Transmitting

On the transmitter side, I was pleased with the reports on s.s.b. I tend to keep the processor running at a reasonable level all the time, and favourable comments were received on the audio.

It was easy to set the processing. The operator is able to select the Meter Peak Hold option, and can then switch the meter to Compression Level. This facility allows continuous monitoring, and ensures that the compression level is not too high.

There's also a key which gives a high boost to the voice, which seemed to add to intelligibility in noisy conditions. It might have the opposite effect if used by a YL, and experimentation would be needed.

I checked the c.w. output, and found it to be

Practical Wireless, January 1994
HF Transceiver

acceptable, with a narrow bandwidth and no key clicks. Although the manual suggests that there will be a shortening of characters if full break-in is used at high speed, the effect was minimal at 40 words per minute (about my limit).

Using full break-in, there is a little more clutter in the headphones than with the TS-930/40 transceivers - a pity, because quiet QSK operation was a hallmark of Kenwood's equipment.

Metering was particularly good, making full use of the bar-graph style. My prejudices against this type of display disappeared completely, and I now find the needle movement on my own equipment harder to read. I suppose this is how they persuade us to buy new gear!

The s.w.r. monitor was very useful. Unfortunately you can only meter s.w.r. or compression level one at a time.

Memory System

The memory system on the Kenwood TS-850S takes a little mastering, but it works well. There are 100 memories, each storing mode and filter information. They are useful for nets, broadcast stations, contests and DXpeditions, etc.

I found the Quick Memory feature to be extremely valuable. Five frequencies can be stacked up and recalled easily on demand. This is ideal for temporary storage, where you can quickly page through the five to find the one you want and then retrieve it.

I also like the Kenwood system of dealing with split operation, to transmit on one v.f.o. and receive on the other. On the TS-850S there's little chance of transmitting on the wrong v.f.o., which is not the case with many rigs.

When on the air, it's helpful to monitor your transmit frequency, which can be done with the TF SET key. This control permits tuning of the transmit v.f.o., even if the dial lock is set. I consider these to be a well thought out combination of features.

There's also a choice of 35 selectable parameters through a menu selection on powering up. The parameters cover such options as changing step sizes for tuning, selecting frequency shift tones (f.s.k.), varying the c.w. keyer functions, and so on.

Most people will only need to adjust half a dozen of the selectable parameters. However, they are nonetheless useful to have available.

Another facility on the TS-850S, not available on all rigs is frequency input from numeric keys. I used this less than expected.

But when you actually need numeric key entry, there's no substitute for just entering the frequency required and having immediate access to it. This facility forms the basis for direct frequency control by computer, which switches directly to the frequency and mode derived from a DX spot on a Packet Cluster.

Automatic Antenna Tuning

The review TS-850S was fitted with the automatic antenna tuning unit, which I highly recommend. The automatic a.t.u. remembers the setting for each band. It also compensates for variations in the s.w.r. by a quick press of the Auto Tune key.

The auto a.t.u. specification suggests that it will match an s.w.r. of up to 2.5:1. But in practice, I found it can cope with s.w.r. levels worse than this.

If the automatic system fails to match, you can adjust the a.t.u. manually. I had to resort to manual tuning to load my 7MHz dipole on 1.8MHz! This was an unfair test.

which takes the most versatile tuners!

However, loading the 7MHz antenna up on 1.8MHz worked, and I had some perfectly R5 QSOs as a result. There is an insertion loss with the a.t.u., approximately 1dB, so it's not really noticeable.

Another useful option on the TS-850S is the Digital Recording Unit (DRU). This stores c.w. or 'phone messages for later transmission.

The DRU is invaluable in contests. It enables a CQ to be sent while you're drinking a cup of coffee or checking multipliers, as well as saving the voice in a long s.s.b. event!

The speech quality from the d.r.u. is reasonable, sounding like a voice over the telephone. It's not quite as good as the real thing, but is pretty close.

Other extras are available to carry out digital speech processing, interface to a computer, to provide voice indications of functionality, and a range of other options. But, of course, all these extras add to the initial cost.

Cost And Purpose

When considering facilities, you have to remember the cost. You also have to consider the purpose for which the equipment was designed.

There's no point in complaining about the lack of a feature which would normally only be found in a radio costing twice as much. Bearing this in mind, I still have a few grumbles about the way in which some of the many facilities of the TS-850S have been implemented.

For example, on the TS-850S there's a knob which purports to be an audio tone control. The knob is supposed to provide top cut, but the effect is negligible. It does no harm, but it's a waste of precious space.

Additionally, the RIT/XIT control, which allows the receiver or transmitter to be varied a little either side of the main dial frequency, is not well implemented. The knob is too small, given that it will be used almost as much as the tuning knob itself (this is a failing of many rigs).

When I used the RIT/XIT control on the TS-850S, the amount of variation (maximum ±2.5kHz) is not really enough for s.s.b. In use, I found it difficult to reset accurately to zero, although this can be done remotely, under computer control.

Fig. 1: A view of the deceptively uncluttered interior of the Kenwood TS-850S transceiver.
I think that a 'clear' button would be useful on the RIT/XIT control. It would help if the designers should sit down with a contest operator or DXer, using all modes, and find out exactly what is needed.

As a c.w. operator I was pleased that there is an internal keyer. This facility can be operated with a standard paddle. It is selected with a back panel switch.

However, the keyer facility would be better done with an extra socket for the paddle, retaining a socket for direct keying. As it stands, an operator using a computer keyboard for sending (more or less standard now in contests) has to switch out the internal facility, and use an external keyer if this is also required.

Filter System

The filter system on the Kenwood TS-850S works well, but it’s not ergonomically perfect. To change from (let’s say) maximum s.s.b. selectivity to maximum c.w. selectivity requires several pushes of two buttons (one for each i.f.).

So, why have the designers allowed for stepping through the different levels of selectivity with a single switch? After all, it’s not of great interest to the user where the selectivity is achieved.

Manufacturer’s Specifications

<table>
<thead>
<tr>
<th>Modes</th>
<th>l.s.b., u.s.b., c.w., a.m. and f.s.k.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output power</td>
<td>10 to 40W (a.m.), 20 to 100W all other modes.</td>
</tr>
<tr>
<td>Transmitter freq. coverage</td>
<td>1.8, 3.5, 7, 10.1, 14, 18.1, 21, 24.9 and 28MHz amateur bands.</td>
</tr>
<tr>
<td>Receiver coverage</td>
<td>100kHz to 30MHz (down to 30kHz with reduced specification)</td>
</tr>
<tr>
<td>Intermediate freqs.</td>
<td>73.05, 8.83MHz and 455kHz</td>
</tr>
<tr>
<td>Selectivity</td>
<td>(s.s.b. and c.w.) 2.4kHz, (a.m.) 6kHz, (f.m.) 12kHz at 6dB down</td>
</tr>
<tr>
<td>Audio output</td>
<td>1.5W into 8Ω at 10% distortion</td>
</tr>
<tr>
<td>Selectable RIT and XIT</td>
<td>1.2 or 2.4kHz each side of centre frequency</td>
</tr>
<tr>
<td>Memory channels</td>
<td>100</td>
</tr>
<tr>
<td>Power requirements</td>
<td>12 to 16V d.c. at 20.5A, negative earth.</td>
</tr>
<tr>
<td>Dimensions</td>
<td>339 x 135 x 375mm</td>
</tr>
<tr>
<td>Weight</td>
<td>10.9kg (not including a.t.u. and accessories)</td>
</tr>
</tbody>
</table>

Note: The above are a brief summary of what we consider to be the most important specifications from a very comprehensive list. Editor.

My thanks go to Martin Lynch of 140-142 Northfield Avenue, London W13 9SB. Tel: 081-566-1120, FAX: 081-566-1207, for the loan of the review transceiver. They can supply the TS-850S at a cost of £1849.95, plus £10 P&P. They can also supply the TS-850 without the automatic a.t.u. for £1699.95.

It was convenient however, to be able to monitor the outgoing signal on s.s.b., with a variable level control. This knob could also allow adjustment of the c.w. sidetone level, rather than the preset method actually used on the TS-850S.

Summing Up

In summing up, I think the TS-850S is generally well-designed. It also sells at a reasonable price, and fits a market niche largely overlooked by its competitors.

The TS-850S is also easy to get used to and has a surprising number of features. During the review period I talked to several owners and, without exception, they were pleased with their rigs.

None of the TS-850S owners I spoke to had had any reliability problems. Any criticism was prefaced with a remark to the effect that they couldn’t see how they would have done better for the cost, and I’m inclined to agree. I am also grateful to G6OFE, G4IFB and WA2UGT, who spent time discussing their experiences of the TS-850S with me.

PW
For Global Reach

The Competition-Class
TS-850S

In one design, Kenwood proved to the world that Engineering and Performance can be offered to the operator at a cost effective price. Isn’t it time you proved it to yourself?

During December and January, Martin Lynch is offering the TS-850S on ZERO INTEREST over a whole 18 months. Deposit £439.00 with eighteen payments of only £70.00. Total Price £1699.00. Phone or write for details.

A full written quotation is available on request.

140-142 NORTHFIELD AVENUE, EALING, LONDON W13 9SB
Tel: 081 566 1120
Fax: 081 566 1207
The Ten-Tec Scout 555 HF Transceiver

The Ten-Tec Scout 555 h.f. transceiver, fitted with the 7MHz band module.

transmit override switch - with the microphone gain turned to zero!

Variable Bandwidth Filter

The Scout has a 9-pole 'Jones' type variable bandwidth filter with front panel control between about 500Hz and 2.5kHz. This avoids the need for an additional expensive narrow c.w. i.f. filter, and it works very well indeed.

The c.w. keying waveform on the monitor-scope looked very good. On air reports were of a pleasant 'soft keyed' sounding signal.

Similarly, reports received on s.s.b. (using the optional Ten-Tec hand-held electret microphone) were good. The rig easily delivered 50W (measured on a Bird Thruline power meter) into a 50Ω dummy load.

The preset power control (accessed through the bottom cover) enables the power to be reduced to a minimum of 3W. I would have liked an externally adjustable power control, but was pleased to find provision for reducing the output to true QRP levels. The c.w. side-tone level adjustment control is also accessible through the bottom cover.

The transmitter is protected from instantaneous damage from load impedances ranging from a dead short to an open circuit. No damage should occur if the rig is inadvertently operated into a short, or open, circuit. Operation at full (or near full) power is allowed with an i.v.s.w.r. of up to around 2:1.

The Receiver

The receiver performed very well indeed. It appeared to cope without difficulty with the strong 7MHz signals after dark.

There are some spurious signals noticeable when tuning across the 500kHz tuning range, but the strongest of these fell outside the 7 and 14MHz bands (the two modules supplied with the review model). The weaker spurious signals will not normally present a problem.

Noise from the digital frequency read-out is present on all bands. 1.8 to 28MHz (including WARC) with the additional of extra plug-in band modules.

The correct sideband is automatically selected for each band and there's no mode switch. For review purposes, the Scout I had on loan came with the 7 and 14MHz modules.

Traditional Oscillator

Unlike the Japanese manufacturers, Ten-Tec prefer to use a traditional variable frequency oscillator (v.f.o.) with crystal mixing (rather than a synthesiser). The Scout is no exception to their rule.

The Scout v.f.o. tunes from 2.2 - 2.7MHz and is permeability tuned, with the tuning knob varying the oscillator inductor. This results in a very positive feel to the tuning, but with a slightly less 'free' feel. Back-lash was virtually non-existent.

Ten-Tec have employed their Frequency Lock System (FLS) with the Scout v.f.o., which automatically compensates for oscillator drift. This seems to work well, and I did not notice any appreciable drift when using the rig.

Internal Keyer

The internal keyer (an emulated Curtis type B) is adjustable between five and 50w.p.m. by a very unusual system. It's achieved by switching the digital read-out to indicate keying speed, adjustment is made by touching the 'Dit' paddle to increase the speed, and the 'Dah' paddle to reduce it!

Transmission on c.w. is not possible while the speed is being adjusted. Some c.w. operators may find this 'preset speed' an inconvenience. Also, there's no battery back-up, and therefore the Scout will always return to its default value of 25w.p.m. after the rig has been turned off.

Ten-Tec's superb c.w. QSK (full break-in) is legendary. It's one of the reasons why the Scout is a joy to use on c.w. There is no transmit/receive switch provided on the Scout. However, for those who would prefer, the p.t.t. switch on the microphone could be used on c.w. as a

I have long thought that the amateur radio market lacks suitably priced quality h.f. equipment. By this I mean equipment that's within the financial reach of those less able to afford the (now) very expensive and sophisticated commercial equipment.

Ten-Tec's reputation for producing high performance transceivers is well known. And I had heard about the Scout's introduction (at Dayton 1993) with interest.

The Scout 555 was introduced by Ten-Tec as a "Back to basics - With real performance" rig. It also promised to be a truly budget-priced transceiver.

The Ten-Tec Scout is supplied as a single band s.s.b./c.w. transceiver. However, it's capable of operating on all bands, 1.8 to 28MHz (including WARC) with the addition of extra plug-in band modules.

The plug-in hand modules are approximately the size of a packet of ten cigarettes. They locate into the front of the rig on the left hand side.

The correct sideband is automatically selected for each band and there's no mode switch. For review purposes, the Scout I had on loan came with the 7 and 14MHz modules.

The correct sideband is automatically selected for each band and there's no mode switch. For review purposes, the Scout I had on loan came with the 7 and 14MHz modules.
makes an excellent budget rig.

In the USA I would be very tempted indeed to buy one myself, together with two or three suitable band modules, for portable use. However, at the current UK price of £589 (and £39.95 for each band module), it's hard to recommend the Scout.

It's a pity, but the cost of the rig, plus modules for every h.f. band, will approach that of a Kenwood TS-50S. Ten-Tec have given us the "Back to basics - With real performance" rig - and all that's missing in the UK is the "budget price!"

My thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or 204695, FAX: (0702) 205843, for the loan of the review model which they can supply for £589 plus P&P. Extra band modules are available for £39.95 plus P&P.

Manufacturer's Abridged Specifications

<table>
<thead>
<tr>
<th>General</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency coverage</td>
<td>All amateur bands 1.8 to 28MHz (plug in modules)</td>
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<tr>
<td>Modes</td>
<td>c.w., u.s.b., u.s.b. (selected automatically for band in use)</td>
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<tr>
<td>Frequency control</td>
<td>Permeability controlled crystal mixer v.f.o.</td>
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<tr>
<td>Offset tuning</td>
<td>±1kHz nominal (on receive)</td>
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<tr>
<td>Antenna</td>
<td>50Ω unbalanced</td>
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<tr>
<td>Power requirements</td>
<td>12 to 14V d.c., 600mA receive</td>
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<tr>
<td>Power requirements</td>
<td>10A transmit @ 50W output, 4.5A @ 5W output</td>
</tr>
<tr>
<td>Dimensions</td>
<td>64 x 184 x 248mm</td>
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<tr>
<td>Weight</td>
<td>2.4kg</td>
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<table>
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<tr>
<th>Receiver</th>
<th>Superhet (with 9-pole crystal filter adjustable 500Hz to 2.4kHz)</th>
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<tbody>
<tr>
<td>Intermediate frequency</td>
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<tr>
<td>Sensitivity</td>
<td>0.35µV typical for 10dB @ 2.4kHz bandwidth</td>
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<tr>
<td>Dynamic range</td>
<td>85dB at 20kHz</td>
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<td>Audio output</td>
<td>1W into 8Ω with less than 2% distortion</td>
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<table>
<thead>
<tr>
<th>Transmitter</th>
<th>Balanced modulator and 8-pole crystal filter</th>
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</thead>
<tbody>
<tr>
<td>Single sideband generator</td>
<td>50W a.c. controlled, internal power level control</td>
</tr>
<tr>
<td>Output</td>
<td>-45dB typical</td>
</tr>
<tr>
<td>Carrier suppression</td>
<td>-45dB typical</td>
</tr>
<tr>
<td>Unwanted sideband</td>
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<td>Keyer</td>
<td>Iambic (Curtis i.c.) 5-50w.p.m.</td>
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<td>Metering</td>
<td>s.w.r. or forward power</td>
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<tr>
<td>Microphone</td>
<td>200 to 50Ω 5mV outputs (built-in power for electret inserts)</td>
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</table>

After seeing his copy of the G3XJS review, Jeff Stanton G6XYU of Waters & Stanton sent us the following comments in answer to points raised by Peter Barville. Editor.

Many thanks for letting me see the draft of Peter Barville's interesting review of the Scout transceiver. I was pleased to see that like other reviewers, he is generally very enthusiastic but there are one or two points I would like to clarify.

Peter compares the Scout with the Kenwood TS-50 but should bear in mind that the Kenwood rig has no v.s.w.r. meter, no variable band width filter and no electronic keyer, all of which the Scout has as standard. Peter mentions the American price of the Scout but omits to mention the local sales tax which would be added. Is the Dollar price relevant? You would never quote the Yen (Japanese) price.

However, I have saved the best news until last. This is that as we are selling the Scouts in such large quantities we have been able to renegotiate the selling price and from our next advertisement the UK retail price including VAT will be £499. Additional modules remain priced at £39.95 each. Jeff Stanton G6XYU Waters & Stanton Electronics.
If you've read the articles 'Setting Up Your Workshop' and 'Tex's Tips' in the December 1993 issue of PW, then you're probably now looking for something to build. This article is to give you an idea of who can supply which parts.

There are some (although now becoming rare) corner shops where you can buy components and boxes. I'm not going to try and mention those shops here, even though they do a good job. This article is about where to get hold of those radio bits and pieces.

**KITS OF PARTS**

Let me start with kits of parts, or part kits to get you going more quickly. Kits can be of three main types: basic, full and excellent. Since the demise of Heathkit, not many suppliers fall into the top end of excellent. Cost alone makes kits of this type rather more expensive than most of us can afford.

To explain the method of coding kit types, I assume that a basic kit is merely a p.c.b. and the more difficult to find bits. The type of kit may be the cheapest form of building and a degree of knowledge may be necessary to complete it. If you are unsure about your abilities, perhaps you should wait until you feel more confident.

Kits supplied with all components, and a set of instructions on how to put them all together, are ones that I term full kits. These are the kits that most people will choose, and they

than p.c.b.s are available, from Badger Boards for most previous PW projects. Reprints of the various projects are available from the PW Book Service. Prices vary, depending on how many issues of PW the project appeared in.

**KIT SUPPLIERS**

Of the kit suppliers we know about, most are to be found at rallies. Many suppliers support low power working (QRP) is less than 5W of r.f.), and are active supporters of the G3QWP club. Novice Licence holders should find these kits ideal, not to mention cheap, entry onto the bands.

**Badger Boards** can supply p.c.b.s for PW kits. John Badger fully supports Novice and Full RAE students. As an instructor he has knowledge of their requirements. He has developed many electronic kits to further the self teaching side of amateur radio.

**C. M. Howes** Communications have been producing some very good kits for some years. At rallies, Dave is happy to discuss the projects in more detail. The kits are designed to a very high standard and come with information on general soldering and workshop practice (see the audio filter kit review in this issue). The latest kit is the CTV150 antenna tuner handling up to 150W of r.f.

**Cirkit Distribution** can supply kits for all sorts of projects, many of which are radio related. See their catalogue for more details.

**Hands Electronics Kits** is a comparatively new name on the kit scene, but one that aims to become well known. Kits are available from test equipment to complex transceivers. See the Hands Kits TVS07 review elsewhere in this issue.

**J.A.B. Electronic Components** can supply both kits of PW projects, and parts for other projects. Their latest catalogue sheets give details of many kits in a variety of price brackets. They can also supply almost any part you need for your own project.

**Jandek manufacturer** a range of inter-related kits for the radio hobbyist. These kits range from the Noise Bridge that Peter Dodd finds so useful in his 'Antenna Workshop', to full blown transceivers covering most h.f. bands. More details of their range, can be found in their catalogue sheets.

**Kanga Products** may be found at most rallies. Look out for the Kangaroo sign on the day. Underneath the 'Kangaroo' you'll find Dick Pascoe selling and discussing the G3ROO kits. Kanga supply bits and pieces as well as kits, the kits cover a range of projects, and are suitable for all levels of skill.

**Kent Keys** make a variety of kits for Morse keys. So, you've...
the 23, 13 and 9cm bands. They can supply power amplifiers for these bands, along with pre-built preamplifiers for the 934MHz CB frequency band.

Mainline Electronics is one of the best sources for hard-to-get r.f. parts. They also stock kits for some of the projects from the ARRL Handbook. Look out for microwave transverters and v.h.f. or u.h.f. power amplifiers.

Maplin Electronics have a 30mm thick catalogue, available through high street newsagents. Shown in it are many pages of projects to build, along with bits and pieces for your own projects. Waters & Stanton Electronics stock not only the commercial equipment, they also stock a variety of kits to make. Their catalogue shows that their stock range includes Howes, MFI and the well known range of Ramsey kits from the USA.

**FURTHER READING FOR IDEAS**

There are many books that a builder of home brew projects. The following are just a short list of what we feel are useful books. Prices are shown with each book, but please note P&P charges must be added to each order. For more details, refer to the Book Service pages in the Arcade section of PW.

- **ARRL UHF/Microwave Experimenter's Manual** is a compilation of various projects for the more advanced builder. £14.50
- **A Beginner's Guide To Modern Electronics Components** by Robert Penfold. £3.95
- **G-QRP Club Antenna Handbook** a book concerning itself with antennas and transmission lines but with some projects to build. £5.00
- **Hints And Kinks For The Radio Amateur** is a compilation of ideas that have been published in QST magazine. £4.95
- **How To Design And Make Your Own PCBs** by Robert Penfold. Just the book if you want to do it all yourself. £2.50
- **More Advanced Power Supply Projects** All transmitters and receivers need a source of power. Robert Penfold shows you how to make all types. £2.95
- **QRP Classics**, a number of low power (QRP) simple projects for hobbyists. £9.95
- **Solid State Design For The Radio Amateur** designing your own projects with examples to follow. £10.95
- **Test Equipment Construction** Test equipment is often forgotten when building projects at home. This book shows some simple projects to build. £2.95
- **W1FB's QRP Notebook** Doug De Maw is well known for the quality of his home-brew projects. Another one of the 'W1FB's... series of books. £7.95

**ADDRESSES**

- **Badger Boards**, 87 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JF. Tel: 021-353 9326.
- **C. M. Howes Communications**, Eydon, Daventry NN11 6PT. Tel: (0327) 60178
- **Cirkit Distribution Ltd., Park Lane, Broxbourne, Herts EN10 7NQ**. Tel: (0992) 444111 or FAX (0992) 464457.
- **Hands Electronics**, Tegryn, Llanfyrnach, Dyfed SA35 0BL. Tel: (0239) 77427.
- **JAB Electronic Components**, The Industrial Estate, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB. Tel: 021-366 6928 or FAX 021-366 6237.
- **Jandek, 6 Fellows Avenue, Kingswinford, West Midlands DY6 9ET**. Tel: (0384) 288900.
- **Kanga Products**, Seaview House, Crete Road East, Folkestone, Kent CT19 4AU. Tel: (0303) 276171.
- **R. A. Kent (Engineers)**, 243 Carr Lane, Tarleton, Preston, Lancashire PR4 6YB. Tel: (0772) 814998 or FAX (0772) 815437.
- **Lake Electronics**, 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: (0602) 382509.
- **LMW Electronics Ltd.**, 12 Bidford Road, Braunstone, Leicester LE3 3AE. Tel: (0533) 630038.
- **Mainline Electronics**, PO Box 235, Leicester LE2 9SH. Tel: (0533) 777648/780891 or FAX (0533) 477551.
- **Maplin Electronics**, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 554161. FAX (0702) 553935.
- **Waters and Stanton**, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or FAX (0702) 205843.

**THE FOLLOWING SUPPLIERS PRODUCE KITS OR SUPPLY PLANS OR PARTS. SPACE DOESN'T ALLOW US TO LIST MORE DETAILS. PLEASE CONTACT THE SUPPLIER FOR MORE DETAILS.**

- **Brian Jordan G4EWJ**, 42 Ben Nevis Road, Birkenhead L42 6QY. Tel/FAX 051-643 8506.
- **Bonex**, 12 Eleder Way, Langley Business Park, Slough, Berkshire SL3 6EP. Tel: (0753) 49502.
- **Cedar Electronics**, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham, Glos GL54 5NS. Tel: (0242) 602402.
- **Coltec Electronics**, 330 Brays Road, Sheldon, Birmingham B26 2PS. Tel: 021-722 2429 or 021-628 7839.
- **Greenweld Electronics**, 27 Park Road, Southampton SO1 3TB. Tel: (0703) 236363 or FAX (0703) 236307.
- **Hands Electronics**, Tegryn, Llanfyrnach, Dyfed SA35 0BL. Tel: (0239) 77427.
- **JAB Electronic Components**, The Industrial Estate, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB. Tel: 021-366 6928 or FAX 021-366 6237.
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- **Waters and Stanton**, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or FAX (0702) 205843.
As a keen home-brew enthusiast, the Rev. George Dobbs G3RJV is very willing to encourage others to 'have a go' and he's tried out a transceiver kit from Hands Electronics, a relatively new name to the amateur scene in the UK.

One of my earliest amateur radio mentors always maintained that his ideal evening "was a good pipe of tobacco and a few watts on forty metres". Thirty years ago 7MHz was probably a more user-friendly band, but it still has the potential to give a lot of enjoyment with a modest amount of power.

Some time ago I reviewed the Hands RX1 Superhet Receiver kit for 3.5MHz. I found it capable of producing good results, so I was interested to try the TCV/7, a development from the RX1 receiver circuit to a 7MHz 10W c.w. transceiver.

**SUPERHET RECEIVER**

The TCV/7 is a superhet transceiver in kit form. It has the now familiar NE602, MC1350P, NE602, LM386 line up in the receiver.

It may be a popular arrangement, but the TCV/7 line-up requires quite a few touches of design skill to achieve the optimum results. The NE602 is not the world's best front end mixer and many a superhet transceiver has been thwarted by a poor i.f. filter.

The TCV/7 includes a separate v.f.o. with RIT (receiver off-set tuning) circuitry. The first NE602A receives the antenna input via a three-pole Butterworth type bandpass filter.

The signal is then matched into the i.f. crystal filter. This filter is a 4-pole ladder type using 4.4336MHz crystals, which are mass produced for use in colour televisions.

The builder can opt for two nominal bandwidths, 2.2kHz or 500Hz. The MC1350 i.f. amplifier has a manual gain control but a.g.c. may be added with an optional board.

The second NE602A functions as a combined b.f.o. and Product Detector and feeds the LM386 Audio Amplifier.

**THE TRANSMITTER**

The transmitter takes the v.f.o. signal and mixes it, in another NE602A, with a crystal oscillator. The resulting signal passes through a band-pass filter terminated with a Pi attenuator with resistance values to set the output power of the transmitter.

The TCV/7 is somewhat unusual in having an LM6321 buffer. This device has the ability to accept a high impedance input and drive a low impedance load.

The LM6321 drives a 2N3353 transistor in Class A feeding a 2SC1969 power amplifier. The 2SC1969 is rated at 18W, but in the TCV/7 is run at under 10W output. A 3-pole, 7-element, low pass filter cleans up the signal for transmission.

The control circuit offers semi-break-in facilities. This changes the circuitry from receive to transmit and mutes the receiver to allow monitoring of the signal.

**THE KIT**

The TCV/7 Kit is supplied with two printed circuit boards (main board and v.f.o.) all the components and a comprehensive manual. A case kit is also available at extra cost.

The p.c.b.s are high quality glass fibre boards. They are fully tinned and have all component placings screen printed on the top side. The manual layout drawings show exact copies of the placement markings at about twice the size.

**EASY BUILD**

It was easy to build the kit when following the "tick as you go"
method of the manual. Most of the inductors are ready wound but there are some which need to be wound by the constructor.

The only likely problems could occur with the coupling transformers. But to overcome this, a series of simple drawings show how these are wound.

**COMPREHENSIVE SECTIONS**

The manual contains a comprehensive test and alignment sections. The only test equipment required is a high impedance multimeter, a general coverage receiver, a 50Ω dummy load and a power meter.

The text describes how a simple power meter can be made. Hands Electronics have also worked out the v.f.o. tuning values very well. The transceiver I built tuned across the required range within a couple of minutes.

After the d.c. checks on the main board, I switched on and could hear amateur signals immediately. I heard DL3KKN calling CQ.

So, throwing caution to the wind, I called DL3KKN on the unaligned TCV/7 into my doublet antenna. He came straight back and gave me a report of RST589 from Bonn! Feeling pleased, I carried out the rest of the alignment procedure.

**INPUT FILTER TIP**

The input band-pass filter can be aligned using signals on the band and I’ve a small tip here. It’s tempting to peak for maximum noise. On 7MHz this is unwise because you can be peaking adjacent broadcast signals.

The best method is to choose a weak signal. Then tune for maximum before slightly detuning until the background noise reduces without much loss of the required signal.

The provided values for the Pi attenuator pad, which controls the transmitter output, produced 7W of r.f. output. Slightly more or much less is possible by changing the values.

In a few evenings of casual use, I worked all across Europe with the 7W and the simple doublet antenna. I opted for the 500Hz ladder filter values and I was amazed at how well it worked for such a simple filter. It produced very pleasant c.w. reception.

I had two criticisms of the kit. The muting of the receiver was poor on the highest setting of the i.f. gain control. The control voltage could not override the effect of the front panel control.

Also the reset on the r.i.t. was not centred. I telephoned Hands Electronics about these two points. As a result of our discussion changes have been made to the values in both circuits.

Sheldon Hands told me he welcomes feedback from kit buyers. He also offers a telephone help service.

**SUMMING UP**

In summing up, I must say that I liked the TCV/7. It was easy to build, easy to get working and gave pleasing results. The input filter handles 7MHz very well during the difficult evening conditions.

I feel that the TCV/7 could make a main rig for a modest amateur station. Set to 5W output, the rig would be a worthwhile QRP transceiver for 7MHz.

My thanks go to Sheldon Hands of Hands Electronics at Tegryn, Llanfrynach, Dyfed, Wales SA35 0BL. Tel: (0239) 77427 for supplying the kit for review. The TCV/7 kit costs £85 plus £2.50 Postage and Packing.

**Fig. 1: Inside view of the transceiver as completed by Rev. George Dobbs G3RJV.**
Back To The Drawing Pin Board

Steve Ortmayer G4RAW is very keen to encourage others to rediscover basic construction. So, he collared the entire stock of drawing pins in Yorkshire to come up with a simple 7MHz receiver using his practical drawing-pin and board method. Try it out – rediscover radio construction!

In Milan in 1398, a row broke out when the builders of the Cathedral were accused of not sticking to accepted theory. "Theory is one thing, practice is another" they said. They did not know much theory, but they knew how to build a Cathedral. Well, Milan Cathedral is still there, so perhaps they were right!

The same is true of some radio amateurs who may not know much theory, but have some good practical ideas. Doug DeMaw W1FB is someone who knows all the theory and all the practice as well! This simple d.c. receiver is based on ideas in his Design Notebook which is full of great projects.

THE CIRCUIT

The circuit is laid out on drawing pins to follow the circuit diagram. The v.f.o. can be built first and checked for output with a diode probe. The frequency covered can then be checked by listening to it on a receiver or with a frequency counter. You may have to experiment with the number of turns or

![Circuit Diagram](image)
with the value of C3. I only had a 50pF tuning capacitor and this gave the best coverage with C3 omitted.

The a.f. amp can be built and checked by connecting up a sensitive earpiece and applying a wet finger to the audio input. The rest of the circuit can be air tested with a good antenna.

**ADDING AN LM386 AUDIO AMPLIFIER**

You should be able to hear strong signals by peaking C1. Better results can be obtained by adding the LM386 audio amplifier which I described in the ‘Challenger’ 3.5MHz receiver on page 36 of the January 1992 PW.

Even better results can be had by adding a simple radio frequency pre-amplifier. Build it - and have fun rediscovering radio construction!

**PW**

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**SHOPPING LIST**

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<thead>
<tr>
<th>Component</th>
<th>Specification</th>
<th>Quantity</th>
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<tr>
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<td>40 turns 26s.w.g. on T68-2 toroid</td>
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<td>L1a</td>
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<td>32 turns 26s.w.g. on T68-2 toroid</td>
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</table>

**MISCELLANEOUS**

Antenna socket to suit (phono type or BNC), 3.5mm jack socket for earpiece/earphones, d.c. power socket (or other size to suit), s.p.s.t. miniature toggle switch. Wooden base-board (softwood off-cut or from DIY store), drawing pins (heavy duty artist's brass type are best), connecting wire, p.c.b. off-cut for front panel.

**Fig. 2: Base-board layout for the direct conversion receiver showing drawing-pins used as soldering points.**
Adrian Knott G6KSN has come up with a rather novel approach to amateur communications using electromagnetic waves. Adrian’s system uses the infra-red end of the spectrum to avoid the crowded bands and provide a rather ‘different’ project.

I’ve always been fascinated by the different ways of electronically processing speech and sending it to some remote location via electromagnetic radiation. This circuit uses a frequency modulated subcarrier superimposed on a main carrier at 319THz (940nm).

The system I’m describing is immune to most forms of interference which its a.m. counterparts suffer from very badly. It also has a good range and introduces very little distortion to the original signal and would be ideal for data transmission up to at least 2400 Baud.

**PROJECT ORIGINS**

The project origins started when I tried out an a.m. baseband system. The received audio quality was excellent but it was very severely affected by mains hum from any incandescent bulbs in the vicinity.

Additionally, the original system had no a.g.c. So, as a consequence, I had to re-think the situation.

If an i.e.d. is pulsed on and off very quickly and the speed of the pulses is altered in sympathy with the desired audio, an i.m. signal superimposed on the light carrier will be created.

I eventually chose 65kHz for the centre frequency. This is a compromise between being able to switch the i.e.d. cleanly and modulator linearity.

The receiver can now be ‘tuned’ to 65kHz. The input signal is limited and then fed to a frequency discriminator/demodulator, and there’s no more mains hum since the receiver is tuned well above the mains frequency.

With the new approach there are no more problems with received audio level. This is because it will remain constant (for a given deviation) and only the signal to noise ratio will change (the noise gradually increasing as the signal gets weaker).

**THE TRANSMITTER**

Let’s now take a look at the transmitter. A simple square wave generator, capable of being frequency modulated, forms the basis of the G6KSN infra red communications project (see text).

The transmitter output frequency, being proportional to Vin. (within limits) is ideal for the purpose. The final circuit is shown in Fig. 2.

The input from R2 via the pre-emphasis components R1 and C1 is fed into the base of Tr1 via C2. The transistor Tr1 forms an audio amplifier which provides the modulating voltage for the astable multivibrator, Tr2 and 3, whose free running frequency is set by R5 to 65kHz (peak deviation is about ±1kHz).

The collector of Tr3 whose output is a square wave, is fed to the voltage follower/buffer Tr4. The transistors Tr5 and 6 form the output driver and are configured as a Darlington pair.
The resistor R13 serves as a current limiter. It can be used to monitor the diode drive which is set by R12 and must not be set such that the i.e.d. (s) are not over-driven.

**RECEIVER CIRCUIT**

The receiver circuit diagram is shown in Fig. 3. The infra-red signal is received by D4 which is d.c. coupled to the wideband amplifier Tr7. The output of Tr7 is capacitively coupled to the tuned circuit formed by C10 and L1. The now filtered output is fed to the base of Tr8, this is another amplifier and the output is fed to the base of Tr9 and 10. These devices should preferably be matched for gain (Hfe).

**CONSTRUCTION STRAIGHTFORWARD**

Construction is quite straightforward and the two units can be built on Veroboard or in similar fashion. Layout is not critical because the frequencies handled are not high. Full duplex working (two-way operation) is required then obviously two of each circuit will be required. By carefully positioning the TX and RX diodes and employing a screen between them, telephone style conversation can be achieved.

Incidentally, L1 should not be mounted directly next to L2 otherwise the receiver may tend to self oscillate. In my prototype these inductors were mounted about 75mm apart.

The diodes should be fed remotely via screened cable. But watch the capacitance of the cable used to connect the receiver diode since the impedances are rather high.

Unscreened cable should not be used. If you do, it may cause the transmitter to oscillate or the receiver to pick up one of the v.f.s. transmissions such as MSF on 60kHz.

**SETTING UP**

When the construction stage is completed you can start setting up. Begin by checking the boards for any unwanted solder bridges, etc. If all appears to be well, you can set the receiver R21 to minimum volume. Then set R29 to minimum resistance and with a multimeter (set to read milliamps) in line, apply 12-15V to the receiver.

The current consumption should be very low, about 10mA. If it's much more than this, switch off immediately and check for shorts on the board.

Now apply 15V and again monitor the diode and audio should be resolved.

**WHISTLE TUNED**

The harmonics should occur at 195 and 260kHz. A 3kHz whistle should be heard when tuned to Radio 4 at 198kHz. But, make sure by checking at 260kHz because it may be oscillating at 48.7kHz (4th harmonic 195kHz).

Once the receiver is tuned, apply audio line level to the transmitter (about 500mV peak to peak) and set R1 at the midway point. It the transmitter is now brought close to the receiver, the receiver noise should reduce and audio should be resolved.

Now adjust R2. Then you should separate the transmitter and receiver until the signal becomes noisy. Then adjust R1 on the receiver for best signal to noise ratio.

If the core of L1 has to be screwed fully in, then C10 can be increased to 27nF and L1 retuned (in practice this is unlikely to happen). The units are now aligned and may be installed.

---

Fig. 3: Circuit diagram of the infra red receiver developed by G6KSN (see text).
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READY FOR USE

The infra-red units are now ready (really?) for use. If the required path is indoors then no more needs to be done. If, however, the path is long or is in a brightly lit location, then a tube fitted over the receive diode should minimise interference from the sun, etc. If the path is very long but still 'optical' then lenses may be required. Placing the transmit (only one is used now) and receive diodes at the focal lengths of converging lenses (Fig. 4) depending on lens quality, ranges of several kilometres should be possible.

In general if the path is 'optical' and the lenses are sufficiently good, then the system will work. For ranges up to 1km lenses of 32mm diameter should be adequate. The receive diode should be mounted in a tube. I found that plastics drainpipe works well, as this minimises incidental radiation from the sun.

Communications via obstructed pathways are also possible, providing that some means of scattering the light round the obstruction is available. Signals via scatter of reflection from buildings are likely to be very weak.

OBSTRUCTED PATHWAYS

With obstructed pathways, large lenses giving high 'gain' must be used in order to obtain an acceptable signal to noise ratio. With any lenses in use, the 'beam' is very tight and alignment will be critical (to within a couple of degrees in both horizontal and vertical directions, so be warned!). I recommend that a tilt and pan mount should be used and it must be mechanically very stable. For portable use, a photographic tripods work well.

I've also got a tip about the weather. If the diodes are to be mounted for outdoor use, it's a good idea to weatherproof the installation to prevent the ingress of moisture.

SHOPPING LIST

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
<th>Notes</th>
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<tr>
<td>Resistors</td>
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<tr>
<td>Carbon/Metal Film 1W 3%</td>
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<tr>
<td>Miniature electrolytic 16V working</td>
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<td>100µH pile wound e.c.w. on a 5mm former with a ferrite core.</td>
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<td>Diodes</td>
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<td>TIL100</td>
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<tr>
<td></td>
<td>7812</td>
<td>1 IC1 (any manufacturer)</td>
</tr>
<tr>
<td></td>
<td>TBA1205</td>
<td>1 IC2</td>
</tr>
</tbody>
</table>

HOURS OF FUN IN THE RED ZONE

In use, the unit has proved reliable and has provided me with hours of fun experimenting with various pathways, etc. I hope my 'red zone' project will be of use to others either for fun, or perhaps some more serious work in this fascinating part of the electromagnetic spectrum.

PW

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**TRANSMITTERS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Spec</th>
<th>Kit Price</th>
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<td>AT160</td>
<td>80 &amp; 160MHz bands AM/SSB/CW 10W PEP adjustable</td>
<td>£39.90</td>
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<tr>
<td>CTX</td>
<td>60MHz CW Transmitter, 40M or 80M versions</td>
<td>£41.50</td>
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<td>MTX20</td>
<td>20MHz (adjustable) CW Transmitter</td>
<td>£29.90</td>
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<tr>
<td>HXT10</td>
<td>10.5 &amp; 15MHz SSB/CW Exciter (vtx crystal filter)</td>
<td>£49.90</td>
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<tr>
<td>HPA10</td>
<td>3/3.5W PEP Linear Power Amplifier to suit HT10A</td>
<td>£39.90</td>
</tr>
</tbody>
</table>

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- 2M16dx, 16 element, 14.5dBd, 9.4M boom
- 2M14dx, 14 element, 13.8dBd, 7.7M boom
- 2M12dx, 12 element, 13.0dBd, 6.1M boom
- 2M10dx, 10 element, 12.0dBd, 4.6M boom
- 2M8s, 8 element, 11.0dBd, 3.6M boom
- 2M6s, 6 element, 9.5dBd, 2.5M boom
- 2M3s, 3 element, 7.0dBd, 1.0M boom

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- 70CM24dx, 24 element, 16.3dBd, 5.4M boom
- 70CM18dx, 18 element, 15.0dBd, 3.7M boom
- 70CM12s, 12 element, 12.9dBd, 2.0M boom
- 70CM6s, 6 element, 9.5dBd, 1.0M boom

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38 Practical Wireless, January 1994
The Howes Communications dual bandwidth ASL5 audio filter kit

Tex Swann G1TEX, the PW Technical Projects Sub-editor has been busy building an interesting filter kit from the well known C. M. Howes Communications range.

The Howes Communications dual bandwidth ASL5 filter kit, built into the associated HA5OR enclosure.

One of the main features to be found on a modern commercial transceiver or receiver, must be a variable bandwidth control. This effectively sets the audio bandwidth to suit the incoming signal type.

In operation, you set the bandwidth control wide for listening to broadcasting stations. It's then set to narrow for speech on single sideband (s.s.b.) mode or very narrow for Morse (c.w.)

On many commercial transceivers or receivers this control is actually applied at one, or other, of the i.f. frequencies. However, when constructing a simple set for everyday use, this technique may not be easy or cheap to apply.

Fortunately, it's possible to add an audio bandwidth limiter after demodulation. In essence, this is what the C. M. Howes Communications ASL5 is.

TOP QUALITY

The ASL5 kit arrived well packed with top quality components. Along with the silk-screened p.c.b. and components in sealable plastics bags were six A4 pages of instructions.

The first two pages of the instructions consisted of general information. These described the kit, its specifications, and what tools were required. There's also one and a half pages of important Do's and Don'ts for kit builders.

As this is a review of a kit, I decided to follow the assembly instructions to the letter. So, beginning on the third page, I was instructed to insert the terminal pins into lettered holes on the p.c.b.

FULL MARKS

I awarded full marks to the Howes instructions for two small diagrams. These showed a terminal pin and how it should look when inserted into the board.

Then it was on to the resistors. In the instruction sheets, the resistors are listed in ascending value order. Each value has its colour code shown along with the positions to receive these values. Again, I awarded full marks for two more small diagrams showing how to read the colour code.

Then I came to the capacitor installation stage. Their value markings were also described more than adequately, along with the positions to be filled. I was also impressed with the paragraph on how to identify the '+' and '-' leads of electrolytic capacitors.

There follows two pages of advice and diagrams of linking the ASL5 board into a typical set-up. It was all very easy to follow and p.c.b. assembly took about three hours.

The final page of instructions includes the full circuit diagram. This reveals that the units are twin dual cascaded filters followed by an audio amplifier.

An audio level control is fitted in the narrow band filter output. This allows the subjective level on c.w. to be brought up to the other two bandwidths.

BOXING IT UP

My next job was to start boxing the project. I had chosen the C. M. Howes Communications HA5OR to complement the filter kit.

The housing kit consists of two pre-formed pieces of heavy gauge bright aluminium sheet. One piece, which becomes the bottom, has a neat screen-printed panel already fitted to the pre-punched front panel.

I only had to drill four 3mm holes for panel mounting bolts which were supplied. Then I had to drill three larger diameter holes for the power cable (grommet supplied) and for two 3.5mm jack sockets (also supplied).

Marking out, drilling the holes and mounting the p.c.b. was not difficult. But this work and making a fairly neat job of wiring the three i.e.d.s that show the selected bandwidth, took me another four hours.

It took me four hours to complete the job because I had to hunt for some suitable hook-up wire. I also had to find a length of coaxial cable.

The lack of the audio coaxial cable has to be a (lengthy) minus point I'm afraid. I would have felt disappointed to have arrived at this point as a beginner on a Sunday afternoon, to find that I needed some other wire to get it up and running, as it's not mentioned in the instructions.

Dave Howes commenting on the review said "Audio coaxial cable is not required for wiring the module within the screened metal case, only for the external inter-connecting jack leads. It's non inclusion in the hardware pack is because it is not required".

SUMMING UP

In summing up, I must say that the project worked very well indeed. I tired the completed project out on the PW Tiny TIM in the middle of the evening on a very crowded 3.5MHz band segment.

On switching to the Speech filter the incoming audio became much cleaner and easier to listen to. Off frequency signals were reduced from annoying to just audible but of no concern.

I could hear a few c.w. signals. But with my poor ability to read Morse code, and the general babble of other signals I would have given up had I not tried the Narrow setting of the unit.

When switched to Narrow, and with a little retuning to bring the c.w. tone into the passband of the filter, the Morse became much more readable. I even found it easier to identify the few Morse characters I do recognise.

I think the project provides an excellent add-on for radio listening. I would rate the pair of kits as ideal for the beginner and the more experienced builders.

My thanks go to C. M. Howes Communications at Eydon, Daventry, Northamptonshire NN11 6PT, tel: (0327) 60178, for the two kits which they can supply for £29.80 plus £4 p&p.
How often have you been walking into a department store and received a static shock as you have touched the counter? Apart from the pain and the surprise, just consider the effect this could have on electronics components. It’s worthwhile to return to the basics, remembering those science experiments from school. You’ll probably remember that some materials when rubbed cause a static charge to be built upon them. The effect is called triboelectric charging (from the Greek ‘tribein’ to rub). This varies in both type of charge (negative or positive) and potential, which is based upon the triboelectric series of the materials in question. Varying surface conditions make it difficult to get a reliable indication of the resulting charge, so I’ve not shown that table. However, it’s enough to say that the further apart the two materials are in the series, the greater the potential.

**BODY CHARGE**

Walking across a floor causes your body to charge up. It does so in the same way as the science experiment charged up the material. In fact, any movement causes your body to become charged. As you are insulated from the floor by your shoes, the charge obviously goes somewhere. In practice, as soon as you touch an earthed object (a large metal body can be classed as an earth), the potential is discharged and that’s when you’ll say “Ouch”! And surprisingly perhaps, the average human sensation level for static discharges is about 3000V. The human body can be regarded roughly as 100-300pF, so I’ve not shown that table. However, as you are connected to earth via a wrist strap, it could be lethal. All workers who handle high voltages, and are in the workshop, should be connected to earth via a suitable wrist strap, it is important to ensure that it is properly earthed. Suitable wrist straps and earth point plugs are available from most mail order suppliers. An Residual Current Circuit Breaker (RCCB) on the shack mains will help avoid risk of shock. A humid atmosphere will reduce the values of the static charges. Steve Best G6EJP takes at look at the causes of the many problems caused by static charges. Steve also provides tips on how you can minimise problems in the workshop.

**Fig. 2: A Residual Current Circuit Breaker (see text).**

Steve Best G6EJP takes at look at the causes of the many problems caused by static charges. Steve also provides tips on how you can minimise problems in the workshop.

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**Table 1: Killer voltages for common components.**

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Range of vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMOS</td>
<td>30-1800/V</td>
</tr>
<tr>
<td>MOSFET</td>
<td>100-200/V</td>
</tr>
<tr>
<td>GaAsFET</td>
<td>100-300/V</td>
</tr>
<tr>
<td>JFET</td>
<td>140-7000/V</td>
</tr>
<tr>
<td>OP-AMP</td>
<td>190-2500/V</td>
</tr>
<tr>
<td>CMOS</td>
<td>250-3000/V</td>
</tr>
<tr>
<td>Bipolar transistor</td>
<td>380-7000/V</td>
</tr>
<tr>
<td>TTL device</td>
<td>1000-2500/V</td>
</tr>
</tbody>
</table>

---

**Fig. 1: A rough graphical model of the discharge current waveform for the human body (see text).**

As your capacitance and potential (roughly doubled), the voltage will increase (roughly doubled). As your capacitance and voltage vary by the same factor your stored energy value (= 1/2 CV²), also increases in proportion to the increase in capacitance. The answer is that it’s from the mechanical effort of lifting the foot.

**LIMIT TO VOLTAGE**

There is a top limit to the voltage that you can charge your body up to. This is due to the finite minimum capacitance that your body has (in the region of 30pF) and the corona which will bleed off charge around 35000V. Now look at the data available for some electronic devices, as shown in Table 1. From the data it’s obvious that if nothing is done to try and reduce the potential on your body, serious damage is likely to occur to electronic devices. The problem of high static voltages is but one difficulty. Another is caused by the rise time of the current peak of the discharge, and this is an important consideration. For example, discharges from the end of the finger have a relatively slow rise time which may damage devices. However, discharges from the end of a screwdriver etc., produce the shortest rise time which is almost guaranteed to destroy the device. Devices are reported to fail in the following ways:

1. **Junction burnout.** When a semiconducting junction is carrying high current, the junction melts.
2. **Dielectric breakdown.** When the insulating silicon dioxide layer of the device is punctured. (This may also refer to the capacitors).
3. **Metallisation melt.** When the bond wires inside the device act as fuses.

Now we have some idea about the material involved, what can the amateur do to reduce the risk of damaging his precious components? Remember, that even when a device is in a p.c.b., damage can still occur, so rips under repair are at risk too.

The storage of components is a good area to start with. So, try answering the three questions below:

**Do you?**

1. Use small plastic bags to hold components in?
2. Use polystyrene to avoid bending legs of components?
3. Use polystyrene ceiling tiles to push components into during assembly?

If you are like me, most of you will admit to answering yes to at least one, if not more of the three questions. Unfortunately, by using the three methods outlined in the questions you’re likely to kill devices or at least reduce their efficiency or working life.

One solution is to store components in the tailor made plastic bags which have a dissipative coating. Or if that’s not possible, how about plugging the components into the black conducting foam used in the electronics industry for holding components, then putting them into the bags? To protect them, Dual In Line (DIL) i.e.s can be stored in i.c. tubes as these are specially treated.

**BLACK FOAM**

The black foam is also useful for holding components during assembly. This is because working on the bench is a hazard unless you are sitting on the floor is a hazard unless the surface is of the dissipating type.

**Warning:** these straps have a high value resistor in series with the lead, and home-brewed straps could be dangerous.

Suitable wrist straps and earth point plugs are available from most mail order suppliers, A Residual Current Circuit Breaker (RCCB) on the shack mains will help avoid risk of shock. A humid atmosphere will help reduce the values of the static charges. But we advise against buckets of water in the shack! Remember, that if you are working with high voltages, and you are connected to earth via a wrist strap, it could be lethal. All good shack safety precautions must be taken, so it’s better to kill a component than kill yourself!
Ian Poole G3YWX begins to unravel the mysteries of equipment specifications in the first part of a series of articles. And to start off Ian deals with receiver selectivity.

One of the most important features of any radio is its ability to pick out the required signal and reject the unwanted ones on other frequencies. This characteristic called selectivity is at the heart of any receiver. As a result, receivers boast a number of figures and specifications about their selectivity characteristics.

**ACCEPT AND REJECT**

The selectivity of the receiver which enables it to accept the wanted signal and reject others on adjacent channels is governed chiefly by the selectivity in the i.f. stages. In the i.f. stage a high quality crystal filter is generally used in most of today's receivers.

Crystal filters allow exceedingly high levels of selectivity to be achieved. They often render signals inaudible when they are just a few kilohertz off channel.

To investigate how selectivity specifications are quoted it's necessary to look at the characteristics of the filters which are used. In an ideal world a filter characteristic would look like that shown in Fig. 1.

From Fig. 1 you can see that a signal will suffer no attenuation within a certain band of frequencies known as the pass band, and it will be heard in the receiver speaker. Outside this band is the stop band where the signals are highly attenuated, and consequently can't be heard.

**A PERFECT FILTER**

Unfortunately it is not possible to make a perfect filter. A more realistic characteristic with a number of imperfections is shown in Fig. 2. It can be seen that there is a small amount of loss, often about 2dB.

The loss caused by a filter is not important as far as the overall receiver specification is concerned, as it is overcome by the receiver gain. Similarly the ripple in the pass band, or the in-band ripple is not normally quoted.

Because the filter response does not fall away infinitely fast it's necessary to choose a point on the response where the pass band can be defined. This is normally taken to be the point where the response has fallen by 6dB, i.e. to half the voltage or a quarter of the power.

The pass band is then the band width between the two -6dB points. To be totally correct the pass band is 0dB, Increasing attenuation

The pass band is then the band width between the two -6dB points. To be totally correct the pass band is

In fact to give an indication of the shape of the filter response a 'shape factor' is sometimes quoted. The shape factor is simply the ratio between the pass band and the stop band bandwidths. Thus a filter having a bandwidth of 3kHz at -6dB and 6kHz at -60dB would have a shape factor of 2:1. For this figure to have real meaning the two attenuation figures must also be quoted. In other words it might quote a shape factor of 2:1 at 6/60 dB.

Filters may also be quoted in terms of the number of poles they possess. To explain this in any detail requires looking at some filter theory. However it is sufficient to say that for every crystal a filter contains, there will be a pole.

Put simply, an eight pole filter has eight crystals. In fact most filters today have six or eight poles.

**DIFFERENT BANDWIDTHS**

Often a receiver will have several different bandwidths quoted. This is because different bandwidths are required to receive different types of transmission.

The bandwidth used on communications receivers for a.m. is normally about 6kHz, although for m.w. broadcast reception a wider bandwidth might be needed. However, s.s.b. reception needs a bandwidth of just 3kHz and most receivers use between 2.2 and 2.7kHz.

For Morse reception much narrower bandwidths can be used. For c.w. work 250Hz filters are sometimes available, although most people prefer a wider filter and use 500Hz.

I hope I've solved some of the mysteries of specifications for you.
It's The Big One.....

Fresh In From 'Stateside

The ARRL Handbook For Radio Amateurs 1994 Has Arrived

You can almost imagine a fanfare as this amazingly popular book arrives in from the USA. The 'Handbook' has got to be the single most comprehensive book available for radio amateurs anywhere in the world. Now in its 71st edition, the book continues to grow in size and reputation every year. The 1994 Handbook runs to over 1150 pages with 39 chapters and appendices.

The 1994 edition of the handbook continues the tradition set by previous years and it's packed with all the basic information and latest circuits with the added bonus of some really up-to-date projects. Ideas for 1994 include W9GR's new digital signal processing project which introduces you to the exciting technology with the traditional 'hands on' approach appreciated by PW readers.

There's also an up-date and new circuit approach for the popular Curtis-keyer-on-a-chip. The Digital Equipment chapter includes a new version - small enough to fit in virtually any rig. For the h.f. operator there are new versions and several completely new projects to build. Many of the projects have p.c.b. templates supplied separately at the back of the book

The ARRL Handbook Editor Robert Schegten KUTG has moulded yet another marvellous collection of theory, projects, practical ideas and dedicated subject chapters into yet another winner. I found the sections dealing with v.h.f., u.h.f., video and space communications to be particularly interesting.

If you enjoy a really good read, backed with plenty of technical articles and projects served up in a light, informal but informative style - The ARRL Handbook For Radio Amateurs 1994 is just right for you. Find the biggest stocking you have for Christmas - it's a big book!

G3XFD

Although the ARRL Handbook For Radio Amateurs 1994 continues to grow in reputation - we have managed to keep the price down again. Get your copy for just £18.95 plus £1 P&P.

Radio Diary

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

*December 12: Centre of England Christmas Radio, Satellite, Computer & Electronics Rally is being held at the Sports Connection Centre, Leamington Road, Ryton on Dunsmore, Coventry A45/A423. Doors open at 11am, 10.30am for disabled visitors, admission £1. Over 80 traders, Bring & Buy, talk-in on S22. Bar and hot food all day, ample free parking. Christmas special 'Spot the Cracker' on many of the trade stands to win a prize. Frank Martin on (0952) 596173.

1994

January 23: Oldham ARC are holding their annual radio rally at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Large trade presence, free parking, doors open at 11am, 10.30am for disabled visitors. Morse testing available, talk-in on S22. Bring & Buy, free programme, draw prize and mobile contact prize. Kathy G4ZEP, OTHR.

February 3: 3rd Northern Crown Rally is being held at the Rodillian School on the A61 between Leeds and Wakefield (near junction M1/M62). Doors open at 11am, 10.30am for disabled visitors and Bring & Buy. Usual dealers, ample parking, refreshments and talk-in on S22. Dave Gray on (0352) 827683.


March 27: Bournemouth Radio Society are holding their 7th Annual Sale at Kinsson Community Centre, Pelhams Park, Milton Road, Kinson, Bournemouth. Doors open at 10am. Talk-in from G1BRS on S22. Amateur Radio and Computer Traders, clubs and specialised groups. Admission £1 including free raffle ticket. Ian G2BDV OTHR on (0202) 866087.

April 3: Launceston Amateur Radio Club will be holding its 8th amateur radio rally at Launceston College. Doors open at 10.30am, well known traders, ample parking. RSGB Morse tests on demand (bring two passport photographs). Roy G2ONC on (0045) 271256 or Rodney & Joy on (0566) 715716.

April 17: Bury Radio Society will be holding a rally at the Castle Leisure Centre, Bolton St, Bury. Doors open at 11am, 10.30am for disabled visitors. Bring & Buy, talk-in on S22, refreshments and bar available. Laurence on 061-761-9358 evenings.

May 2: Dartmoor Radio Rally will be held at Yeovilton Memorial Village Hall, Meavy Lane, Yeovilton, Devon. Trade stands, Bring & Buy, refreshments etc. Parking for disabled, doors open 10.30, talk-in on S22. Ron (0822) 852596.

May 8: Midland Amateur Radio Society/Drayton Mobile Radio Rally is being held at Drayton Manor Park, Tamworth, Staffs (A44/A41). Doors open at 10.30am, usual traders, flea market, car boot and club stands. Peter G6DRN on 029-244-1189.

May 8: The 10th Yeovil ORP Convention will be held at the Preston Centre, Yeovil, Somerset. Doors open 9am - 5pm, free car parking. Traders, ORP kits and components plus club Bring & Buy and ORP club stand. Natter area and refreshments. Peter G3CRD, OTHR on (0393) 813354.

May 29: The 18th Annual East Suffolk Wireless Revival will be held at The Maidenhill Sports Centre, Stoke Park Drive, Ipswich, Suffolk. Attractions include vintage radio display, Noyce stall, RAUC, BYLARA, RAINET. Non radio stalls and refreshments. Talk-in on S22. Bob Baal on (0394) 271257.

June 19: Denby Dale & DARS Annual Mobile Rally will be held at Shelley High School, Phil G4FSO on (0444) 544827.

June 26: The 37th Longeston Amateur Radio Rally is being held at Longeston House, Warmminster, Wiltshire. Shaun O'Sullivan G4GVP on (0772) 864242 (office hours) or (0225) 872098.
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DC10 £10.00; RN Trans 2m/6m £175.00; TV-6F230 £195.00.

FREE MAIL ORDER DELIVER FOR CHRISTMAS
This month Peter Hunter G0GSZ has a mixed bag, which should please everyone reading the column.

I'll start off this time with a cry for help from Peter DK4BF. He wants information of a ZX81 User Group in the UK.

Peter belongs to a group of 60 in Germany called the ZX-TEAM. Six of the group are radio amateurs. There are user groups in the Netherlands and Canada. Peter feels sure their must be ZX81 users in the 'Fatherland of Sir Clive'.

I haven't been able to find any information, but if anyone can help please write to me, or direct to: Peter Liebert-Adelt DK4BF Luetzowstrasse 3, D 38102 Braunschweig, Germany.

Pride And Joy

Ted G8VEL sent me a photograph of his 'shack' layout a little while ago (see Fig. 1). This got me thinking that a lot of you out there may want to share your 'pride and joy' with other readers. So I decided a new feature 'Readers' Spot' is called for.

If you'd like to see your 'computerised shack' featured in 'Bits & Bytes' just send me a clear photograph, with your name and any other information and I'll do the rest. Please, do not write on the back of the 'photo. Photographs can't be returned, so make sure it's a spare.

Amiga Group

If you belong to the Amiga Amateur Radio Users Group (AARUG) please note that the new PD library manager for surnames A - M is: Ross McKinnon GO7BKH, 30 John Smale Road, Barnstaple, N. Devon EX31 2HR. And please don't forget the return postage.

If you're not a member of the AARUG, but would like to be, then write to: Bob Welbeloved G3LMH, Fichtenweg 10C, 53804 Much, Germany including an IRC for return postage.

That's it for another month, and indeed for 'Bits & Bytes' first year. It'll be interesting to see what 1994 brings! Your letters etc., to me Peter Hunter G0GSZ, 2 Mayes Close, Bawthorpe, Norwich NR5 9AR. Tel/Fax: (0603) 748328. Packet: G0GSZ @ GB7LDX.SBS.BRU. 73 de Peter.
Ron Ham invites you once again to enter the friendly atmosphere of PW's very own wireless shop. But, watch out for those sprigs of holly hanging from those storage racks!

Firstly, may I wish all of my readers a very happy Christmas and a prosperous new year. Secondly, I want to thank many of you for your kind remarks about 'Valve & Vintage'.

You have entered into the spirit of the column. And believe me your letters, comments and tips about the various items of vintage equipment that I have mentioned, are much appreciated.

**Vintage Wireless Day**

Despite the rain, it was a happy get-together for the many collectors and enthusiasts who visited the special Vintage Wireless Day, held at the Amberley Chalk Pits Museum (West Sussex), on September 11.

Everyone attending the vintage wireless day was pleased to welcome Tom Morita, a collector from Japan, who was paying a flying visit to the UK. Tom heard about the event through this column and stayed an extra day to be at the Chalk Pits.

The Chalk Pits event was organised by David Rudram. David is the Honorary Curator of the museum's wireless exhibition and he was assisted by radio engineer Ron Weller.

Ron and I were young engineers together at the same firm 45 years ago. During the Wireless day we were delighted to meet Joe Hastings, another of our former colleagues.

We remembered some of our work together all those years ago. Each day, Joe, Ron and myself took our turn in connecting up about 150 2V lead-acid accumulators from wireless sets for charging!

As guests, Joan and I met many old friends among the exhibitors and visitors. The magazines Radio Bygones and 405 -Alive were represented by Geoff Arnold G4GSR and Barbara his wife, and Andy Emmerson G8PTH (Andy writes the ATV 'Focal Point' column in PW) respectively.

Gerald Wells was there representing the British Vintage Wireless Society. A 405-line television display was demonstrated by Bill Journeaux with his own television system, a Baird 30 -line mechanical system.

Visitors to the event could also be entertained with contemporary music and live interviews with visitor and exhibitors. Visitors to the event could also see themselves on the video screen. This was provided by courtesy of roving TV cameras, operated by members of the Video Repeater Group.

Beautifully restored sets and speakers from the 1920s and 30s were shown by Mr. B Brett-Knowles, John Narburgh, Mr. Patten and Bob Small. Gramophones were shown by Mr. K. Stroud.

A replica of the Baird 30-line television system was demonstrated by Dave Sumner. Dave had built the mechanical system himself.

As well as showing a 1920s McMichael 'Super Range Portable Four' David Rudram pointed the way for future collectors. He is seen in Fig. 1, next to his McMichael. David is shown holding a Philips NT300 (left), a Wonder 880 a.m. pocket radio and a Sinclair Micromat (right). These are all from his considerable collection of 'novelty' transistor receivers.

**Famous Booklets**

Periodically, original copies of such famous wireless booklets, from the 1920s as The Popular Wireless Radio Handbook and Wireless Questions Simply Answered are on the second hand market. However, if you can't find a copy, your luck has changed!

Reprints of the 1920s booklets are now available from Peter & Valerie Wallage. Peter and Valerie now have 18 of the publications on their reprints list.

The Wallages had a selection on their stand at the Chalk Pits special event. Each one measures approximately 145 x 206mm, have between 30 and 45 pages, and the post-free price varies between £2.95 and £3.95.

I think the Wallage reprints are good value for money. Particularly for illustrated publications that are a mine of contemporary information for wireless collectors. Readers who are interested can obtain the Vintage Wireless Booklets contents and price list by sending an s.a.e. to: Peter and Val Wallage at 48 Albert Road, Ashford, Kent TN24 8NU.

One of my favourites in the Vintage Wireless series is the already mentioned Handbook. Pages 7, 8, and 9 entitled 'Selected Radio Definitions' are especially interesting. In addition, among its 32 pages, are 15 plus circuits, a page of circuit symbols and easy to read text dealing with antennas and earths, batteries, components and loudspeakers.

Peter told me what they're aiming at. He said "we're aiming to preserve and make available to enthusiasts, in reprint form, at a reasonable cost, information on their hobbies from ephemera such as booklets, books and magazine features which are now hard to find".

**Hospital Radio**

During the vintage wireless day, a team from our local hospital radio service 'Coastway Hospital Radio' were busy. They kept everyone entertained with contemporary music and live interviews with visitor and exhibitors.

Among the visitors to the Chalk Pits Museum event was Dave Higginson, Fig. 2. Dave soon became the proud owner of a rare Marconiphone Model 82 superhet receiver which he plans to renovate. Because the Model 82 has an unusual design, I took the opportunity on behalf of Valve & Vintage readers to have a detailed look at it. The set, made in the 1920s, was recently found in a garage.

Although complete, Figs. 2 and 3 show the deterioration of the cabinet and the remnants of rotting wood on the frame antenna. Fortunately the 'G. Marconi' emblem (lower centre) has survived...
the damp and the woodwork of the cabinet is complete.

The sub-chassis holding the eight valves and other components is mounted on a strip metal, skeleton frame, Fig. 4. Some of the wiring is bare and where necessary it’s insulated with black china beads.

Typical inter-valve transformers with their ‘I’, and ‘O’ primary and ‘I’ and ‘O’ secondary markings are at the top centre. The multiple contact, two-way wave change switch (top right) is mounted below the tuning coils.

One of the valves and a side to know that Dave Higginson of 28 High Street, Misterton, Doncaster, Yorks DN10 4BU (0427) 890768, is a professional radio and television engineer. Dave says he’ll give estimates, without obligation, for repairs and renovation of vintage sets.

**One Valved Receivers**

A recent episode of ‘V&W’ reminded Mr E. Redshaw (Belper, Derbyshire) of the one valved receivers he and his friends built, around 1928, at the age of 14. Mr Redshaw says he’ll never forget the wooden baseboards, Ebonite or plywood front panels and the Mullard PM1 ‘A’, ‘HF’ and ‘HL’, series of 2V filament valves and the Igranic, Lissen or Telsen coils and transformers.

“We didn’t get into cabinets for some years!”, Mr Redshaw wrote. He added that “one ‘house’ set resided on a table, along with all the batteries’.

The moving-coil loudspeaker, mounted on a baffle-board, hung from the ceiling above. His father used to “twiddle the knobs” on dark nights trying to get German stations on the medium-wave, especially to hear their military bands.

**Marconi CR100**

My recent reference to the Marconi CR100 has prompted several of you to write to me about this wartime communications receiver. One letter came from John Long (Cambridge).

John told me that he served as a Radio Officer on a Merchant Navy Aircraft Carrier during the Second World War. He knew the Marconi CR100 communications receiver as the Royal Navy ‘B28’ with a blue front panel and a black cabinet.

John’s ship also had the low-frequency version of the CR100, a ‘B29’. This they used to copy weather forecasts from Whitehall.

From my memory John, the appearance of the ‘B29’ matched the ‘B28’. The frequency coverage ranged from 10 to 600 kHz in several bands.

After the Second World War the Royal Navy replaced these sets with the ‘B40’ and ‘B41’ respectively. They worked well, but were still just as weighty!

“A lot of the ex-Royal Navy sets will have a RIS (radar interference suppression) input up on the top left of the front panel”;

So wrote Ron Wilson (Exeter).

Ron continued, “This terminal is connected to the suppressor grids of the two r.f. stages and should be disconnected and the suppressor grids connected to their respective cathodes”. Ron was a Petty Officer radio mechanic in the Royal Navy during the Second World War.

Ron is very familiar with the ‘B28’. He would like to emphasise the need to be very careful of the smoothing capacitors.

On one occasion Petty Officer Wilson had drawn a set from storage and was getting it ready for service. A few minutes after switch-on Ron says “there was an almighty bang. The electrolytic had exploded, the lid of the set was open and the can denied the ceiling of the workshop”.

As a result, the inside of the set was covered “with an infernal mess”. Ron told me that these sets tended to drift in frequency but “experienced operators, keeping listening watch on specified frequencies, would prop the front of the lid open to reduce heat and consequent drift”.

“About five years ago a rather dirty but original CR100 came into my possession” said John Hoban (Bolton) who wrote in to say he was overcome by “great waves of nostalgia”.

John, remembering the fun he had operating a CR100 back in the late 1950s, embarked on a restoration project that lasted several months. The set was completely stripped with only the mains transformer and valve holders left on the chassis.

He replaced all the perished rubber wiring with modern coloured wire. He even opened the i.f. transformers for re-wiring!

John spent a long time on the coil packs. He also replaced the Paxolin waters with ceramic on the wave change and i.f. band-pass switches.

Changing from Paxolin to ceramic was achieved by raiding other switches from his stock for bits. He cleaned all of the small silver-plated switch contacts in a jewellery cleaner and when complete, added a single application of Electrolube.

John has used Electrolube for many years and tells me that it is available from Maplin Electronics. Apart from replacing the ‘small’ capacitors and resistors and realignment throughout, John also sprayed the front panel in a gunmetal grey (and re-lettered it) and finished the case in metallic silver.

Well done John! I’ve no doubt that all your hard work was worth it at the end.

Well, that’s the lot for this time. And I’m looking forward to your company next time the PW ‘wireless shop’ is open for business next month. In the meantime you can write to me at ‘Faraday’, Greyfriars, Storrington, West Sussex RH20 2HE.

**Fig. 3: The Marconiphone Model 82 bought by Dave Higginson will need restoration as it had been stored in a garage for many years. Fortunately, Dave is a professional radio and television engineer who can carry out the work himself (see text).**

**Fig. 4: The sub-chassis of the Marconiphone Model 82 (see text).**
A CHRISTMAS PRESENT...

Wouldn't it be wonderful to pass on the pleasure which amateur radio has given you?

You can buy D-i-Y Radio Magazine as a gift subscription this Christmas and open up the doors to the wonderful world of amateur radio. D-i-Y Radio is the magazine for beginners of all ages published by the Radio Society of Great Britain. It encourages a long-term interest in radio and electronics and may even help towards a worthwhile career.

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- An RSGB Map of Western Europe
- An RSGB Pen
- Plus a large plastic wallet to keep them all in!

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All for only £9.00*
Paul Essery GW3KFE passes on some h.f. operating tips, news from your letters and information on activities on the bands.

When you're on the air, you must be able to know immediately when the set-up deviates away from being correct. Normally however, the tools you have available are few. Usually there's the s.w.r. indicator, field-strength meter, multi-range test meter and the rig's own meter.

Once you have things to your liking, you're only looking for changes. Be careful, though. Always record the beam heading, the precise position and reading of the f.s. meter, a.t.u. setting, and the power input, at 30-kilometer intervals across each band.

By recording the data I've suggested, you ought to be able to work around a very small order. On the receiving side, a quick and quite severe check is to look at a dummy load through the a.t.u. You should be able to notice the change of noise level as you peak the a.t.u. tuning. Or, if you're using an older rig, observe the same effect as you tune up. A tune round the band will soon show you that your filters and your audio are working correctly.

Back for a moment to the pile-ups. Remember that when the DX operator works split-frequency they do so to prevent all but the very experienced operators from working them.

It's up to you to work out their operating pattern and so get the contact!

**Conditions Variable**

Recently, conditions have been variable with days of no sunspots, and others with lots. Occasional openings on 20MHz for a few minutes, lots of Sudden Ionospheric Disturbance) events blacking things out. At the time of writing though, things were looking up.

Don G3NOF notes that the 14MHz morning long-path openings to VK and ZL were good up to 0900UTC. He says the short path to W6, VK, Asia and KL7 around 1500-1900. He says 18MHz has been pretty fair, with N. Americans sometimes from 1030 up to midnight. On 7MHz Don reports that South America has been noted between 2200-2300UTC.

**Coming Events**

Now it's time to look at coming events. The 3Y1, Peter 1st Island expedition is still a 'go'. But at the time of writing the arrangements are still being finalised. Keep an eye open for this - it'll be a 'biggie!'.

The BVI Pratas effort is reported as slipping. It may not take place until late November.

All 1.8MHz band addicts should remember the 1994 CW World 160 Metre Contest. The c.w. leg runs between 2200UTC January 28 to 1600 on January 30, followed by the 'Phone weekend over February 25-27.

Intendingcontesters should note that the rules specify a DX window between 1.825-1.835MHz. This is to attract the rare countries, who will listen outside the window. A change to the rules makes the /MM stations worth five points but no longer valid for multiplier status.

Notice also that for this contest K8 and KL7 are counted as countries not states. Also, the WAE countries are added to the DXCC ones, so GM Shetland for instance counts as another country.

Disqualification rules are more severe now. Those who are borderline - e.g. just short of the 3% dupes mark - may have a warning and have this indicated in the published results. So play, but be aware!

Mailing date for logs is February 28 and March 31 respectively. They should go to: David L. Thomson K4JRB, 4166 Mill Stone Court, Norcross, GA 30092 USA. Please indicate 'c.w.' or 'Phone' on the envelope.

**Your Letters**

Time to look at your letters now. A note from GW4JSY up the road from me, tells that he has worked ZD9X. This operator started on September 17 and will be there until March 1994. No cards have been printed as yet.

Alas, Ted G2HKU has been in the wars again. A quick (very quick, complete with blue flashing lights) trip to the bandage factory meant radio activity has fallen this month.

Nonetheless, despite the hospital trip, Ted caught VK0KM on 10MHz. He also worked him again on 18MHz, where ZD9X was also hooked with QRP. The latter was also raised on 24MHz using full power.

Ted also picked up TA6JM on 18MHz. Equipment at G2HKU comprises an Omni-V at 70W, IC-725 at 5W. On the QSL front, Ted notes that T97T is via S5AGD, and TA6JM is via SP7LZD.

Another operator who has not been feeling to good, is G4ITL. He had a heart attack in August and comments that he isn't quite what he was before. Our message of 'best wishes and get well soon' go to both G4ITL and G2HKU.

A late holiday cut into the operating time for John G3BDQ in Hastings. On 1.8MHz John found OHOBCI, 4X4NJ (at 1756UTC) and 5V8ZS, and he notes that while the lads in the north west of England and Ireland have been working the ZLs - split frequency - in both the morning and the evening openings, the south eastern England stations have heard the ZL either weakly or not at all.

The geographical advantage for the north western operators on 1.8MHz is in accordance with theory. This states that the grey-line path can only cross both countries at certain times of the year, and even then favours the western parts.

A thanks to QSLs received for an old one. It is not a major QSL front, Ted mentions that he hasn't had a lot of QSLs back from ZL either weakly or not at all.

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**Equipment at G2HKU**

Don has a four-element GAP antenna for 3.517MHz. He also says that he isn't quite as active as he used to be. He also says that he has been in the wars again. A quick (very quick, complete with blue flashing lights) trip to the bandage factory meant radio activity has fallen this month.

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A thanks to QSLs received for an old one. It is not a major QSL front, Ted mentions that he hasn't had a lot of QSLs back from ZL either weakly or not at all.
The antenna described here, was designed for a site where planning restrictions wouldn’t allow a separate antenna mast. However, a short mast on the roof of the chimney of the house was permitted.

The antenna can be accommodated in a garden with a maximum length of 16 metres, and it will operate on 7, 14, and 21 MHz without an a.t.u. The loop has reasonable DX characteristics with a relatively low angle of radiation.

My research into a suitable antenna narrowed to a full wave (on the lowest frequency of 7MHz) loop. I was very interested in the experimental results of L. V. Mayhead, G3AQc [11]. His work resulted from L. V. Mayhead, G3AQc [11]. His work involved measuring polar diagrams of different u.h.f. loop antenna configurations close to the ground.

John Devolder, ON4UN also favours low height, full wave loops for low band DX. His book [12] gives a wealth of information on antennas for low band DXing.

**Equilateral Triangle**

A loop antenna in the form of an equilateral triangle needs only one support point. If this support point is a mast fixed to the chimney then it overcomes the planning restrictions described above.

I decided to try to model this loop antenna using the computer modelling program ELNEC. This was to try to determine the antenna DX characteristics and to find the optimum point to feed the antenna.

Wishing to investigate other loop shapes, I started with an equilateral triangle delta loop antenna so that I could compare it with existing documented results. The first model was fed at the apex, resulting in a mainly horizontal polarization with pronounced vertical directivity, Fig. 1.

The reason for the antenna’s vertical directivity is, that the polarization is mainly horizontal. The results I found agree with existing data relating to low horizontal antennas.

Because of the pronounced vertical pattern this configuration is not suitable for DX. Although, the antenna would be useful for short skip QRP contacts.

When I moved the feed point on the antenna model to one of the lower corners, I obtained a much improved low angle radiation pattern. The result was probably due to the antenna being predominantly vertically polarised.

On the basis of the test results, I decided to build a real wire delta loop at my QTH, where the chimney is near the centre of the house. This means that the loop must be tilted from the vertical.

As the house is not in the centre of the plot, I felt this would be similar to the situation for most of you who try to reproduce this antenna. The constraints of the location, mean that the loop cannot be an equilateral triangle. The best I could manage was an asymmetrical, tilted delta loop, Fig. 2. From this drawing, you can see the antenna comes close to the ground.

**Possible Danger**

There is a possible danger of someone receiving an r.f. burn if they touched the antenna when the transmitter is on. For this reason I recommend using insulated wire for the lower half of the antenna.

As a loop antenna is not a high Q device, extremely high voltages, such as those found at the tips of a dipole, do not occur. So, the thickness of the insulation on the lower section of the antenna depends on the r.f. power used. For very high power I would use 50Ω coaxial cable with the outer braiding removed.

As this was experimental loop antenna, I used 2.6 mm wire with 1.0 mm thickness of insulation, obtained from the local scrap yard. Using an earthed wire, and 100 watts into the antenna, I was unable to draw a spark through the insulation of the element with this test.

For the top part of the antenna, I used bare copper wire. You could use insulated wire for all the loop, but lighter wire for the upper part, and a lightweight support, has a lower visual impact.

Using thinner wire doesn’t have much affect on the antenna performance, because the radiation resistance of a loop is fairly high.

**First Experiments**

My first experiments were carried out with the coaxial feed connected directly to the loop. I
found the s.w.r. was over 3:1.
As I didn’t have a noise bridge, I
couldn’t measure the feed point
impedance. But most literature
places the feed point impedance
of a loop antenna above 100Ω.

After fitting a 4:1 balun, see
Fig. 4, the s.w.r. dropped
even more and so that the antenna
could be used without an a.t.u. The s.w.r.
measurements for this antenna, with the balun, are
shown in Fig. 5.

I tried feeding the antenna,
first at the top apex then at one
of the lower corners. With the
antenna fed at the top the results
were as predicted by ELNEC.

When fed at the lower point
the results were not as good as I
expected them to be. This could
have been an environmental
effect, or that my antenna is not
an equilateral triangle.

I decided to model this tilted,
lop-sided antenna creation using
ELNEC. I’ve not attempted to
model its environment - but
more of this later.

When the antenna was fed at
either bottom corner the results
were not as good as if the loop
had been an equilateral triangle.
I gave this antenna
configuration up as a poor
performer, so I tried modelling
other feed points on the loop.

The best results occurred
when the antenna was fed about
one third up from the bottom on
the most vertical of the triangle
sides.

**Constructional Details**

Now, a bit more on the
costuctional details. Note that
the lowest leg of the triangle is
only 0.6m above ground.

The insulated corners are
held in position with a tentpeg
like arrangement. Although
with a fence, together with
shrubs and small trees I found
enough fixtures for the lower
corners.

The antenna apex is
supported on a 2.5m length of
scaffolding pole fixed to the
chimney about 9m above the
ground, with a double TV
antenna pole lashing kit.

This method of attachment
gives the antenna enough height
and a reasonable clearance
above the roof. The apex of the
loop is nearly 11m high.

The antenna feedpoint, with
my antenna, came level with the
flat roof of the house extension.
This was a convenient point to
experiment with matching
devices, feeding the antenna
with a 4:1 balun.

**Environmental Effects**

Now, a bit more about the
environmental effects on the
performance of the antenna.
Traditional multi-band antennas,
such as the G5RV, just don’t
work at this house. Loop
antennas fare much better.

The only long antenna that
worked here was the Barker &
Williamson BWD 1.8-30
Antenna. This antenna,
reviewed in ‘Antenna
Workshop’ (PW Feb. ‘93)
worked quite well, even though
it has relatively low efficiency
due to a terminating resistor.

My house is a bit of an r.f.
black hole. This is due to house
plumbing, comprising of a
mixture of steel, lead and copper
pipes. The spiders web of
telephone wires that radiate
from a nearby telegraph pole to
many houses in the area doesn’t
help either.

The new asymmetrical tilted
loop antenna worked quite well
considering its average height
above ground. I have worked
quite a lot of DX with this
antenna and I feel that is is a
space saver for the lower
frequency bands.

In a later ‘Antenna
Workshop’ I will describe how
this antenna can be used on
other h.f. bands.

**References**

[1] ‘Loop Antennas Close to
Ground’ a section in ‘h.f.
Antenna Collection’. An RSGB
Publication
[2] Low Band DXing by John
Devoldere, ON4UN. An ARRL
Publication

**Fig. 3: House and asymmetrical loop antenna.**
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There can be little doubt that the RS-10 is our most popular satellite. It's sensitivity, constant mode 'A' activity and ease of use with non-specialised equipment ensure the transponder is kept busy. In fact, more stations are to be found on RS-10 than all of the other satellites put together.

In South Africa Frank ZR1AGD is a PS/reader and a regular RS-10 user. He runs just 10W of uplink power into a 5x8 length base loaded vertical.

Frank tells me that the satellite is still in excellent condition with all temperatures and supply voltages nominal. Frank also reports that he puts the telemetry and callsigns of stations worked via RS-10 onto the Capetown packet network every weekend.

Translation Frequency

The usual method used in calculating your translation frequency from 145 to 2.9MHz is to add a figure to the downlink you are listening on, to give the uplink that will put you on that frequency. This is roughly 116.500MHz.

Recently, WD8LAQ has done some more precise frequency measurements. He's found that the exact addition figure is 116.504MHz, plus or minus up to 3.7kHz of Doppler shift. Whether this change is due to an earlier approximation, or to a slight drift of RS-10's oscillator through time is unknown.

To help, I've provided Table 1. This gives a small chart that may be read off to give the Doppler shift corrected uplink to downlink frequency relationships.

To use the table, just tune your downlink to the desired clear 29MHz frequency. Then leave it there, and look up the required uplink frequency from the table.

The AOS column gives the uplink at acquisition of signal. The TCA column gives the uplink at time of closest approach and the LOS column that uplink required at the time of loss of signal.

All the information is for a typical pass going from 10°

Table 1 RS-10 Uplink Frequency Table

<table>
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<th>Uplinks</th>
<th>AOS</th>
<th>TCA</th>
<th>LOS</th>
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</tr>
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</table>

Radio Sputnik Visit

Nico Jansen PA0DL0 reports that he recently visited the Radio Spunik command centre near Moscow. There he met Leonid Lyubimov UA3JR, his son Evgeny RA3APR, Sergei Samurburov RV3DR, and the operators of RS3A.

Together with Andy Mironov RK3KPK they pass on the following information on the Russian satellites. Current RS Operations are as follows. For a number of technical reasons, command problems, interference and the like, the radio amateur satellite systems RS 10/11 and RS 12/13 cannot presently be switched to modes other than those presently in use.

Consequently, for the immediate future, RS-10 may be expected to continue to operate in mode A (145MHz uplink and 28MHz downlink). RS-12 and RS-13 in mode K (21MHz uplink and 28MHz downlink). In the meantime RS-11 and RS-13 will remain switched off and in 'standby' mode.

New Satellite System

The new Russian 70kg amateur satellite system RS-15 is now complete and ready for launch. It will be built into another Cosmos navigation satellite, similar to NAVSAT Cosmos-2123 that houses RS 12/13.

At the moment it's not known exactly when the launch of the RS-15 satellite will be. But as soon as an older spacecraft in this series of navigation satellites reaches the end of its operational life the replacement with RS-15 on board will be launched into its circular 2300km high 67° inclination orbit.

The RS-15's assembly consists of a mode 'A' 145MHz up and 28MHz down 5W linear transponder. There are also 0.4/1.2W beacons at either end of the 40kHz linear non-inverting downlink passband.

The antennas are quarter wave monopoles for both uplink and downlink. The RS-15 spacecraft will have a bulletin board with two megabytes of memory, a command complex, and a 64 channel metered parameter telemetry system. The frequencies to be used are:

- **Uplink passband**: 145.857 to 145.899MHz
- **Downlink passband**: 29.357 to 29.397MHz
- Beacon 1: 29.288MHz
- Beacon 2: 29.335MHz

Anyone interested in experimental work with RS-15 will have to contact: V. Yamnikov at the Laboratory of Aero-Cosmic Technology, ROSTO; ul. Zemlynoi Wal 46/48; Moscow 103 064, Russia. Or send via e-mail to RW3DZ@RW3DZ.PUBLIC.SU for A. Zaitzev, or RW3DZ@RW3DZ.PUBLIC.SU for A. Zaitzev, or RW3DZ@FSK.RUS.EU via PACKET.

There are no plans for any further RS satellites after RS-15. The only project that the RS team is involved in now is the voice experiment satellite VOXSAT. In this project, the Russian team will work together with AMSAT-LU to build this amateur satellite system also to be built into a Russian satellite.

That's all from the world of amateur radio in orbit this time. Cherio for now and Happy Christmas to one and all.

Pat Gowen G3IOR provides the latest news on both the current and future Russian RS satellites programme.
Poor old RF Byrne is wondering where to start with Digital Radio... he should have phoned Siskin Electronics! Our latest Digital Radio catalogue has just rolled off the press and it's packed with the up to the minute product news for Packet Radio, Packet, AMTOR, RTTY, Automatic CW, Narrow and FAX just for any home computer available today.

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I've recently had a lot of mail for routing to Australia, much of it with the incorrect addressing. This causes unnecessary work as each message has to have the correct address edited. The information has to be found in either the White Pages, or from memory!

To help with mail to that area Phil VK6KS, a BBS holder in Perth, Western Australia, was kind enough to send me the following information. This information was in answer to a request, on my behalf, by Ian VK6CR.

The shear size of the state of WA. This allows for easy routing of intra-state mail. When H-addresses were being implemented in Australia about three years ago, we found ourselves with the dilemma of how to structure the state field of our H-addresses. The State abbreviations don't have the same number of characters. Unlike the US post office, which uses only two characters for its state abbreviations (e.g., HI for Hawaii, CA for California etc.), we have states with two and three letter abbreviations. States, such as New South Wales (NSW) and Victoria (VIC) do not use the # character in the State field.

Originally the # char was to be used for the State or Sub-state fields, to eliminate any possible conflicts with country or country Sub-state fields. An example is the possibility of confusing SA for the state of South Australia with SA for the continent of South America. Those states with only two letter abbreviations Western Australia (WA) or New Territories (NT) use the # as the first character, padding the sub-state field out to three characters.

In Victoria, due to its small size, most BBSs have direct connections with each other, and can route mail based on callsigns alone. However, in WA we are spread over an enormous area, and using the sub-state field solves many problems. The beauty of H-addressing scheme, is that the H-addresses (areas) remain constant, although the callsigns of various BBS's are relatively volatile. The moral of the story is that if you use H-addresses properly, whether a BBS uses # or not, will be irrelevant.

Hence the following # is a trick I've used to help routes.

**All Four Fields**

"In the case of my H-address (& all those in WA for that matter) we use all four fields although the first three are enough for routing around Australia. We use the Sub-State field because of the sheer size of the state of WA. This allows for easy routing of intra-state mail. When H-addresses were being implemented in Australia about three years ago, we found ourselves with the dilemma of how to structure the state field of our H-addresses. The State abbreviations don't have the same number of characters."
Peter Shore's Round-up

In this month's look at the h.f. broadcast bands Peter Shore has details of new winter programme schedules, as well as some interesting programme news.
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Practical Wireless, January 1994 57
October was an amazing month. Everything was there. Tropo, aurora and the Orionids meteor shower. For the specialist there was the ARRL moonbounce contest.

On the 50MHz band multi-hop Sp-E and t.e.p. openings to Africa and South America. What more could you ask for?

**Tropospheric Conditions**

It's always expected that the autumn season brings with it enhanced tropospheric conditions and again we weren't let down.

The period from October 19 through to the beginning of November was arguably the best for some considerable time. It didn't seem to matter where you were located. Literally the whole of the UK got in the action.

Joe Ludlow GW3ZTH reports that the EME weather map on October 19 indicated a strong possibility of an opening to Scandinavia. Quickly packing up his eight lead-acid accumulators (to power the 400W solid-state p.a.) he headed for his portable QTH. Between 1630-2130UTC GW3ZTH/P made 77 QSOs on the 144MHz band with stations in 22 locator squares. Many SM, OZ and QL operators were worked. Joe reckons that the opening was caused by a cold front passing N/SW through the centre of the high pressure system.

On October 29, inter-UK conditions on the 144MHz band were excellent. As a result G0OFE (I08) on the south coast reported hearing the GB3LER beacon and GM0JLB (IP90) on the Shetland Islands.

A number of stations in central England also heard the G6YVF beacon in locator IPS2. Now that is unusual!

Heading for November, the conditions got even better. Some operators, including GW4VEQ (I073) and G4RCG (I091) heard I2FAK and I2FHW on October 30-31.

At my QTH (I081) on October 31, the 144MHz band was open from HB9 and OE through DL to OZ and SM. The 430MHz band was also in tremendous shape.

The stations of HB9SMR and HB9MIN/P were in much demand, the latter being worked by GM4JJJ. Further to the east OEXUJ (LJ7YJ) and OEXB (LJN68) were being contacted by stations situated in southern and central England.

The club station G6RAF (I032) were heard having a marvellous time! They were working DX from southern France through Czechoslavakia and into Scandinavia.

The microwave bands also experienced tropo ducting. Following a contact with HB9MIN/P on the 430MHz band Neil Underwood G4LDK (I090) tried for a QSO on the 10GHz band.

The Swiss station HB9SMN/P, running 15W to a 1m dish, was heard straight away at S9+.

At 1650UTC Eric heard his QTH (I104) on the south coast reported hearing the GB3LER beacon and GM0JLB (IP90) on the Shetland Islands.

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The Swiss station HB9SMN/P, running 15W to a 1m dish, was heard straight away at S9+. Although Neil was only running 100mW to a 500mm dish he received a 5S report in a two-way 10GHz contact lasting 20 minutes. Signals over the 75km path were strong enough to be relayed back on the 430MHz band.

**Auroral Events**

During October a total of four auroral events were recorded in central England. These occurred on October 11, 25, 26 and 27, slightly less than that recorded in the previous month.

You must bear in mind that the report on auroral events relates to what was heard in the middle of the UK. Stations in Scotland and northern England will detect more activity and will have openings to different locations.

Not very much appears to have been worked on the 50MHz band. Perhaps operators don't like working stations less than 1000km away!

On the 144MHz band there was some DX to be found particularly in the openings on October 25 and 27. But not enough to explain sailing, as both openings coincided with other propagation modes.

On the 50MHz band it was possible to make auroral contacts when beaming north. If you beamed north you could work stations right across the UK. He then mentioned the possibility of making auroral contacts when beaming north. By turning the beam to the south it was also possible to work stations around the Mediterranean area via Sp-E.

On the 144MHz band it was a similar situation, with the exception that Sp-E was replaced by enhanced tropo. If you beamed north you could work DL, OZ and SM via auroral reflection.

If both stations beamed at each other then contact could be made on tropo. Now try sending on the key "CQ DX but only via aurora please". Yes I know that CQA is supposed to signify that, but it didn't stop the tropo DX from coming in.

**The 50MHz Band**

Now it's time to look at the 50MHz band in depth. During October this part of the v.h.f. spectrum certainly lived up to its reputation for being the 'magic' band. (Although I cannot understand what is particularly 'magic' about listening to white noise for hours at a time!).

Just when you thought that E-layer propagation had died away it popped up again. In addition to that there was also some t.e.p. into Africa and South America, a few auroras, the Orionids meteor shower and even some tropo. Enough to keep everyone happy!

The Sp-E propagation was quite remarkable and was noted nearly every day between October 9-30. At times it was knocked out by auroral activity. At other times it continued to have its moments. According to the DX Cluster, the 50MHz band was open to 20 European countries via Sp-E during October. On some days double-hop Sp-E was observed extending propagation down into southern Africa.

Eric FS5KX (previously FJ1JKK, TA52A, TL8MB, XU0UN) has recently become active from Mauritania. He came to signights FS5/FS5XK but now has the call sign ST5JC.

Eric will be QRV from Atar (1130AM) for two years. On October 8 between 1630-1720UTC he had his first opening on the 50MHz band to EH, F1 and 9H.

At 1650UTC Eric heard the beacons GB3HAG and GB3RNM, but nobody answered his CQ calls. Where were you?

Two days later, on the 10th at 5T5/F5JKK had another opening to the UK. He then contacted a number of stations including GJ4ICD, GJ6ORH, GW5DOS, G3ZYY, G4CCZ and G4ISO.

There were also a number of other openings into Africa. On October 5 around 1730UTC the 5V1HF beacon was heard in the south of England but no other Namibian stations were active.

This month David Butler G4ASR has news on propagation, moonbounce techniques and what's been happening on the microwave bands.
A good opening occurred on October 14 between 1800-1900UTC. Many operators in central England and parts of northern England to the south heard 7Q7RM and 707RM. A similar event took place around the same time on October 24. Stations in northern England were working 7Q7JL and 707RM.

The opening to South America occurred around 2100UTC on October 11. The band had been open to CT via Sp-E and a little later to EHC2AV in the Canary Islands. This extended to Brazil and the station of PYSC made a number of contacts with stations in F and ON while contacting a few G stations.

### Moonbounce Scene

Let's now take a look at what's been happening on the moonbounce scene. The first leg of the ARRL e.m.e. contest on October 9-10 created much interest on the v.h.f. and u.h.f. bands. One of the more unusual stations was that of the Toronto VHF Society VE3ONT in Ottawa. They were using a 46m diameter radio telescope on the 144 and 430MHz bands. Of course with an antenna of that size signals were going to be enormous. However, although they were loud it seemed they were not as strong as expected. Nevertheless on the 144MHz band they appeared to be about 3dB stronger than the old WSJ array. And that's quite strong!

A total of 236 world-wide QSOs were made on the 10GHz band with 43 multipliers. In this contest a multiplier is W & VE call signs so far. John Fell GOAPI has now started work on a 3m dish from the Flight Refuelling Radio Club G3WDG/G4KGC QTH. The technique adopted by Charles and Petra enables them to carry out echo testing at reduced powers. When conditions are favourable it is possible to hear echoes from the moon with as little as 4W output!

### Deadlines

Deadlines

It's that dreaded deadline time again! Please send your letters to reach me by the end of the month at the very latest. Don't forget that I can also receive messages via packet radio GB7MAD or at my DX cluster GB7DXX.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as OS L cards, awards, certificates etc. are also useful.

### Microwave Bands

Up in frequency now, to the microwave bands. There's been some tremendous work recently on the 10GHz band by the G3WOG/G4KGC duo. More e.m.e. contacts have been made with the 3m dish (shown in the May issue) since working SM4DHN and WAC7CO earlier in the year. During May 8 contacts were made with DJ7FJ and 4CHY.

The station of OJ7FJ runs 15W into a 3m dish with linear polarization. That of 4CHY runs 20W into a 4m dish with circular polarization.

On September 12 the station of WA5VJB was contacted in a QSO taking 20 minutes to complete. The American station was running 5W into a 3m dish. Further improvements have been made to the system at the G3WOG/G4KGC QTH. A new waveguide input h.e.m. low-noise amplifier was an FH16 device being used. This gives a front-end noise figure of 0.65dB and produces an overall system noise figure of about 0.8dB at 10.368GHz. A new p.a. consisting of two 20W t.w.t. (travelling wave tube) amplifiers combined in a magic Tee gives nearly 40W output. Incidentally a 'magic Tee' is a waveguide combiner (or splitter) device with mystical qualities!

Remote control and monitoring (RC&M in professional circles) of both the antenna steering and transmit systems is now possible from the warmth of the shack at G3WOG/G4KGC. The dish position is indicated by the use of 10-turn potentiometers. The 10-turn potentiometers are chain driven from the dish mount. This allows the dish to be pointed fairly accurately at the moon. With the G3WOG/G4KGC system, the readout accuracy is not so important as tracking is accomplished by listening to moon noise. With the new l.n.a. in place about 2dB of lunar noise is detectable. A p.i.n. diode attenuator has now been included in the drive to the t.w.t. amplifier. Remote power monitoring at the dish feed is fed back to the shack.

The technique adopted by Charles and Petra enables them to carry out echo testing at reduced powers. When conditions are favourable it is possible to hear echoes from the moon with as little as 4W output!

Earlier in the year G3WOG/G4KGC carried out e.m.e. tests with WAC7CO. That station runs 350W output on the 10GHz band and calculations showed that it would be possible to hear him with a 1.2m dish. This prompted John Fell GOAPI and Andy Talbot G4JNT to combine their talents and attempt some small-dish e.m.e. tests. Along with DJ7KS and 2E1AES a series of listening sessions were conducted on October 9-10 at the Flight Refuelling Club (G4RR) in Dorset.

The G4RR receiving system consisted of a 1.8m dish offset fed dish, a h.e.m. pre-amplifier and G3WOG down-converter (The photograph, Fig. 2, shows a typical G3WOG 10GHz transverter).

With this system the operators at G4RR found it was possible to hear 0.36dB of moon noise and signals from WAC7CO on 10.3681GHz. Although weak, they were quite pleasant. The G4RR set-up is probably the smallest dish system to hear 10GHz e.m.e. signals so far. John Fell GOAPI has now started work on using a 3m dish from the Flight Refuelling Radio Club G3WOG/G4KGC, which will transmit to the G4RR in Dorset.

Activity via this mode is certainly capturing the interest of a number of operators. The station of ON6JZ running 20W into a 3m dish recently made contacts with SM4DHN and WAC7CO. The gear was then transported to the QTH of PA3CGS who also worked the same two stations. The performance from these small-dish systems is very impressive. A few tens of watts and a 2-3m dish and you have the capability of working a number of countries around the world. This brings 10GHz e.m.e. within reach of many UK operators running conventional narrow-band systems and a small t.w.t. amplifier.
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!

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4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
5: Only one problem per letter please.

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Altogether, it's a fascinating insight to communication at sea.

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Practical Wireless, January 1994
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Kenwood Trio B1000 receiver, 50Hz-30MHz, manual, boxed, perfect, £195.00, a.t.m. model S1 T1002, £20.00. Tel: Middlesex 061-366 8542.

Kenwood TS-790E 144MHz, T/X/R with P552 p.s.u., as new, £1390.00. 296MHz unit for TS-791E, £270.00. SF31 ext speaker (new), £55.00. IF232C interface and PC control software, £100.00. MagFlex, Heilbronn, Germany: Tel (0293) 513501. WANTED: Trio TS-700G all-mode 144MHz transceiver, excellent condition, 280.o o.n.o. Tel: Essex (0269) 266077. Wobbulator Taylor in good working order, £15. Audio signal generator, large vintage type, excellent condition, £15. Realistic RX-205A with product detector, £5.00. Tel: Barnsley (0226) 957718.

Trio TS-700G all-mode 144MHz transceiver, excellent condition, 280.0 o.n.o. Tel: Essex (0269) 266077. Wobbulator Taylor in good working order, £15. Audio signal generator, large vintage type, excellent condition, £15. Realistic RX-205A with product detector, £5.00. Tel: Barnsley (0226) 957718. Yaesu FT-880 communications receiver, all-mode, mint condition, boxed, £375. Tel: Devon (0603) 864003.

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Yaesu FT-9000 400MHz multi-mode transceiver, FL7010 10 watt matching line, N/Cads, charger and case, £300.00 (manuals). Two antennas-M48 and Torna 19-1/2; one mobile 3 x 9.5; £15. Excellent base or mobile. G4AYZ, OTHR. Tel: (0679) 54333.

Wanted

BB4 radio equipment for fitting in Abbots AV and plugs, harness etc., good price paid and used equipment also required. J. Barnsley, Crockenhill, Kent: Tel: (0987) 700265. Wanted DX1000/2000 receiver/scanner. Tel: (01302) 695720 anytime.

Yaesu FT-9000 400MHz multi-mode transceiver, FL7010 10 watt matching line, N/Cads, charger and case, £300.00 (manuals). Two antennas-M48 and Torna 19-1/2; one mobile 3 x 9.5; £15. Excellent base or mobile. G4AYZ, OTHR. Tel: (0679) 54333.

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