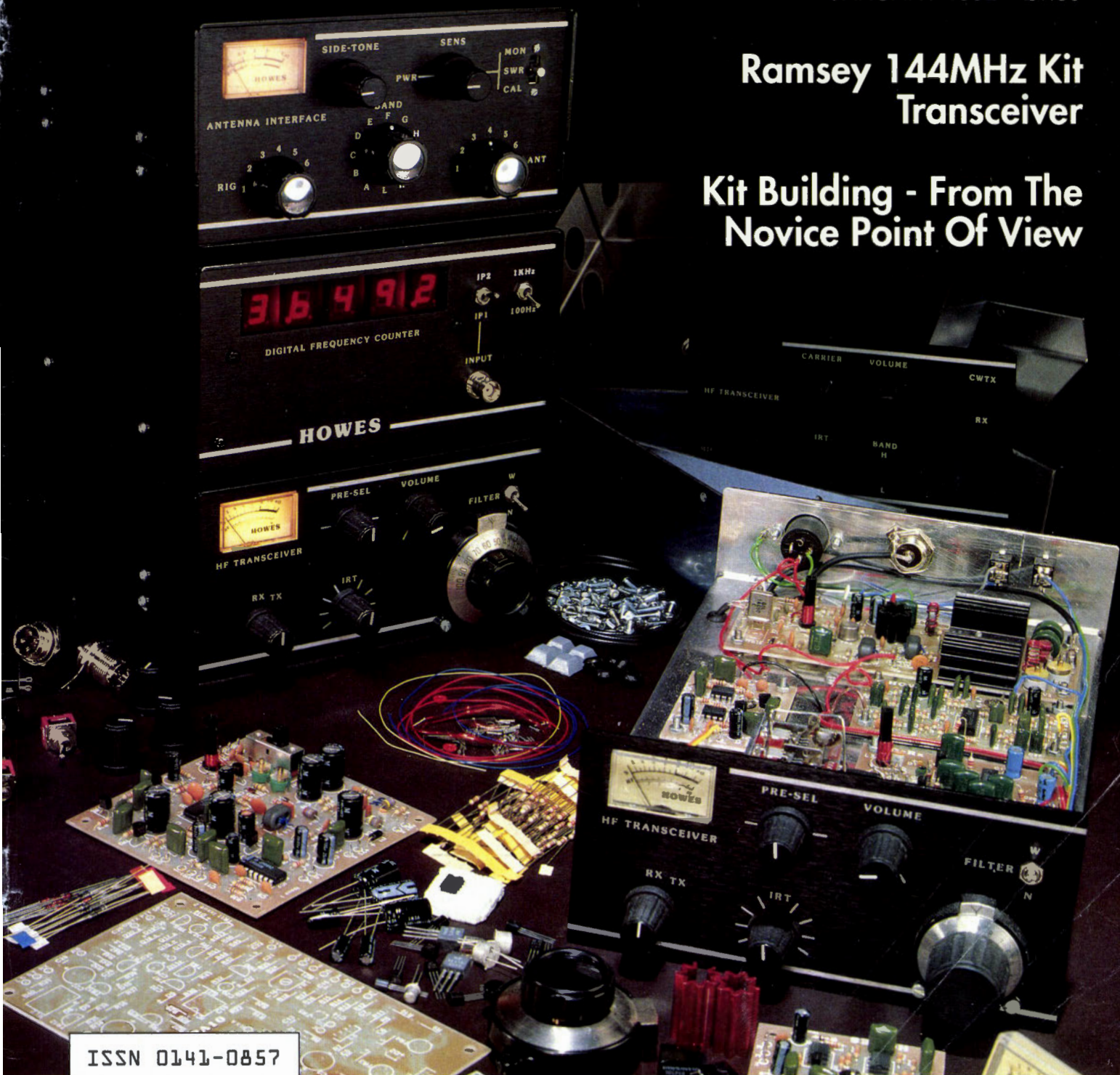


practical Wireless

JANUARY 1992 £1.60

**Ramsey 144MHz Kit
Transceiver**

**Kit Building - From The
Novice Point Of View**



ISSN 0141-0857



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Noisy, crowded frequencies are about as productive as motorways at rush hour. Now you can skip the jams and head for the wide open spaces with the FT-650 from Yaesu.

The three frequency operation lets you win the battle of the bands and communicate clearly on 6m, 10m and 12m frequencies. These less crowded bands put your transmission high in the sky and above the noise.

The FT-650 packs substantial communications power in a streamlined, compact case. A flip-out handle makes it the perfect portable, while an optional power supply lets it function as a base station. Broadcast from anywhere - mountain tops, remote islands, boats, vehicles or just the suburbs - and hear the difference with the FT-650.



FT-650

With 6, 10 and 12m frequencies you can avoid the crowds

- ✓ **100 Watts On All Modes:**
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- ✓ **DDS:**
Direct Digital Synthesis.
- ✓ **Low-Noise:**
(NF 1.2dB) RF preamp with switched 5MHz bandwidth BPF, varactor tuned.
- ✓ **Extended Receiver Coverage:**
24.5 to 56MHz.
- ✓ **Automatic Seeking IF Notch Filter.**
- ✓ **100% Continuous Operation**
Duty Cycle.

- ✓ **105 Memory Channels:**
99 channel memories, 4 programmable scan memories and 2 priority channels.
- ✓ **All-Mode Operation:**
SSB, CW, FM and AM.
- ✓ **Selectable Scan Skip:**
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- ✓ **Optional Accessories:**
DVS-2 Digital Voice Recording System, MD-1C8 Desktop Microphone, SP-5 External Speaker with AF Filter, FP22 240V AC Power Supply.

FT-690RII

- The choice radio for the serious field operations enthusiast
- All-mode 6 meter (690RII)/2.5 watt mobile
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- One-touch reverse split button.
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- 2 Independent VFOs
- All-Mode Noise Blanker
- Optional CTCSS Tone Squelch (FTS-7)
- Semi Break-In CW Keying and Side Tone.

Call today for complete information about this and other Yaesu products.

Performance without compromise

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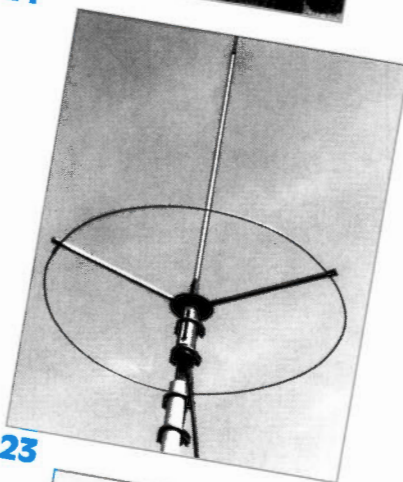
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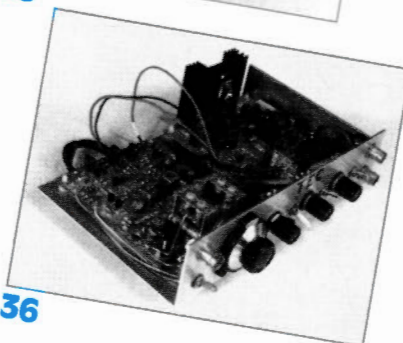
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January 1992
(ON SALE DECEMBER 12)
VOL.68
NO.1
ISSUE 1018

NEXT ISSUE (FEB)
ON SALE JAN 9

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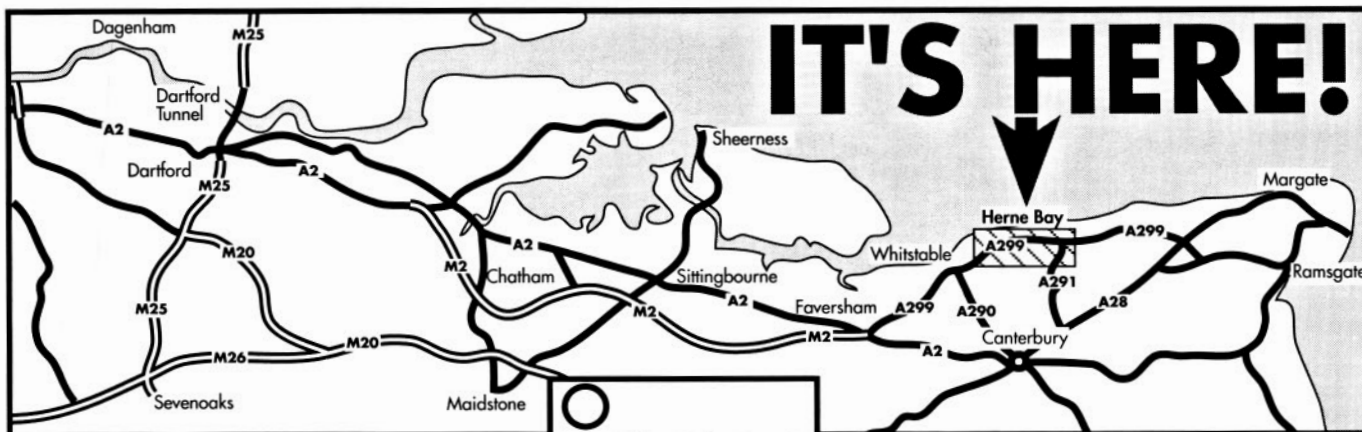
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Published on the second Thursday of each month by PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. Printed in England by Southernprint (Web Offset) Ltd., Poole, Dorset. Tel: 0202 622226. Distributed by Seymour, Winsor House, 1270 London Road, Norbury, London SW16 4DH, Tel: 081-679 1899, Fax: 081-679 8907, Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd., South Africa - Central News Agency. Subscriptions INLAND £19.00, EUROPE £21, OVERSEAS (by ASP) £22, payable to PRACTICAL WIRELESS, Subscription Department. PW Publishing Ltd., Enefco House, The Quay, Poole, Dorset BH15 1PP. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is Published monthly for \$40 per year by P.W. Publishing Ltd. Enefco House, The Quay, Poole, Dorset, BH15 1PP U.K. Second Class postage paid at Middlesex, N.J. Postmaster: send address changes to C and C Mailers International, 40 Foxhall, Middlesex, N.J. 08846.



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Kenwood's New FM Dual Bander is a Mobile Marvel

FM DUAL BANDER TM-732E

In the fast-moving world of mobile communications, Kenwood's new TM-732E FM dual-band transceiver is a winner. Despite its compact design, the TM-732E packs a host of advanced features such as dual receive (including VHF+VHF and UHF+UHF), built-in DTSS and pager functions. The detachable front panel has a high-visibility LCD display to provide instant intelligence on operational status. And on-the-move operation is

facilitated by a multi-function microphone. TM-732E offers true pole-position performance.

Enjoy all advantages of these superior features: ■ Detachable front panel for maximum freedom of choice during installation (requires optional PG-4K/PG-4L kit) ■ Dual receive on same band (VHF+VHF or UHF+UHF) with one antenna ■ Audible frequency identification ■ Multi-function microphone ■ Built-in DTSS with pager function ■ Tone alert system ■ Separate speaker terminals for each band (switchable) ■ Automatic band change (ABC) ■ Multi-scan functions ■ 50 split memory channels or 64 simplex memory channels plus 1 call channel (switchable)

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Handheld
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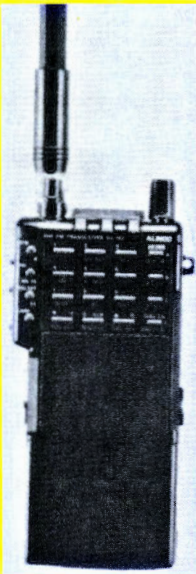


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Rubber Antenna
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AMERITRON HF LINEARS

Model 811
600 Watts
£699



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ANALYSER
£99.95

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Ten Tec Argonaut

5W QRP
£1295



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ALINCO

DJ-560
2M & 70cms
Full Duplex

£359

£329!

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UHF Rx 400 - 520MHz
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£129



The **MFJ-948** is a complete 300W aerial matcher in one box. It will match coaxial, balanced feed and single wires. A dual power twin meter VSWR PEP/RMS meter is included, plus 3 way aerial switching and 12v illumination. Fantastic value.

Model 949 is exactly the same but with 300 Watt internal dummy load. **£149**

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Model MFJ-407B is a budget price electronic keyer that is remarkable value. Operating from internal or external source it provides conventional or iambic keying at speeds from approx. 5-50 WPM. Controls include tone, speed, weight and volume. (Needs paddle key).

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DJ-X1



Scanning Receiver 500kHz - 1.3GHz

Specification:

AM/FM/WBFM

5/9/10/12.5/20/25/30/50/
100kHz steps

100 Memories (3 banks)

Auto Memory Load Bank

3 Scanning Speeds

3 Scanning Modes

Rotary Frequency Control

Call & Priority Channels

Dual Ratio Battery Save

Memory Lockout

Frequency Lock

Illumination Mode

Triple Conversion

External Supply: 6-15V

Internal Pack takes 6 AA Cells

Sensitivity: -8dBu 12dB SINAD

Size: 110 x 53 x 37mm

Weight: 320g.

**"Probably the
best performer"**



The DJ-X1 scanning receiver marks a major step forward in both design and performance. ALINCO engineers have applied the very latest technology to produce one of the world's most sensitive and compact handhelds. No other handheld has a similar performance or specification.

When you handle the DJ-X1 you will immediately appreciate its superiority to any other model. But then that's hardly surprising. Most of its competitors have either been around for several years or have simply undergone cosmetic surgery!

The DJ-X1 is a brand new design from start to finish. Micro electronic circuit boards mean greater reliability whilst leaving plenty of room for 6 long lasting internal AA cells. A revolutionary CPU design provides simple one touch functions that are both logical and easy to remember. And there's a wide range of optional accessories available too that will appeal to the professional user.

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ANNOUNCING THE IC-P2ET NEW HANDHELDS WITH ARTI

Icom announces the debut of the VHF IC-P2ET and the UHF IC-P4ET, these multi-functional handhels both feature artificial intelligence that allows you much easier operation and can even evaluate ability.

Design concept

The IC-P2ET and IC-P4ET were designed with the following points in mind:

- Contains all the features in the "ST" series.
- New body design and colour.
- Artificial intelligence function that allows easier operation.
- Trial mode to evaluate user ability.
- Star selection mode that allows you to select a number of functions manually.
- Seldom-used functions can be hidden.
- Cartridge-type battery packs that can be easily inserted into the transceiver.
- A keyboard that activates functions quickly.
- Compact, but not too small to hinder use.

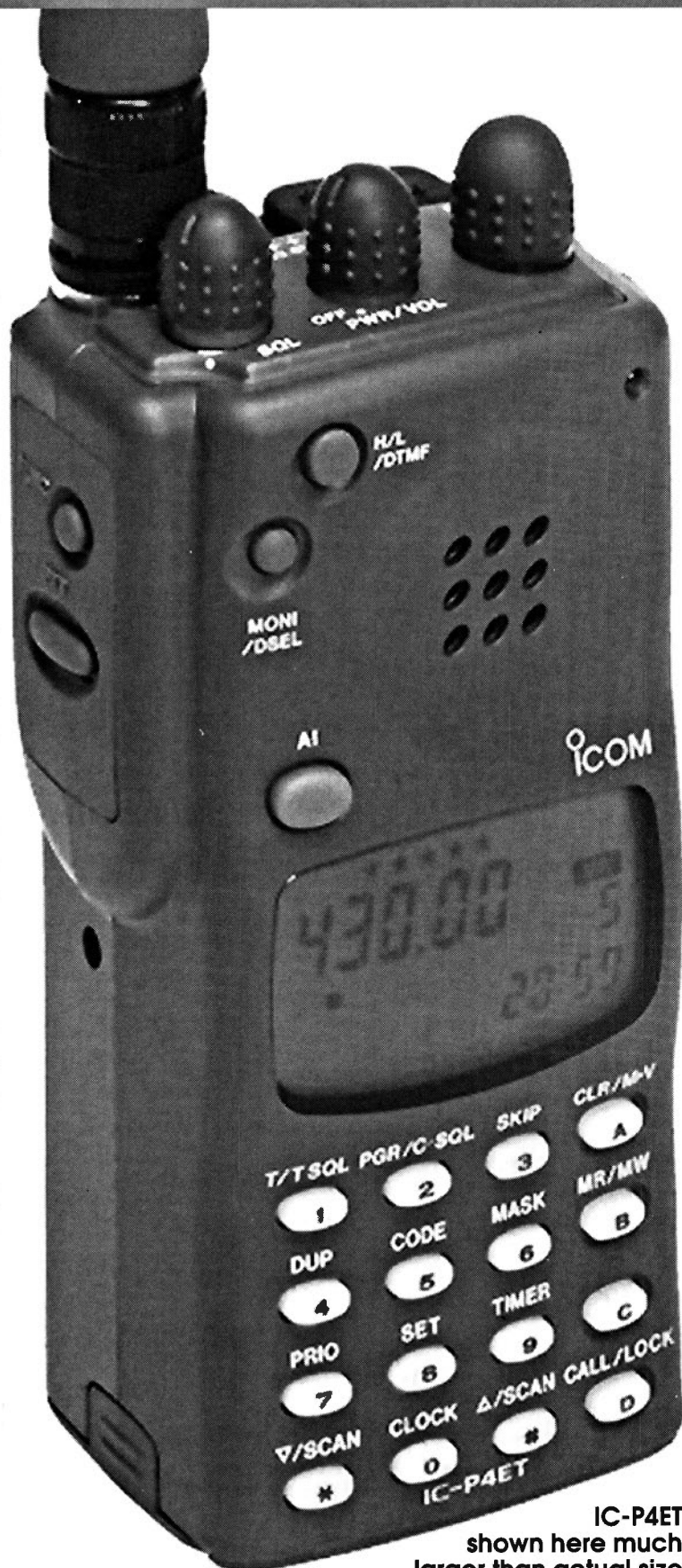
Easier operation with AI

This is an exciting new feature not previously available on handhels. By adopting the sophisticated AI (Artificial Intelligence) function, these handhels 'learn' the order of used functions.

The last-used function is automatically allocated to the AI key. The allocated function is shown in the AI indicator, you can then activate it with one touch.

Also, your favourite function can be allocated to the AI key manually by utilising AI mode.

ICOM



IC-P4ET
shown here much
larger than actual size

AND IC-P4ET, TWO CLEVER FICIAL INTELLIGENCE ABILITY

Automatically evaluates user's ability: Trial mode

Using the newly developed trial mode, simple operations for beginners or multi-function operations for more advanced users are selected automatically. Depending on the users ability this mode hides or allows access to various functions.

By assessing the users answers to 15 questions this mode automatically evaluates ability and awards a number of star marks.

When desired the operating level can be manually selected via the star selection mode.

Compact, rounded body design

At just 49(W) X 105(H) X 38.5(D) mm including supplied BP-111 battery pack, the new IC-P2ET and IC-PE4T handhelds are small, smart and fit everyones hand comfortably.

Easy-to-see function display

Day or night, the larger function display indicates all the required information clearly.

Illuminated keyboard

A variety of function settings are possible via the keyboard. For night time operation, the keyboard is illuminated.

Numerous channels

Many channels are included for operating convenience. 100 memory channels and 1 call channel store the operating frequency, offset direction, offset frequency and sub-audible tone

frequency independently (an optional UT-50 Tone squelch unit is required for subaudible tone frequency)

For programming scan, 2 edge channels are provided independently.

Full 5 Watt output power

By connecting an external 13.8V DC power source, a full 5W of output power is available. 3.5W, 1.5W or 500mW low output power are also selectable for longer operating times.

Miscellaneous convenient functions:

- Dual tuning system: the keyboard or the main dial on the top panel.
- High sensitivity receiver.
- Full, programmed, memory scans and priority watch with skip function
- Auto power off timer.
- Auto power saver.
- 10 DTMF code channel for auto dialling
- 1750 Hz tone call.
- 5, 10, 12.5, 15, 20, 25, 30 or 50 kHz tuning steps.
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- Memory masking function.
- Memory transfer function.
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- One-touch squelch monitor function.
- Optional pocket beep and tone squelch.
- Optional pager and code squelch functions.



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DEC 27 9.00am - 5.00pm DEC 28 9.00am - 1.00pm
DEC 30/31 9.00am - 5.00pm JAN 1 CLOSED
JAN 2 Open as usual.

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supplied with FNB20 7.2V 600mAh NiCad & SMC28 charger.
This offer is on a first come first served basis and is only
available whilst stocks last.



The Best of The Best - the FT-1000



Designed with no spared effort or expense for optimum performance and operability, the FT-1000 is the fruit of over 25,000 man-hours of intensive research and development by Yaesu's top design engineers. Instead of merely offering incremental improvements on existing designs or adding bells and whistles to an old model, the FT-1000 project involves a wholly new approach to the application of the latest digital and RF technologies to today's most demanding needs on the HF bands. Extensive surface-mount component technology allowed six microprocessors and five Direct Digital Synthesizers to be harmoniously integrated with a simple operator interface into a highly reliable full-features transceiver optimized for serious HF applications.

BRIEF SPECIFICATIONS

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and Packet
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz AM, FM, PKT
- ★ Auto antenna impedance range 16.7 to 150 ohms
- ★ Selectable receiver bandwidths 2.4kHz, 2kHz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance control
- ★ Power output up to 200W P.E.P. 50W AM
- ★ Sensitivity pre-amp on SSB/CW 0.25 microvolts 10dB S/N
- ★ D.D.S. Direct Digital Synthesiser
- ★ Dual Selectable noise blankers with adjustable threshold
- ★ 99 Memories

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HL62V	2m 10W in 60W output	£137.95 ... C
HL110V	2m 2/10W in 100W output	£220.00 ... C
HL180V	2m 3/10/25W in 170W output	£299.00 ... C
HL36U	70cm 6/10W in 25/30W output	£138.00 ... B
HL63U	70cm 10/25W in 50W output	£220.00 ... C
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KENWOOD TS-950SD HF all mode transceiver with general coverage receiver, complete with all filters, auto ATU and DSP unit. **£2995** including a **FREE REMOTE CONTROL VIDEO RECORDER**. (Carriage £30).

KENWOOD TS-790E all mode base station for 2 metres and 70cms. **£1525** including a **FREE MC-60A BASE MICROPHONE**. (Carriage £15).

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YAESU FT-767GX HF all mode transceiver with general coverage receiver. **£1599** including **EITHER A FREE 2M MODULE OR A 6M MODULE**. (Carriage £15).

YAESU FT-747GX HF all mode transceiver with general coverage receiver. **£659** including a **FREE FM BOARD**. (Carriage £12).

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ICOM IC-W9E 2m/70cms dual band handheld transceiver. **£395** including a **FREE DUAL BAND MOBILE ANTENNA**. (Carriage £7).

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ICOM IC-925T 2m mini handheld transceiver. **£299** including a **FREE 2M 5/8 WAVE ANTENNA**. (Carriage £7).

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SECOND HAND ITEMS

REALISTIC PRO-2005 scanning receiver, covers 25-1300MHz. AM/FM/WBFM. Good condition. **£199**. (Carriage £5).

REGENCY MX-4200 VHF/UHF portable scanning receiver. Good condition. **£169**. (Carriage free).

YAESU FT-790RI 70cms multimode transceiver. Good condition. **£245**. (Carriage £5).

REALISTIC PRO-2004 scanning receiver. Covers 25-1300MHz. Good condition. **£169.95**. (Carriage free).

HF-125 communications receiver, covers 30kHz-30MHz. USB/LSB/AM/CW. Very good condition. **£295**. (Carriage free).

ICOM IC-04E 70cms handheld, comes with charger and nicad pack. Very good condition. **£199**. (Carriage free).

KENWOOD TM411E 25w 70cms transceiver, comes with mobile mount, microphone etc. Excellent condition. **£245**. (Carriage £7).

YAESU FRG8800 communications receiver, covering 100kHz-30MHz, all modes, complete with FRT-7700 ATU. **£499**. (Carriage £12).

PK-232 terminal unit, decodes RTTY, AMTOR, CW, PACKET and FAX. **£189**. (Carriage £7).

ERA microreader RTTY/CW decoder with built in display. **£90**. (Carriage £5).

NRD-525 HF communications receiver. (This is in mint condition with box and manuals and accessories). **£875**. (Carriage free).

KENWOOD TH-205E 2m handheld transceiver. Good condition. **£169**. (Carriage £5).

YAESU FT-203R 2m handheld transceiver comes with charger and nicad packs. Very good condition. **£169**. (Carriage £5).

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REALISTIC PRO-34 handheld scanning receiver. Excellent condition. **£149**. (Carriage £5).

REALISTIC PRO-2005 scanning receiver, covering 25-1300MHz. Good condition. **£199**. (Carriage £5).

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Keylines

Readers' response to the 'Elmer' editorial was amazing. It seems that for too long this unsung band of heroes, have gone unnoticed. It's time to change this for the good, and to this end we are introducing the 'Practical Wireless Annual Elmer Award'.

It's an appropriate time to launch this new award, as *Practical Wireless* enters its Diamond Jubilee year. Very many people involved in the radio hobby have been introduced to a lifetime's interest with the help of an 'Elmer', and we want to mark the magazine's 60th anniversary and the many hitherto neglected radio 'helpers' in the best way possible.

The PW Elmer Award

The 'Elmer' award is very special. The award is open to all, in recognition of the very varied type of helper who is, or has been an 'Elmer'.

We are also very conscious that many 'Elmers' aren't radio amateurs. Some will have amateur radio licenses, and some will be very experienced short wave listeners.

I've no doubt that there will also be hundreds of possible candidates who, although they've helped someone on the way to enjoy the radio hobby, are not directly interested in the activity as such. However, it doesn't matter whether your 'Elmer' was a railway electrician (like mine!) or the licensed amateur down the road.

What does matter, is that they helped you and possibly others, to get started. What really does matter is that they cared, and shared their knowledge and humanity.

Who Can Be Nominated?

So, who can be nominated for the Practical Wireless Elmer Award? The answer to that question is simple! As the list of

who can qualify to be nominated is literally endless, it's far easier to specify those who can't!

Full-time employees of the magazine, our regular authors, advertisers and anyone else who is involved professionally in the production or promotion of *Practical Wireless* can't be nominated.

Nominations will be accepted after the publication of the January issue of the magazine. They will be accepted up to and including Tuesday 1 September 1992.

Full details will be available on the nomination form available from the editorial offices, by sending a stamped self-addressed envelope marked 'Elmer Award'. Readers from abroad who wish to nominate someone (who can be in the UK or abroad) are asked to include one IRC.

As you will realise, we want to make this award open for nominations from **ALL** of our readers. The nominated person does **NOT** have to be a *PW* reader.

He or she, can be a dedicated 'Elmer' in Scotland, East Anglia, New Zealand, South America, Australia, Newcastle or Newark-on-Trent for example. In other words, if they've helped you or others, we want to know about it!

What You Do

What you have to do, is to write (it's not difficult - honestly!) in no more than 100 words, why you are nominating your possible 'Elmer'. Full details of the rules, and what you have to do will be enclosed with the nomination form.

The next stage, is for you to send in the nomination (as quickly as possible from abroad please) with a photograph of your nominee if you can manage it.

The award itself will be unusual but very appropriate.

John Worthington GW3C0I, our Welsh-exiled cartoonist, will produce a specially commissioned cartoon of an appropriate 'Elmer', hand-painted in water-colours and mounted in an attractive wooden frame with an engraved brass nameplate.

The Worthington cartoon, complete in the frame, will be presented in a ceremony at the 1992 Leicester Show (the 21st anniversary event). Nominations will close on Tuesday 1st September and the name of the winner will be announced in the November issue of *Practical Wireless*.

The *PW* team are really looking forward to reading the nomination forms. We are also pleased to be able to reward and acknowledge the debt the radio hobby owes to the previously unsung 'Elmers' of years gone by. So, get writing for those forms and get busy with the nominations!

Morse Weekend

Are you interested in a possible Morse tutorial weekend? We are planning a residential weekend during the late spring/summer of 1992. It's for anyone interested in getting to grips with the key and putting that final little 'polish' on their style before taking the Morse test. You'll even be able to take the test itself!

You may be one of those people who, although keen, has never quite progressed enough to face up to the test and perhaps doubts their ability to pass. Why not come and join us, and prove yourself wrong by passing with flying colours?

The weekend, Friday evening to possibly around lunchtime on Sunday, will be fully residential with meals, accommodation, instruction and lectures included for around £160, will be held in the Dorset/Hampshire area. We have excellent communications with the rest of the country down here, and the train service is

excellent, with direct services to the North and Scotland.

Don't forget, that although your partner may not be interested in the Morse activities, there are the seaside resorts of Bournemouth and Poole nearby, plus the attractions of the New Forest to mention only a few. If enough non-participating people attend, we can arrange a coach trip or other attractions. It could be an interesting weekend for all the family.

So, if you're interested in this planned weekend, please write to me, clearly marking your envelope with 'Morse Weekend' enclosing a **fully refundable** deposit of £25 to book your place. We'll send you full details as soon as we have an idea of the number attending.

New Look Same Price

We hope that you like the new look of *PW*, the high quality glossy paper and the way that we can now use colours to advantage in the magazine. I am especially pleased with the improvement obtained with technical drawings and photographs.

It's a wonderful way to enter *PW*'s Diamond Jubilee year, and I'm also pleased that, for the moment at least, we can hold the price of the magazine to the level we've managed for the last two years. Enjoy your reading, we've got a lot of surprises and excellent projects coming your way in this, the 60th year of *Practical Wireless*.

Finally, everyone on the team wishes you all a happy Christmas and peaceful new year, wherever you are in this wonderful world. May God bless you all.

Rob Mannion
G3XFD

Services

Queries

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

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

Back Numbers & Binders

Limited stocks of many issues of *PW* for past years are available at £1.65 each including post and packing. Binders, each holding one volume of *PW* are available price £5.50 each (£1 P&P for one, £2 for two or more). Send all orders to the Post Sales Department.

Subscriptions

Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

Constructional Projects

Each constructional project is given a rating to guide readers as to its complexity.

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

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

Advanced: A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.

Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article.

The printed circuit boards are available, mail order, from the Post Sales Department.

Mail Order

All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank). Access, Mastercard or Visa please.

Receiving You

Letters TO THE EDITOR

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

Dear Sir

I feel compelled to write this letter. Your magazine, has published letters from many amateurs complaining about the shortage of 'new blood' coming into our hobby. Although we shall see more now the novice licence is here, have they considered what may be contributing to this shortage?

In 1989, the average course fee was just under £40. Unfortunately I was too late to enrol then, so in 1990 when I did join my local RAE course, it had increased to £48. I now hear that course fees can exceed £60, with an exam fee of (currently I think) £37.50.

Unless RAE course fees are kept at reasonable levels to fit everyone's pockets, I believe that many people are going to become discouraged from entering a very enjoyable hobby.

Lee Greaves G7JZA
Dallington
Northampton

Editor's comment:
Unfortunately Lee, you have

hit on only part of the problem in my opinion. Yes, I agree that local authority further education course costs are rising rapidly (there's been a lot of publicity about this very subject in the national news recently), but the cost is not the worst effect. The worst effect is surely the number of courses that are being cancelled! I have much sympathy for the unfortunate students who suddenly find their courses cancelled due to the fact they are below the official viability number. To try and combat this growing problem, everyone on the *PW* team (especially Sharon George our news editor), are doing their best to help people find a suitable course. So, to help potential students, we always need course information. It's especially heartwarming to hear from the many clubs who are stepping up their traditional activities in this area. Keep the information coming!

Dear Sir

I would like to thank you and your staff for the chance to display our societies, activities in your 'Club News' section. Can I also thank you for the very prompt way you printed our change of venue for our meetings.

I know that it's not always possible to meet a deadline, but I was very surprised at the quick response from your team. If they always work as quickly and efficiently as this, you will always have a very good magazine!

The 'Club News' section, I feel is an important part of *PW*. It's very useful for visitors to a new area to look up a local club. For example, at the beginning of September I had a 'phone call from Gary Wagner K3OMI. Gary was visiting Stratford-upon-Avon on business.

He had been to the newsagents, and found *PW* in the hope of finding a local club. This he did of course, and was able to come along and spend an evening with us.

I think this success proves what an important page 'Club News' is, and if you have to run to two pages let it be. It may not be a bad idea anyway, if the print on that page gets any smaller I shall have to find a magnifying glass!

It was also a great pleasure to meet you and your staff at the Leicester Show. As in previous years I had a very warm welcome, even though you were all very busy. Many thanks.

Alan Beasley G0CXJ
Shipston on Stour
Warwickshire

Editor's comment: Thank you for your kind comments on the 'Club News' section Alan. We re-introduced the club page because readers and clubs wanted it back. They could not understand why it had been dropped in the first place! Although it proves to be a headache (because we have to pack a lot of information into it) I've had many comments at rallies, shows and during my visits to clubs, supporting the 'Club News' section. Hard pressed club sec's, chairmen and chairladies (I don't like the term 'chairperson'!) apparently find it useful for getting ideas for talks, events, outings, competitions and a host of other ideas. I believe (very strongly!) that the local club is at the very foundation of the hobby, and my thoughts are backed up by what I see and hear when I visit clubs up and down the country. Chin up all you club sec's, you're doing a grand job! Everyone on the *PW* team is delighted to meet you all at the many shows. Keep the news coming in, but do keep it brief, or the next free gift might have to be a magnifying glass!

★★★★★★★★★★★★ This Months Star Letter ★★★★★★★★★★

Dear Sir

Please can I thank you for producing an informative and interesting magazine for all to read. I think you lay it out well, and I have been a keen reader in the days before and since getting my licence. I am however, writing to suggest something that could make your magazine even better (if that is possible!). I am the only licensed member of our school club, The High School of Glasgow Amateur Radio Club. Last year, there were two other licensed members who I found to be invaluable sources of information, both practical and theoretical. All this was before I gained my licence.

Nowadays I am occasionally put in their shoes by the rest of the club, when I am asked about various procedures and phrases, etc. So, my suggestion is that you publish articles for beginners and the newly licensed operator more often. I am sure that I can boost your sales by getting the club members to buy *PW* magazine. Finally, I must mention that I find your 'Mathematics for the RAE' very helpful. Keep it up!

Craig C. Ritchie GM7KSC
Paisley
Strathclyde

Editor's reply: Thanks for your letter Craig. We hope you like the improved magazine. Steve Hunt, our art editor can now make the magazine look even better than before. The *PW* team hope your school club will find the copies of our popular reprint, *Passport To Amateur Radio* that we've sent you, to be helpful. We are trying to cater for all readers, and George Dobbs G3RJV's series 'Getting Started - The Practical Way' is proving very popular, as is Ray Fautley's 'Mathematics For The RAE'. Despite this, I feel that we could do more for the really young reader and I hope to introduce something very soon. Watch this space!

Dear Sir

I felt compelled to write to you to congratulate *PW*, and especially Richard Marks 2E1AAQ, for his excellent article on Michael Faraday. I found it easy to read, informative and totally absorbing.

I do hope Richard continues with his articles and I would be delighted should he become a regular contributor to *PW*. Best wishes to him in his radio work, and thanks to *PW* for probably being the best British radio magazine.

Tim Rowe G4ARI
Stanton-under-Burden
Leicestershire

Editors reply: Richard will be pleased to read your remarks Tim, and I'm pleased to say that 2E1AAQ was one of the novice radio amateurs who took part in the project led by Ken Smith G3JIX in this month's issue. I'm sure we will hear more from him, and we hope that more young authors will volunteer their work in the future!

Dear Sir

Thank you for your recent letter answering my technical queries, and the copies of the April and May issues of the magazine. It was most kind of you.

I enjoy *Practical Wireless*, especially your constructional articles and the lively debates that echo around 'Receiving You'. The adverts for modern Japanese equipment and the servicing of them, leave me completely cold, but I do realise that they subsidise the guts of the magazine, and as such, I welcome them.

My particular interest lies in

good valved equipment, with well engineered mechanics. It really is a golden era for old 'fuddy duddies' like me, now that beautiful old equipment can often be had for a song.

I would like to see the occasional article, a series if possible, devoted to improving the performance of old sets. A little bit of 'solid state' in judicious places could work wonders in older equipment.

Thank you again, and good luck to yourself and all the *PW* team.

D. G. Gibbons
Westport
Co. Mayo
Eire

Dear Sir

Many thanks for two superb, fact-filled articles in the latest-to-hand issue of *Practical Wireless*. I'm referring to 'Five Bells Go to Iceland' (October 1991 issue) and 'Getting Started the Practical Way' (same issue). Unfortunately, there never seem to be sufficient copies of *Practical Wireless* here 'Down Under', to go round and satisfy your New Zealand readers in Auckland.

I am currently in hospital suffering a recurrence of trouble, which in 1980, plagued and finally hospitalised me in two of Auckland's best hospitals. I am 77 years 'young' and a more than keen radio amateur!

Most of my time in hospital is devoted to studying anything in radio and allied subjects. I'm interested in electronics, TV and pianolas (self-playing pianos).

I wonder if any readers, particularly in New Zealand, would be kind enough to let me have back issues of *Practical Wireless*, and other radio and technical magazines. Nothing will be regarded as being too old! I'd also like to be contacted by any local Auckland readers at any time. A letter to me is all that's necessary to start the friendship going. Best of luck to you all at *Practical Wireless*.

James Ramsay
Auckland 3

Editor's reply: Nice to hear from you James. I hope, by the time you see your letter in print that you will be on the road to recovery. By then, hopefully you will also have received the 'surprise' air-mail package with some good reading for you from the team here in Poole. As regards finding *PW* for sale 'Down Under', I can only suggest that you try a subscription, which is advice I have no doubt you will have read before. Get well soon! Anyone wishing to write to James should write to him c/o the *PW* Editorial Offices, and we will gladly pass any correspondence onto him.

Competition Corner

Wordsearch

K	S	U	G	E	N	S	W	E	N	B	U	L	C	H
S	R	A	M	S	E	Y	R	A	E	N	I	L	I	K
S	O	L	D	E	R	I	N	G	I	R	O	N	A	O
M	J	C	A	E	N	R	E	M	F	W	S	N	B	L
D	H	A	T	O	S	U	E	R	O	N	B	A	V	N
A	L	T	I	O	N	A	E	M	I	R	W	H	J	S
C	U	D	G	L	Y	E	H	A	L	W	S	A	E	S
D	D	U	J	D	E	R	F	P	L	E	G	E	K	L
R	E	F	F	O	L	A	I	C	E	P	S	N	Q	Y
L	S	B	B	O	D	E	G	R	O	E	G	U	O	X
T	I	U	C	R	I	C	D	E	T	N	I	R	P	L
T	I	V	I	I	W	D	O	U	G	D	E	M	A	W
R	H	O	W	E	S	R	O	R	C	R	B	Y	B	A
Z	S	A	T	E	L	L	I	T	E	S	C	E	N	E
M	O	R	S	E	W	E	E	K	E	N	D	N	E	V

Fifteen different 'radio' words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down or diagonally, but they are always in a straight line without odd letters in between. You can use the letters in the grid more than once for different words, and they're not all used. Once you have found all fifteen words, mark them on the grid and send it, along with your name and address (photocopies accepted with the flash below please) to our editorial address, marked Competition Corner, Wordsearch Jan '92. First prize is a year's subscription to *Practical Wireless*, two runners-up receive six month subscriptions. Closing date is Friday 31 January 1991.

DOUG DEMAW
RAMSEY
LONG WIRE
ELMER
FRED JUDD
GEORGE DOBBS
CLUB NEWS
HOWES
SPECIAL OFFER
SOLDERING IRON
PRINTED CIRCUIT
LINEAR
PHASE
SATELLITE SCENE
MORSE WEEKEND

Name
Address

Competition Corner
Jan 92

Sony RAE Course

A course of study, leading to the City & Guilds Radio Amateurs' Examination, will be run by the Sony Broadcast Amateur Radio Training Group. Unlike the previous course, the 1992 course will be run on modular lines. Students can opt to study all the modules, or select those for which they need tuition.

Cost for the 11 module course will be £50, which includes a copy of the *RAE Manual*; individual modules will cost £5. Tuition will be by members of the Sony Broadcast Amateur Radio Club, all experienced amateurs and experts in their field, who will make full use of Sony's training facilities, backed up by the club station.

The course will run on Mondays, from 7.30pm until 8pm, starting 6 January 1992, at Sony's HQ building, in Jays Close, Basingstoke.

For further details, please contact:

Stephen Harding
Sony Broadcast Amateur Radio Training Group
Sony Broadcast & Communications Ltd.
Jays Close
Basingstoke
Hants RG22 4SB.

IRTS Celebrates Diamond Jubilee

In 1992, the Irish Radio Transmitter Society celebrates its Diamond Jubilee marking 60 years of service to radio amateurs in Ireland. The year also marks 30 years of amateur activity on 70MHz in EI. To mark these two occasions, the IRTS announces the EI 70MHz Activity Award for 1992.

The purpose of the award is to promote activities of the 70MHz band, not just in those countries licenced for it, but also European and Intercontinental cross-band contacts. The award certificate is unique, being hand-painted and inscribed, each costing in excess of £20. Such a certificate will be presented free-of-charge, to every station qualifying for the award. In addition, a Galway cut-glass crystal trophy will be presented to the station earning the first award in each category.

Award details from:
Paul Martin EI2CA
c/o IRTS
PO Box 462
Dublin 9.

Please send in all of your news items to Sharon George at the editorial office in Poole.

P.S. We hope you like the new look in *PW* this month



New Radio Club At Alcester Grammar School

A new radio club, open to all students, has been formed at Alcester Grammar School, in the attractive Warwickshire market-gardening countryside, south of Birmingham.

Leading light in setting up the club, was 16-year old Paul Robertson G7JCG. Paul wrote directly to Rob Mannion G3XFD, the editor of *Practical Wireless*, to ask for help and guidance in setting up the club.

Although most of the donkey work had already done by Paul, Rob Mannion travelled north to present some essential radio 'bits and pieces,' and give a talk on amateur radio. Rob also demonstrated some simple radio constructional projects, and told club members about *PW* during a lunchtime meeting on November 8th.

The club is well under way now, and Paul G7JCG (pictured on G3XFD's immediate right, along with some of the club members) has organised the school club call sign G7LBX. Paul is now arranging various activities for the keen youngsters.

The Headmaster, Mr Shearn, and Head of Physics, Mrs Hughes, are supporting the club as much as they can, but the club is in need of an 'Elmer' to help out. So, if you live in or nearby Alcester, can you offer voluntary assistance during school hours to help this fledgling club? If you can, please contact the Headmaster directly at their Birmingham Road address.

Paul Robertson G7JCG is shown standing to G3XFD's right, during the *PW* editors visit to help launch the Alcester Grammar School's new radio club on November 8th.

From Sketch Pad to Launch Pad

Thirty years ago, Ron Hickman accidentally cut a chair in half when using it as a sawhorse. This misfortune led to the development of the world-famous 'Workmate' - and Ron Hickman's fame and fortune.

A nationwide search has been launched, to find the next brilliant idea that will revolutionise our lives.

Sponsored by British Fuels Limited, the country's leading distributor of coal and oil, the scheme is asking for innovative ideas for new or improved products that can be commercially developed for use in the home or garden.

A first prize of £1000 is being offered, and British Fuels will supply practical advice for the development and marketing of the new product, this will range from legal protection and suggestions on where to seek funding, to manufacturing and support with market planning and promotional activity.

There is a second prize of £500 and a third prize of £250. Closing date for all entries is 1 February 1992.

A panel of experts including Sir Cyril Smith MBE MP, will examine all entries in strict confidence.

For further information, including entry packs, please contact Christine Mortimer or Linda Ward at:

BFL Innovations Award, FREEPOST, The BRAHM Building
Alma Road, Leeds LS6 2AH., Tel: (0532) 304000.

Reduced Power On 430MHz In December

Just as *Practical Wireless* was going to press, we discovered that the Radiocommunications Agency had requested the RSGB to broadcast a message on behalf of the 'Primary User' of the 432-433.5MHz sub-band. This request was broadcast via the GB2RS news service on Sunday 24th November and we are repeating it for the benefit of readers who may not have heard the original RA request.

The request asks that all radio amateurs using the sub-band in the area bounded by the lines 53°N 02°E, 55°N 02°E, 53°N 03°W and 55°N 03°W reduce power to 10dBW p.e.p. e.r.p. during the whole calendar month of December 1991.

To help find out if you are in the effected area, you can draw lines on the map of England between Cromer in Norfolk and Wrexham in North Wales. The area covered then extends to Carlisle in Cumbria, and then runs east through Newcastle-upon-Tyne and out into the North Sea for 200km, before turning south again to meet the original line passing through the Cromer area. This means that if you live in England, to the north of Nottingham, you are in the effected area.

As we go to press, the DTI have not confirmed whether or not this request has been published in the London, Edinburgh or Belfast Gazettes. Although we were not informed of the request officially, we are publishing the information in the spirit of co-operation, to enable radio amateurs in the effected area to assist the authorities by reducing power.

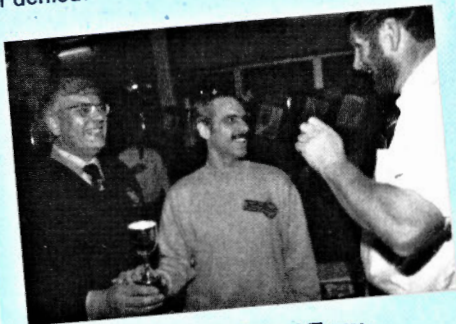
Rob Mannion G3XFD, Editor.

Mansfield Group Win PW 144MHz QRP Contest....Again!

Once again, the winners of the *Practical Wireless* 144MHz 1991 QRP Contest were The Mansfield Contest Group, G0MCG/P, from Nottinghamshire.

The silver trophy was presented to Paul Kelsall G0CYB - holder of G0MCG - and Tony Gibbins G4GNC. They are pictured receiving the trophy at the 1991 Leicester show from Rob Mannion G3XFD, the editor of PW.

We're not sure what the joke was, but it seems that the editor was highly amused to hear where the group intends to operate from for next year's contest. Rumours of a space-vehicle launching site in rural Nottinghamshire have yet to be confirmed or denied!



Paul Kelsall G0CYB and Tony Gibbins G4GNC from the Mansfield Contest Group (G0MCG/P), accept the PW 144MHz QRP Contest Winner's silver cup from Rob Mannion G3XFD the Editor, at the 1991 Leicester Show.



Royal operation from the Royal coach. The Queen of Sodor (Kay Pemberton) enjoys her first taste of amateur radio, watched by Lee G0MTN and the King of Sodor (John Pemberton).

'Royal' Visit to Special Event Station

The King and Queen of Sodor visited the special event station being operated by the Solihull ARS during the Birmingham Railway Museum's 'Friends of Thomas the Tank Engine' weekend.

Appropriately, the radio station was located in a former GWR Royal Saloon Coach. Completed in 1940, the coach was first used by Sir (then Mr) Winston Churchill and General Eisenhower, as a mobile office. After the war, the coach was put into service as originally intended and carried members of the Royal family on many occasions.

As well as two radio stations, on 7 and 144MHz, the coach also contained a display of second world war memorabilia, to commemorate Battle of Britain Day, which occurred during the weekend of the operation. Part of the display was a Battle of Britain video, which alternated with the RSGB recruitment video.

Battle Of Britain Special Event Station

On 21 September 1991, Royal Air Force Leuchars held its annual Battle of Britain Open Day. To mark this event, a special event station was operated using the callsigns GB1BOB and GB2BOB. The station consisted of a v.h.f. operating position, an h.f. operating position, plus a static display of home-made equipment, maps, books and posters.

Despite flat conditions on 144MHz, all operators were kept busy, either talking 'on the air' or chatting to members of the public. Although conditions were poor, contacts were made into greater Manchester on 144MHz, though the most frustrating moment of the day was being unable to establish contact with GB6BOB at Royal Air Force Finningley, who were heard calling CQ.

Business was brisk on 7MHz, the operator at GB2BOB very quickly had a pile-up on his hands.

A photo QSL card will be sent to all stations worked by GB1BOB/GB2BOB, and also to any s.w.l. sending reports. Thanks go to all the amateurs who supported the event on the day, it was a great success. Look out for them again next year.

Novice Licence Presentation In Devon

The Radio Society of Great Britain's President, John Case GW4HWR, presented the City & Guilds Examination Certificates, and the first Novice radio amateur licenses, to be issued in the county of Devon, during a ceremony on November 6th.

The ceremony, held at the South Dartmoor School, Ashburton near Plymouth, was held in the presence of invited guests. The Headmaster, Ray Tarleton, opened the proceedings and welcomed the RSGB party, parents, school governors and Rob Mannion G3XFD and Sharon George (News and Production editor) from *Practical Wireless*.

Certificates and licenses were presented to Novice radio amateurs whose ages ranged from the early teens to a mature 76 years! A special prize was presented from the RSGB to Jonathan Hiestad 2E1AFX, in the form of an electronic constructional kit, in recognition of the progress he had made in the hobby.

The man behind South Dartmoor School's amateur radio success, is Peter Thornhill G6ZKQ, whose activities with the school club led him to be appointed Chief Novice Instructor for Devon.

Peter is shown standing between Clive Trotman GW4YKL, Chairman of the RSGB Training and Education Committee, John Case, RSGB President and Jonathan Hiestad. John Case remarked that he was most impressed at the enthusiasm of the school and the level of support from the Headmaster, which has led to a club with only one 'token' adult on the committee.



Certificates and licences were presented to Novice radio amateurs, whose ages ranged from the early teens to a mature 76! Proud Peter Thornhill G6ZKQ, joins his group and can be seen, back row fourth from the left.



From left to right, Clive Trotman GW4YKL Peter Thornhill G6ZKQ, RSGB President John Case GW4HWR and Jonathan Hiestad 2E1AFX.

Newsdesk
'92

Club News

Aylesbury Vale RS meet 1st & 3rd Wednesdays, 8pm at the old Village Hall, Hardwick. December 18 is an informal social in the pub. Further details about the club from Geoff on (0280) 817496 or Martyn on (0908) 560026.

Barnsley & District ARC meet Mondays in the radio club room and shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. On December 23 they have a Construction Competition and Christmas Raffle. For further information, ring Ernie G4LUE on (0225) 365393.

Basingstoke ARC meet 1st Mondays, 7.30pm at the Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. For further details, please contact John Randall G3OAZ, 243 Paddock Road, Basingstoke, Hants RG22 6DP.

Bedford & District ARC meet Thursdays, 8pm in the Allen Club, Hurst Road, Bedford. More details from Gavin Carmichael, 15 Evesham Court, Avon Drive, Bedford MK41 7AJ. Tel: (0234) 365660.

Bradford ARS meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. On January 9 they have a natter night. Charles Bolt G0ACX on (0247) 494694.

Braintree & District ARS meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. January 6 is a member's evening. D. Andrews, 22 Armagh Grove, Braintree, Essex CM7 5UQ. Tel: (0376) 27431.

Bromsgrove & District ARC meet Fridays at Avoncroft Arts Centre, South Bromsgrove, Worcester. On December 13 they have their Christmas social. More details from Joe Poole G3MRC on (0562) 710010.

Bromsgrove ARS meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

Conwy Valley RC meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. January 9 is a talk by Frank Muraca G7WPE on 'Printed Circuits'. For further details, contact Mervyn Jones G4WNL, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW. Tel: (0492) 530725.

Coulston ATS meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. Andy Briers G0KZT on 081-668 7004.

Coventry ARS meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. For further details phone Jon on (0203) 610408.

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. December 18 is their Christmas Party and January 8 is 'The Work Of The RSGB' by John Allen G3D0T. More details from Richard Buckley G3VGV, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.

Derwentside ARC meet Wednesdays, 7.30pm in the Steel Club, 36 Medomsley Road, Consett, County Durham. Regular talks by amateurs and non-amateurs. Construction work overseen by Don G4LGA. Further details from Geoff Darby G7GJU, 60 Pine Street, Grange Villa, Chester-le-Street, County Durham DH2 3LX. Tel: 091-370 2032.

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. December 16 is their Christmas Party. Tony Rees G5WFMQ on (0248) 600963.

Dunstable Downs RC meet Fridays, 8pm at Chews House, 77 High Street South, Dunstable, Beds. On December 13 they have a TV Show. Further details from Wendy Jefferson on (0582) 451057.

Echelford ARS meet in the Community

Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. Further details from P. Townshend G6PMT on (0344) 843472.

Fareham & District ARC meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. On December 18 they have a Christmas Quiz. Details from Rod Smith G0ERS on (0705) 373572.

Fyde ARS meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. Eric Fielding G4IHF on (0253) 726685.

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

Gloucester ARS meet at St. Johns Ambulance HQ, Heathville Road, Gloucester at 7.30pm. January 8th is a Slide Show - review of the year. More info from J. Beckingham on (0452) 528533 Ext. 2741.

Great Lumley AR&ES meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact Barry G1JDP on 091-388 5936.

Halifax & District ARS meet 1st & 3rd Tuesdays, 7.30pm at the Running Man Public House, Pellon Lane, Halifax. On December 15 they have their Christmas Social. For further details, contact David Moss G0DLM, Beechwood Lodge, Leeds Road, Lightcliffe, Halifax, West Yorkshire HX3 8NU. Tel: (0422) 202306.

Hambleton ARS meet in Room A5 of Northallerton Grammar School at 7.30pm. For more details, contact Nigel Robertshaw G0NHM on (0609) 776508.

Hordean & District ARC meet 1st Thursdays, 7.30pm at Hordean Community School, Barton Cross (off Catherington Lane), Hordean, Hants. January 2 is 'British North Greenland Expedition 1952-1954' by Richard Brett-Knowles G3AAT. For more information, contact Stuart Swain, 35 Mavis Crescent, Havant, Hampshire PO9 2AE. Tel: (0705) 472846.

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. On January 2, they have a talk on 'Digital Signal Processing' by Alistair G3ZBU. Further details from Peter Stevens G8SUI, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: (0737) 842150.

Ipswich RC Contact Mrs S. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ.

Keighley ARS meet at The Cricket Club, Ingrow, Keighley, 8pm. On January 2 and 9th they have Natter nights. Further details from Kathy Conlon G1IGH on (0274) 496222.

Kettering ARS meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eskdale Street, Kettering. All enquiries to Len G7EHM on (0536) 514544.

Kidderminster & District ARS meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact Geoff Philpotts G7JIR, 62 Erneley Close, Stourport-on-Severn, Worcs DY13 0AH. Tel: (0299) 379229.

Louthians RS meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. Further details from Mel Evans at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.

Loughton & District ARS meet in Room 14 of Loughton Hall, 7.45pm. December 13 is their Christmas Meal and the 27th is Christmas Drinks at the Victoria Tavern. For more details contact Mike Pilsbury G4KCK on 081-504 4581.

Maidenhead & District ARC meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. December 17 is a Christmas Quiz and January 2 is 'Direct Conversion Transceivers' by John G3TWG. Details from Neil G8XYN on (0628) 25952.

Mansfield ARS meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. Further information from Mary G0NZA on (0623) 755288.

Morecambe Bay ARS meet every other Tuesday, 7.30pm at the Trimpell Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact J. Burrow G0NYD, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212.

Nelson & District ARS meet Wednesdays, 7pm at Llancaich School, Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact Leighton Smart G7OLBI at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736.

Norfolk ARC meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich. December 18 is a Night on the Air and January 8 is 'Getting Signals Out Of Noise' by Stuart Dodson G3PPD. Jack Simpson G3NJQ on (0603)

747992.

North Bristol ARC hold their meeting at S.H.E., 7 Breemar Crescent, Northville, Bristol. Chris Budd G0LOJ on (0454) 616267.

Nottingham ARC meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. On December 12 they have an amateur radio quiz and the 19th is their Christmas social, to be held at the Greenwood Tree public house, Greenwood Road. Further details from Rex Beestall G1LRI on (0602) 733740.

Poole RAS meet 2nd & last Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. On December 13 they have a Quiz and their pre-Christmas buffet. More details from Vernon Cotton G3BCI, 45 Branksome Hill Road, Bournemouth, Dorset BH14 9LF. Tel: (0202) 760231.

Prudential ARS is open to all employees and ex-employees of the Prudential companies. Those interested overseas should contact Alan McCulloch Z56KU, PO Box 2291, Helderkuin, 1733, South Africa. Those in the UK can contact Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF6 4TE. Tel: (0222) 512959.

Reading & District ARC meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR.

Rhyl & District ARC meet 1st & 3rd Mondays. They have a Junk Sale on December 16 and a 'Satellite TV' talk and demonstration by Roy GW8XLL on January 6. For more details, contact Ken Padley GW7IAR, 67 Rosehill Road, Rhyl, Clwyd LL18 4TS. Tel: (0745) 338276.

Salisbury Radio & Electronics Society meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. For further details, contact Bert Newman G2FX on (0722) 743837.

Sevenoaks & District ARS. Details from The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

Shefford & District ARS meet Thursdays, 8pm at the Church Hall, Amphill Road, Shefford, Bedfordshire. December 13 is a return Quiz Vs Cambridge Club (to be held at Cambridge), the 19th is Chairman's Mince Pie night and January 9 is Welcome Back. For further information, contact Nigel G1JKF on (0908) 274473.

Silverthorn RC meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. More details from Andrew Mowbray G0LWS on 081-529 4489 between 5.30 and 6.30pm weekdays only.

Solihull ARS meet 3rd Thursdays in The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. For more details, contact Colin Taylor G3USA, 231 Robin Hood Lane, Hall Green, Birmingham B28 0DH. Tel: 021-777 9965 evenings or (0827) 53344 daytime.

South Dartmoor ARC meet Mondays, 8pm at South Dartmoor School, Balland Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact Peter Thornhill G6ZKQ, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433.

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. December 14 is their Christmas dinner, the 22nd is a Fox Hunt and January 7 is a club meeting. Geoff Gwillian G4FJD, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.

South Notts ARC meet at Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham. For further details call Trevor G4IRH on (0509) 672734.

Southgate ARC meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. Brian Shelton G0MEE, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.

Spalding & District ARS meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. Further details from David Johnson, 65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 425367 (6-7pm).

Spen Valley ARS meet Thursdays, 8pm in Old Bank Working Men's Club, Mirfield. Alternate Thursdays are 'Noggin & Natter nights'. They have a Christmas Event on December 19. Further details from Ian Barraclough G7OWY on (0484) 716453, early evening.

Stevenage & District ARS meet in Ground Floor Lecture Room, 'D' Block, Ridgmond Training Enterprise, Ridgmond Park, 7.30pm. On December 17 they have a Dutch Party and Quiz, the 31st is Practical Computer Assembly and Modification and January 8 is a talk '2m D/F Aerial' by Alf G7KPV. More details from

Pete Daly G0GTE, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.

Stirling ARS meet Thursdays, 7.30pm at premises near Throsk, Stirling. Details from Brian Mulleady G6KWL, QTHR or on (0324) 36235.

Stourbridge & District ARS meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. January 6 is an On Air/Discussion evening. Details from Dennis Body G0HTJ at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 5AE.

Stratford-Upon-Avon & District RS meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. On December 25 they have Christmas morning greetings at 11am on 145.275. Further details from Alan Beasley G0CXJ, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.

Stroud & District ARS meet fortnightly in the Minchinhampton Youth Centre. For more details, please contact Dave Stallon on (0453) 886964.

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. On December 19 they have their Christmas Get-together, January 2 is a committee meeting and the 6th is a natter night. More details from John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.

The Three Counties ARC meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. December 13 is their Christmas Dinner. Kevin Roche G8GDS on (0420) 83091.

Torbay ARS meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbot. On December 13 they have their Christmas Party and the 20th, 27th, January 3 and 10th are Club nights. More details from Andy Stafford G4VPM on (0803) 329055.

Trowbridge & District ARC meet at 8pm, in the Territorial Army Centre, Bythesea Road, Trowbridge, Wiltshire, 8pm. More details from Ian Carter on (0300) 830383.

Verulam ARS meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings and 4th Tuesdays are their main monthly meetings. December 17 is their AGM. More details from Walter Craine G3PMF, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD5 0DR.

Wakefield & District RS meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. On December 17 they have their Christmas Social evening, on the 21st the 0001GMT Christmas Cumulative Contest starts and on January 5 the 2359GMT Christmas Cumulative Contest ends. John Bailes G0MVA on (0324) 250048.

West of Scotland ARS meet Fridays, 7.30pm at the Scotch HQ, 21 Elmbank Street, Glasgow. For further details, please contact John Power G6MKT, PO Box 599, Glasgow G3 6QH.

Whitten ARG meet Fridays, 8pm at the Whittton Community Centre, Percy Road, Whittton, Twickenham. On December 31 they have their New Year's Eve Dance. More details from Rosalind Catley, 15 Park Close, Hounslow, Middlesex. Tel: 081-894 2950.

Wiesbaden ARC - DA1WA - is a club mainly for US military personnel stationed anywhere near Wiesbaden, Germany. For more details, contact Robert Kipp DJ0PU, Hugelstr. 25, D-6070 Langen, Germany.

Wigtownshire ARC meet Thursdays, 7.30pm at the Community Education Office, Stranraer Academy. More details from Ellis Gaston G6MHPK, 3 Victoria Buildings, Cairnryan, Stranraer, Dumfries & Galloway DG9 8RA. Tel: (0581) 2202.

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. December 13 is their Christmas Social. Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.

Wirral ARS meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrow Park Road, Birkenhead, Wirral. On December 18 they have their Christmas Party and the 25th is Christmas Day Net. More details from Alec Seed G3FOO on 051-644 6094.

Club News has become so popular, we have had to squeeze it in even more this month. Club Secretaries please keep your details as brief as possible.

Radio Diary

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

1992

January 19: The Oldham rally will be held at the Queen Elizabeth Hall, Civic Centre, Oldham. Doors open 11am, 10.30am for disabled and for those taking the Morse test. Bar & catering facilities available and parking is free. Details from **Kathy G4ZEP** on 061-624 7354 day or 061-652 8617 evening.

January 26: The 2nd Lancastrian rally will be held at the University of Lancaster. Opening times are 10.30am for the disabled and 11am for everyone else. Further details from **Sue G10HH** on (0524) 64239 or QTHR.

February 2: South Essex ARS have their 7th mobile radio rally at the Paddocks Community Centre, Long Road (A130), Canvey Island, Essex. All the usual traders, Bring & Buy, refreshments, free car parking, including parking for the disabled outside the main door. Doors open 10am. Talk-in on S22. For further information contact **Dave Speechley G4UVJ** on (0268) 697978.

February 16: The Kidderminster & DARS rally will be held at the Harry Cheshire School, Habberley Road, Kidderminster, Worcs. Doors open 10am. **G8JTL**. Tel: (0384) 894019.

February 23: The Northern Cross rally will be held at the Rodillian School on A61 between Leeds and Wakefield (junction M1/M62). Doors open 11am, disabled 10.30am. On-site parking, dealers, groups and craft stands, Bring & Buy, Morse test. Car crime prevention demo. Bar & refreshments. Talk-in S22. Entry 50p (programme draw prizes). **Dave Gray G0FLX** on (0532) 827883.

February 29: Tyneside ARS have arranged a new venue for their annual rally, the Temple Park Leisure Centre in South Shields, Tyne and Wear. The centre offers up to 18 000 square feet of floor space, all on one level, with easy access for traders where needed. Catering facilities, including a bar on site, as well as family rooms. For those other members of the family not wishing to partake in the Rally, all the amenities of the Leisure Centre are available too, including heated Leisure pool and gymnasium. Plenty of free parking. Further details about the Rally from **Jack G0DZG** on 091-265 1718.

March 7 & 8: The London amateur radio show will be held at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9.

March 15: Wythall RC will be holding their annual rally at Wythall Park, Silver Street, Wythall (nr. Birmingham). Doors open 11am to 5pm. Usual traders, bar and refreshment facilities, Bring & Buy. Talk-in S22. Admission 50p. Full details from **Chris G0EYO** on 021-430 7267.

April 5: The Launceston 6th amateur radio rally will be held at Launceston College. Doors open 10.30am. **Maggie**. Tel: (0409) 21219.

April 19: Centre of England Easter Sunday radio & electronics rally, held at the National Motorcycle Museum, Bickenhill, nr. the NEC (Jct. 6 M42). Doors open 10.30am, 10am for disabled. Admission £1. Over 60 traders, ample parking, Bring & Buy. Talk-in S22. Bar & refreshment facilities. Details from **Frank Martin G4UMF** on (0952) 598173.

***June 14:** Royal Naval ARS have their annual mobile rally at HMS Mercury, Nr. Petersfield, Hants. There will be dozens of trade stands; a Bring & Buy; flea market; radio-controlled power boats and trains; local radio clubs and repeater groups; childrens' rides and amusements; vintage fire engine; TV detector van; ices and refreshments; arts and crafts' exhibition; two Grand raffles; spectacular arena displays and other attractions, making this a great day out for all the family. Talk-in on 144 and 430MHz, free parking and picnicking, free admission for children, adults £1.50, no dogs except guide dogs. For full details, contact **Cliff Harper G4UJR**, 34 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.

June 28: The 35th Longleat amateur radio rally. Details from **Shaun GBVPG** on (0225) 873098.

July 25/26: Norfolk ARS are planning a 2-day event. **Sheila G0KWP**. Tel: (0603) 618810.

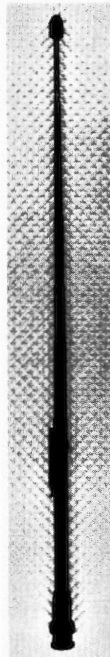
September 20: The East of England radio rally (Peterborough R&ES) will be held at the ICI Building, The East of England Showground, in Peterborough. For further details, please contact **Mike Bowthorpe G0CVZ** on (0733) 222588.

November 28: The Greater London amateur radio & computer show will be held at Harrow Leisure Centre, Christchurch Avenue, Harrow, Middlesex. Doors open from 10.30am to 4.30pm. **CLPK**, 18 Litchfield Close, Clacton-on-Sea, Essex CO15 3SZ.

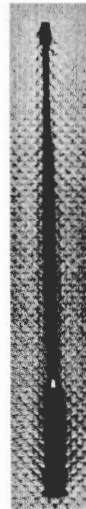
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The closing date for this offer is 8 January 1992.

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Amateur Radio Personality

It is with the greatest of pleasure we announce that as from the February issue, Doug DeMaw W1FB, the world-famous amateur radio designer, writer, and personality will be writing for Practical Wireless. The Rev. George Dobbs G3RJV, visited Doug at home in the USA and tells us more about the man behind the famous name.

*"Il n'y a point de heros pour son valet de chambre"
(No man is a hero to his valet) Mme Cornuel (1728)*

Heroes are notorious in their ability to disappoint. So, it was with some trepidation I drove with Dick Pascoe G0BPS, from the Dayton HamVention to Northern Michigan to visit Doug DeMaw W1FB.

I've been an admirer of the work of Doug DeMaw since the early 1970s, when I first began to read his technical articles in the pages of QST, the journal of the ARRL. His buildable technical projects, together with his lucid, and entertaining style of writing, have been popular for many years with radio constructors world-wide.

First Licensed

Doug DeMaw was first licensed in 1950, as W8HSS. This was while he was working in the research and development department of the University of Michigan.

After working in aeronautical research and in radio and television station engineering, he formed his own company, 'Avtronics' in 1960. Among the products from this company were v.h.f. and u.h.f. amateur radio items. It was during this time he began *The VHFer Magazine*.

In March 1965, Doug joined the ARRL headquarters staff as an assistant technical editor under George Grammer W1DF. In 1968, he was promoted to ARRL laboratory supervisor and editor of the *ARRL Handbook*.

Technical Director

Doug DeMaw's career moved on in 1970, when he succeeded W1DF as ARRL Technical Director, and Senior Technical Editor. During this period he wrote regular practical articles and series for the constructor in the *QST*.

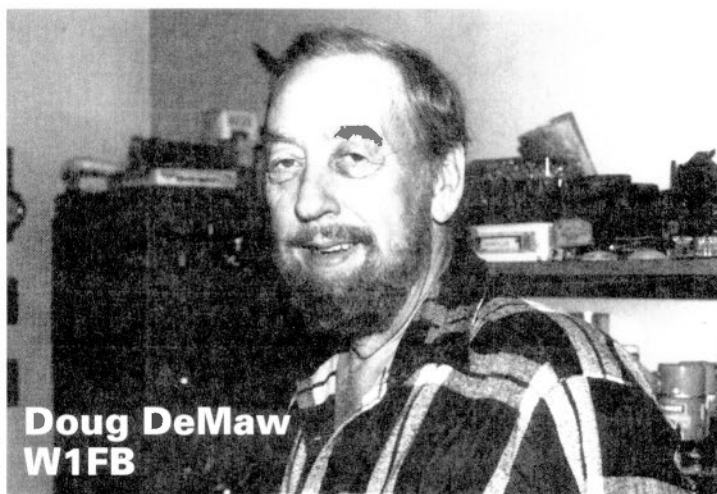
Other, now well-known books appeared. One example, that was written in partnership with co-author Wes Wayward W7ZOI, became the now famous *Solid State Design For The Radio Amateur*. This is a book that has become a classic amongst radio constructors.

Working at the American society's headquarters became a family affair for W1FB. Doug's wife Jean, also worked at ARRL headquarters, in the awards department!

Early Retirement

In 1983, Doug took early retirement from the ARRL after an 18-year stint. He returned to the family farm among the lakes of North Michigan, where he now lives with his wife Jean who has the callsign W1CKK.

Practical Wireless, January 1992



After retirement, Doug formed 'Oak Hills Research' in partnership with his son, Dave KA1BUQ. He remained under contract to the ARRL, and has produced a series of books which are still gaining excellent reputations in the world of amateur radio literature.

Examples of his prolific work are titles including: *QRP Notebook*, *W1FB's Antenna Notebook*, *First Steps In Radio*, and *W1FB's Design Notebook*. All are available from the *PW Book Service*, as is *QRP Classics*, which contains many of the Doug DeMaw articles from *QST*.

Attractive Place

North Michigan is an attractive place. After driving through the flat industrial landscape of Ohio, skirting Toledo, and into Michigan, passing through Kalamazoo and Grand Rapids, we began to drive into miles of forest and past many lakes.

The W1FB QTH is certainly in the wilds! The village of Luther, the nearest community is set off the main interstate road. Broadly speaking it's a collection of small wooden buildings, mobile homes and make-shift shacks based upon a former logging community.

The 'Oak Hills Farm' is set on a dirt track road just north of the village. Once it was a working farm, but all that remains is the picturesque wooden farmstead set in several acres of land, which is now returning to the wild.

It's no longer economical to work the small farms in the north of Michigan, although some of them are given over to Christmas tree cultivation. The original farmhouse is lovingly restored, and there is a large barn, (filled with electronic junk!) and a workshop attached to a garage.

No Disappointment

Doug DeMaw was no disappointment. He turned out to be a tall, bearded man with a growl of a voice and an impressive range of interests and insights.

Since his retirement, Doug has taken a keen interest in the local community. He's now the Chairman of the Lake County Board of Commissioners, and also a member of the Michigan Association of Counties. These appointments leave him with official and legal duties that take up a lot of his time, and he's always on the go.

Attractive Radio Shack

Doug has an attractive panelled radio shack and combined writing room, which runs along one side of the house. One of the first things I noticed in this room,

was the impressive array of armaments lining the back wall!

Was the display of guns an example of the American love of firearms and other weapons? On closer inspection however, and following explanations from Doug himself, this collection proved to be somewhat different.

The collection consists mainly of muzzle-loading rifles and hunting bows. In recent years Doug has become a follower of the sport of muzzle-loading rifle shooting.

The rifles are modern copies of old weapons, which are hand-loaded and charged with black powder. Doug's also a member of a group which meet in forest camps, dressed in authentic early costumes while they compete at target shooting with early weapons.

Challenging Sport

Dick Pascoe and I were fascinated with the antique-style weapons. We were invited to have a go, and we found out just how much a challenging sport it is. Out on Doug's own rifle range, just outside his house and under his 1.8MHz loop antenna, we attempted to fire muzzle-loaded rifles at targets.

It's a long process! First you charge the rifle from a powder horn. Then you put in the wadding, before placing the ball in the muzzle. Next you have to ram it home, place the cap on the striker arm, cock the rifle, aim and fire.

These modern copies of traditional weapons are long beasts! They weigh a lot, and wave about and give out a lot of smoke. But the gun-toting Vicar of Sudden didn't do so badly. I have a target at home, which shows where two of my shots actually made holes in the paper target (and Dick Pascoe lived to tell the tale too!).

Workshop Delight

The W1FB workshop is a delight. It's almost as untidy as mine and containing a similar array of old, but good, test equipment.

I felt at home by the workbench with its collection of well-used tools, part and wholly completed boards and projects. The later projects which feature in his more recent books, were built under true amateur conditions, in a confined space using basic tools and inexpensive equipment.



Where it all begins, W1FB at home in the shack.

New Notebook

I was shown some of the boards for his new edition of the *QRP Notebook*. This will be a complete re-write of the earlier work, with new projects making a much larger book to appear quite soon. I'm pleased to say, that after seeing it in preparation, I think it will be worth waiting for.

Doug DeMaw's contract with the ARRL is now completed. The royalties from previous books are such that he doesn't wish to continue writing as much as he did in the past, as this would affect his pension and taxation rights.

The 'Oak Hills Research' business has been sold, and its kit production business has also gone. However, Doug is going to continue to produce articles for selected magazines, including *Practical Wireless*.

He's recently had work published in *CQ Magazine*, but the high-volume output is now at an end. Despite this, I am pleased to report that Doug says he will be placing some technical material in the G-QRP Club journal *Sprat* in the future.

Interest In QRP

Doug DeMaw's interest in QRP goes back a long way. He was building little QRP transmitters, usually with valves like the 6AQ5, many years before his time at the ARRL.

His interest, like many of us, was re-kindled when 'Ten-Tec' was formed and sold their first products. These were a series of little transmitter and receiver modules, which became their PM Series of QRP transceivers.

The first published QRP transceiver design by W1FB, appeared in the early 1970s. It was this project that led to the meeting with Wes Hayward W7ZOI, and to their extremely successful joint work on *Solid State Design For The Radio Amateur*.

His Working Life

After giving most of his working life to amateur radio, Doug DeMaw is relaxing. He's now beginning to settle back into enjoying the hobby for its own sake.

To say I enjoyed my time with Doug is an understatement. Over the years he has given a lot of pleasure and knowledge to many radio amateurs, who like myself, like to build equipment.

I only hope we will be able to continue to read more of his work in years to come. Doug has of course been invited to join me in England. It's an invitation which he tells me he intends to take up. He will be among friends.

PW



Doug's house really is in the wilds!

Practical Wireless, January 1992

To start off the new year, 'Quaynotes' takes a look back at the history of CB radio in the UK, and talks about the problems involved with the original licence conditions, and antenna specifications.

CB HIGH & LOW

By 'Quaynotes'

It's nice to be back, and I'm going to delve into history for a little while. But I promise it won't be boring!

Before 1981, as we all know, 27MHz operation in the UK was illegal. Despite this, many thousands of people defied the law and used their rigs from the home-base and the car. They were always on the look-out for Post Office Radio Branch detector vans, and of course the police.

The CB radio service had become a legal public facility in the USA, some 30 years before this. In the meantime, other countries had made it available to the public under licence.

However, after a great deal of persuasion by the would-be CB fraternity, including threats to remain 'illegal' come what may, the Home Office changed their minds. At long last, the CB radio service became legal in the UK from November 1981.

The CB Licence

The original CB radio licence, and the terms relating to operation, proved to be something of a nonsense. For example, the specified legal antenna for 27MHz was a 1.27m long conductor and a series loading coil. Nothing more!

Without some means of maintaining the flow of r.f. current over 180°, such as a 'ground-plane', this 'specified' antenna would not function at all. Inductive 'centre loading' for mobile or base station antennas was not permitted either!

Although the Home Office invited manufacturers to submit antenna designs for approval, as far as I know, none were accepted. One of these antennas, designed for a manufacturer by the well-known amateur radio writer Fred Judd G2BCX, is shown in Fig. 1. This particular design was the origin for Fred's popular 'Ring-base' antennas featured in *PW* for the amateur bands.

The radiating section fully complied with the Home Office requirements, and the 'resonant ring' provided the essential r.f. current continuity. Despite this, the design was rejected! Yet today, it

would be quite 'legal' according to the terms of the present DTI CB radio licence!

Antenna Height Factor

There was also the nonsensical requirement of: "inserting a 10dB attenuator at the transmitter output if a 'base station' antenna was

mounted higher than 7m above ground".

That rule meant a reduction of the allowed 4W of transmitting power by a factor of 10. In other words, the power dropped to 400mW (milliwatts)! It was your hard luck if you lived at the top of a block of high-rise flats, (10 is the power ratio of 10dB by the way).

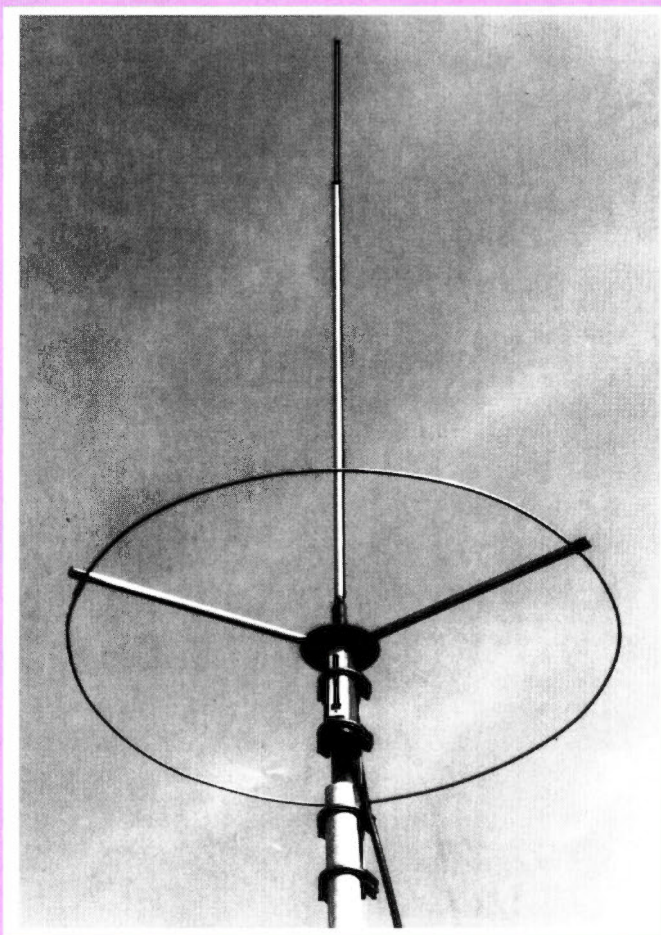


Fig. 1: Prototype of the 'Ringbase' antenna for 27MHz. The radiating element complied with original Home Office CB radio licence requirements. Approval for manufacture was rejected (see text).

Groundwave Propagation

Groundwave propagation is applicable for most of the time at 27MHz. Some idea of signal level versus distance is shown by the curves in Fig. 2. These curves are for propagation over flat ground of average conductivity, and they are calculated for 27, 20 and 10MHz respectively, using the 'Sommerfeld Equation'.

You can clearly see how the working distance increases, as operational frequency is decreased. It can also be seen that 27MHz has the shortest groundwave range.

The actual field strength measurements for 27MHz, used an r.f. power of 4W, with a base station antenna seven metres high. They were constructed to the original Home Office specification, with the addition of a small groundplane, and they're shown in Fig. 3.

The transmitted signals were received, measured and recorded using mobile receiving equipment. The caption explains the plotted curves. It's quite obvious to me that a small antenna of this nature, was specified in order to limit working distances.

Present Specification

The present DTI specification for a 27MHz antenna is a single conductor with a maximum length of 1.65m. You can improve performance a little, as slightly less inductance is required for resonance.

The antenna may also be 'legally' operated with a ground-plane or other method of maintaining a 180° r.f. current flow. Also, nowadays there's no height-above-ground restriction, except by local planning authorities, or if you live near an airport.

For 27MHz, the higher the antenna, the greater the working 'ground-wave' distance. There are of course times when ionospheric conditions, propagate signals on 27MHz over very great distances, but conditions like this don't appear every day.

The 934MHz Service

The original Home Office CB radio schedule, section 3, quoted, "The antenna for 934MHz equipment with provision for connection of an external antenna (wouldn't have been much good without such a connection!) shall consist of a maximum of four elements, none of which may exceed 170mm in length". This made it possible to construct antennas with some gain over a dipole.

The DTI are a little more generous nowadays. They now permit 12 elements (same length). They also allow the construction of a parasitic and other type of beam antenna. These relaxations allow arrays with a more acceptable amount of gain over a dipole, along with phased vertical collinear antennas for a mobile operation.

Again, there are no height-above-ground restrictions made, except those mentioned earlier. On the 934MHz allocation, there is of course, the added bonus of greater

than line-of-sight working distances, when certain 'tropospheric' conditions develop.

UK And CEPT Frequencies

Details of the frequency coverage for both UK and CEPT allocations have been published before, but for the benefit of new readers, I'm going to repeat them. They allow 40 operating channels between 26.965 and 27.405MHz (CEPT) and 40 channels between

27.60125 and 27.99125MHz (UK), a total of 80 channels.

The use of either set of frequencies are now permitted by the DTI CB radio licence but must be an approved set for each band.

I hope you found that interesting. I'm looking forward to covering some more really interesting topics in 1992, but until then, I wish you all a happy Christmas and peaceful new year.

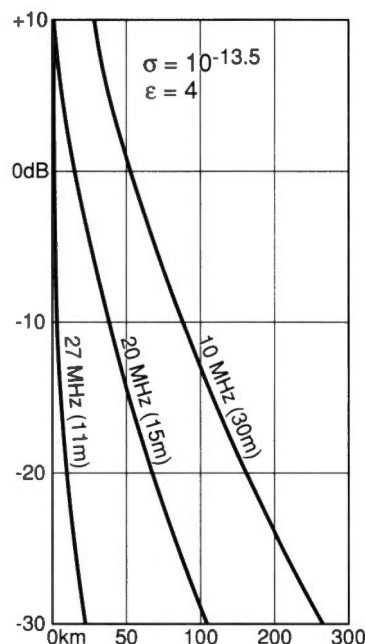


Fig. 2: This diagram shows signal strength versus distance in km at 27, 20 and 10MHz. They were calculated from the Sommerfeld equation, for propagation over ground of average conductivity.

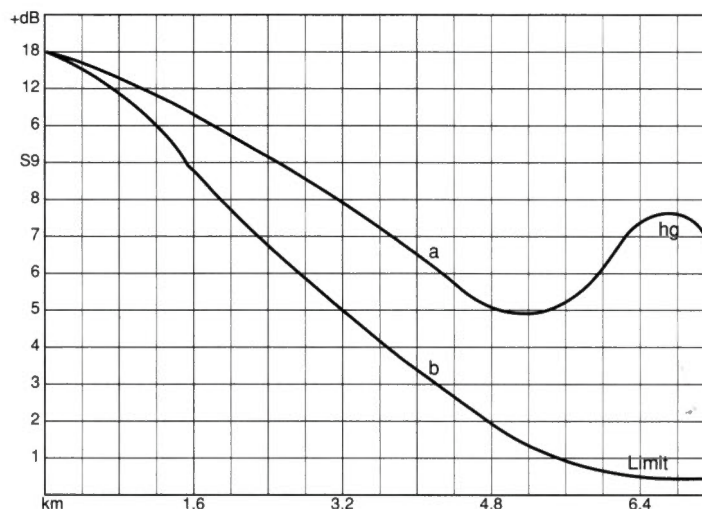


Fig. 3: This diagram shows the results of field strength trials at 27MHz. We had a base station power of 4W, and the antenna was at 7m and transmitted to a mobile with a gutter-mounted antenna. Curve (b) Measurements over flat ground to limit reception. (a) This diagram shows an increase in signal strength (hg), when the mobile was travelling over rising ground.

Errors And Updates

PW Challenger

A Simple 3.5MHz CW Transmitter

Pages 32-34 *PW* December 1991

Steve Ortmayer G4RAW, has sent us a small table of power and r.f. voltages that should have accompanied his article.

When using a dummy load and a diode probe to measure the r.f. voltage, as detailed in Fig. 1 on page 32, the power output may be estimated from the following chart. It is a little 'rough and ready' but it works.

Voltage Reading	7.1	8.7	10.0	12.2	14.1	15.8	17.3	18.7
Power (r.f.) watts	0.5	0.75	1.0	1.5	2.0	2.5	3.0	3.5

PW Beaver

A Simple Transmitter Receiver For 50MHz

PW October & November 1991

On page 40 of *PW* November 1991, the description of winding the modulation transformer, T4 is misquoted. Please ignore the transformer type number quoted in the text, the transformer type number (RS 228-258) detailed in the 'Shopping List' is the correct one.

In the 'Shopping list' for the receiver section, on page 29 of the October issue of *PW*, there is a mistake about the varicap diodes D1 and D2. As the device quoted in the shopping list, a KV1236, is a dual diode, there is no need to buy two, as one is sufficient.

Our thanks go to those of you who have pointed out these errors. Please accept my apologies for the mistakes. Editor

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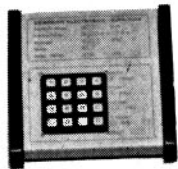
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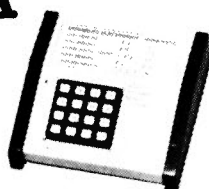
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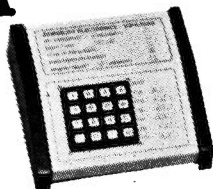


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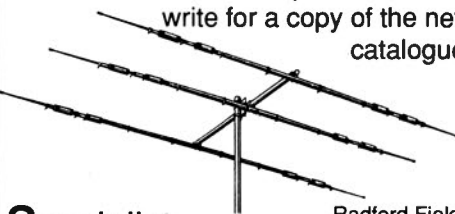
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D3W



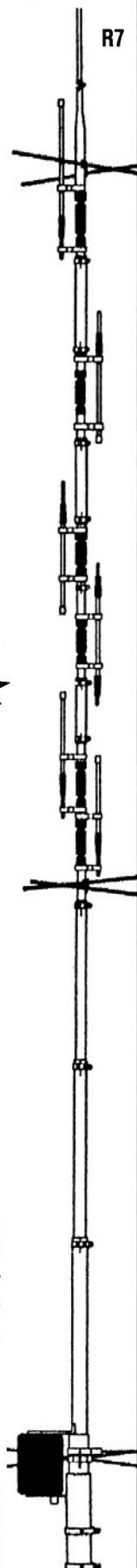
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The Long Wire - A Simple Antenna For All Occasions **Part 2**

Construction

For almost all my 'amateur radio years', I've preferred end-fed and tuned antennas for general operation on the h.f. bands. At my present QTH in Norfolk, the (permanent) h.f. antenna has a physical length of approximately 40m. Most of the antenna is at a height of around 10m.

I say 'most' because at first, the wire goes up from the shack to a mast. Then it passes over our bungalow roof to another mast and continues at right angles for about 8m to another (short) mast on a car port alongside the house. It's a bit bent you might say!

However, with a home constructed tuner the antenna functions on all the traditional h.f. bands with a more or less 1:1 v.s.w.r. Using a transmitter power of not more than 100W on any band, I've achieved 'DX Century' three times over. This includes good contacts with ZL, VE and other more distant locations on the 3.5MHz band.

A Simple Tuner

The basis of a tuner to cover all the h.f. bands from 1.8 to 28MHz is shown in Fig. 2.1. It's a very simple design, and amounts to little more than a tuned circuit, consisting of a multi-tapped inductance and an air-spaced variable capacitor.

For low power operation, C1 may be a receiver type of variable. For higher power operation it **MUST** be a transmitting type, with wider spacing between the vanes and capable of withstanding high r.f. voltages.

Virtually all transmitters and/or transceivers have the now almost universal 50Ω r.f. output. As I've shown in Fig. 2.2, a short length of 50Ω coaxial cable is first taken to a v.s.w.r. meter. It's then taken to the antenna tuning unit (a.t.u.) via another short length of coaxial cable which is tapped into the tuner inductance near the earthed end.

Loading And Matching

The antenna tuner works by allowing the antenna wire to be connected to a suitable tap on the inductance, allowing loading and the correct impedance match to be obtained.

Resonating the whole system at the required frequency of operation, is achieved with the aid of the tuning capacitor, which is also connected to a suitable tapping point.

This simple arrangement will also work with a length of antenna wire unrelated to the portion of 'Top Band' allocated to the Novice (A) licensee. This allocation is between 1.95 and 2MHz, a 50kHz bandwidth.

If harmonic operation of the antenna is required, the minimum length for a self-resonant quarter-wave for the Novice licence allocation in the 1.8MHz band can be derived easily.

This can be obtained from the centre frequency of the allocated bandwidth of 1.95 to 2MHz, or 1.974. A quarter-wave will be $300/1.975/4 = 38$ metres 'rounded off'. For

the full bandwidths on all the h.f. bands, you should use $300/1.9/4$ which gives a length of 40 metres in 'rounded off' terms.

Building The Tuner

The general details to help in building the tuner, are given in Fig. 2.3. My original tuner is housed in an all-metal case 300 x 200 x 150mm.

The insulating strip on which the tap sockets (or terminals) are mounted, is bolted to the front panel near the top, on short stand-off spacers. Well insulated leads from the tuning coil, L1, and the variable capacitor, C1, are taken through a hole of about 30mm diameter made in the panel, just below the tapping strip.

The Tuning Coil

The tuning coil former, preferably a ceramic type, can otherwise be made of quality Paxolin or white plastic tube. It needs to be between 130 to 140mm long and 35 to 45mm in diameter.

The winding on the coil uses 1.5mm enamelled wire. It's close wound, starting about 10mm from the top and ending the same distance from the bottom. The coil length is not critical as we're actually winding an inductance which can almost be regarded as a 'roller-coaster' because of its many tappings.

All you have to do, is to carefully wind the coil, and fill the former as I have shown in the photograph. Care taken at this stage, will be repaid with a neat and efficient coil.

Taps are made every two turns, in the way indicated in Fig. 2.3 and the photograph shown in Fig. 2.4. The taps are arranged so that they're in line along the coil, as can be seen in the photograph.

As promised last month in Part 1, Fred Judd G2BCX now describes a practical and simple antenna tuner, to help you get the very best results from your 'long wire' on the traditional amateur bands.

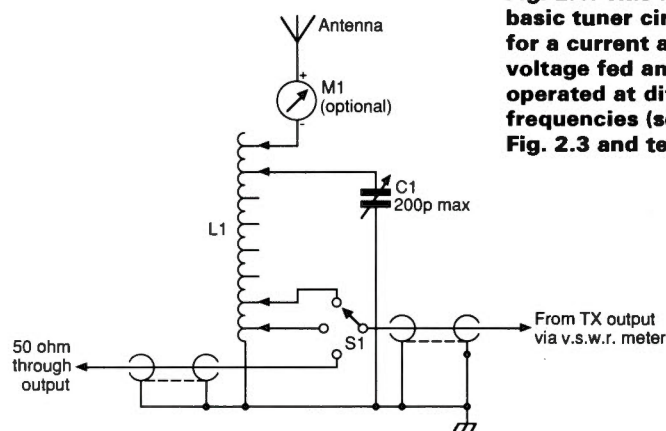


Fig. 2.1: This is the basic tuner circuit for a current and/or voltage fed antenna operated at different frequencies (see also Fig. 2.3 and text).

Fig. 2.2: How the antenna tuning unit described in the text, is connected and used in conjunction with a s.w.r. meter. The plug sockets (with the plugs to select tapings un-connected for clarity) are shown at the top of the cabinet.

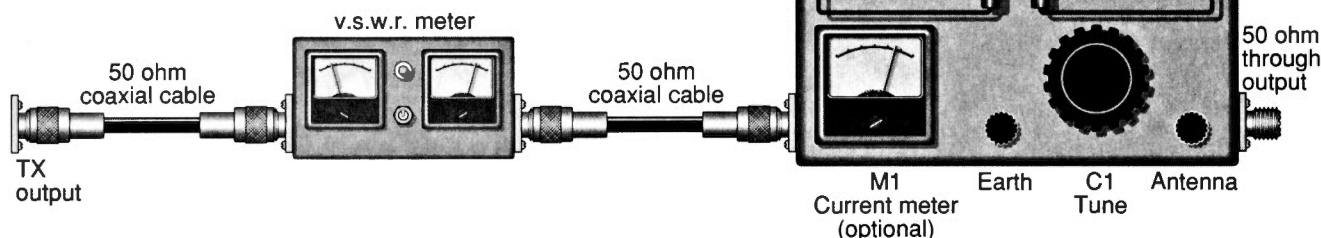
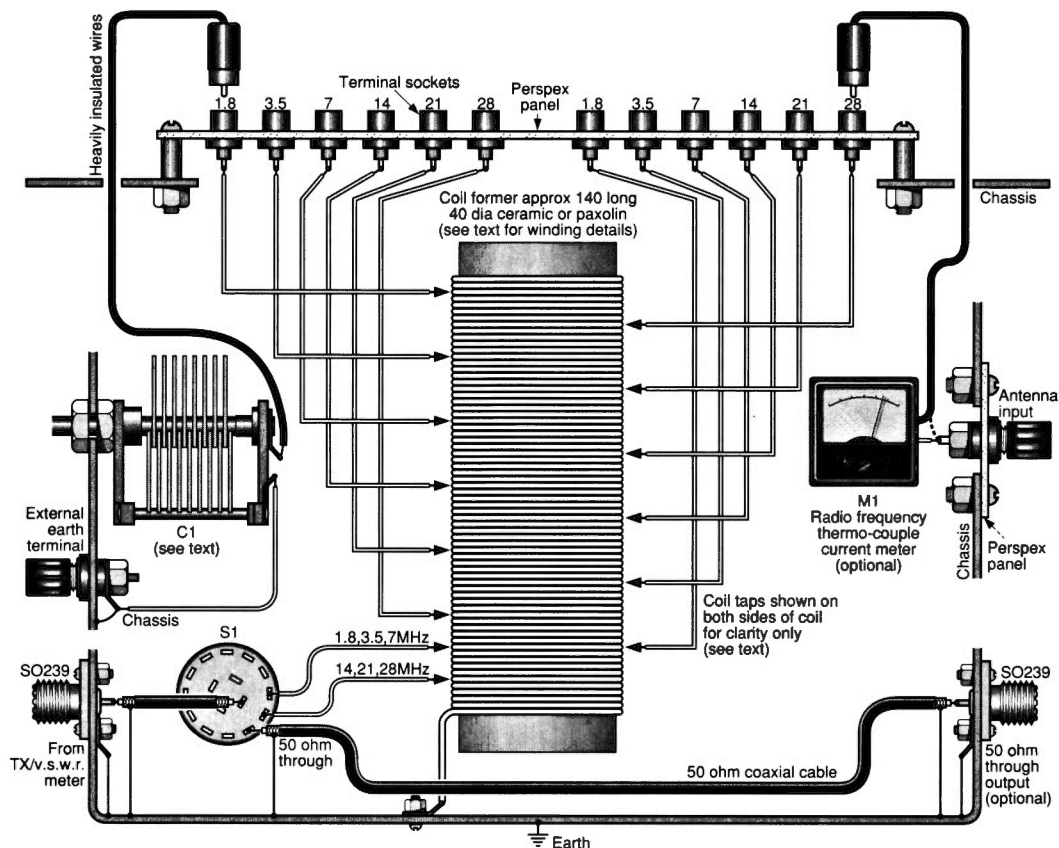


Fig. 2.3: The constructional guide for the simple antenna tuning unit. Note: The coil windings are only shown on either side of the coil diagram for the sake of clarity, and they are in fact, all in-line on the same side of the coil (see photograph in Fig. 2.4). The dotted line between the antenna input and the output side of the r.f. thermocouple ammeter, represents the route of the wire if the optional meter is not used.



The top of each tap is cleaned and tinned with solder. In the diagram, Fig. 2.3, these taps are shown one either side of the coil only to clarify the drawing. They are, in fact, all in-line as shown in Fig. 2.4.

Optional Refinement

The r.f. thermocouple meter is an optional refinement. If you decide to use a meter, it should have a maximum range of at least 1A. This is to allow for a current feed when the transmitter power is in the region of 150W.

If you are not familiar with r.f. thermocouple ammeter, you should be wary! Meters of this type are clearly marked as thermocouple types. Don't be fobbed off with the wrong type of meter. Fortunately they are freely available at rallies and radio surplus stores.

You should also note the well insulated antenna terminal. Don't forget that the r.f. voltage on the terminal will be very high, when the antenna itself is voltage fed.

The switch S1, a single pole three-way type, may be a conventional type. But it's best to use a ceramic framed switch, with fairly large contacts.

The current, via the switch, could be high with a transmitter output in the region 100/150W. For the legal novice licence ratings, S1 need not be quite so robust.

Using The Tuner

The tapping points for both the tuning capacitor and the antenna have to be found experimentally. Find them for one band at a time. This should be done at the band centre frequency, starting with the lowest end with reduced power from the transmitter.

Absolute resonance is indicated by the lowest possible v.s.w.r. reading. The reading for each band, should be in the region of 1:1 at band centre.

Once the correct tapping points have been found for each band, no other adjustment is necessary except to retune when changing bands. Don't forget to mark the tap sockets (or terminals) accordingly.

The v.s.w.r. will increase a little, with a change of frequency within a band. If the reading increases, and reaches about 1.5, it's time to retune the antenna.

The taps for the 1.8 and 3.5MHz bands, will be much closer to the lower end of the coil if, at either frequency, the length of the antenna is physically a quarter-wavelength long. It must therefore, be current fed from a low impedance source, i.e. a tapping near the earth end of the tuning coil.

Note: The switch, S1, as well as allowing you to select tapplings, also provides for a 'through' 50Ω connection for any other antenna, fed directly from a transmission line of the same impedance.

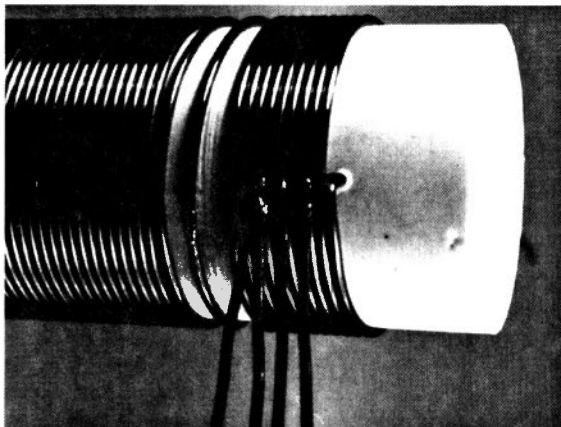
Radiation And Polarisation

If the antenna, irrespective of physical length, is tuned to a quarter-wavelength for the frequency of operation, radiation will tend to be omni-directional. The polarisation will then be predominantly horizontal, particularly if most of the antenna is itself horizontal.

If the antenna becomes half-wave resonant at the band frequency and again, if most of it is horizontal, the radiation pattern will be approximately cosine. In other words the plotted radiation profile will form a figure-of-eight pattern, as it would do for any half-wave antenna and with horizontal polarisation.

You may recall that I provided a computer calculated radiation pattern for an antenna operating in the region of 10MHz, in part 1 (Fig. 3). The electrical length of this antenna was 1.4 wavelengths, running (quite straight) from east to west.

Fig. 2.4: Photograph showing how the coil windings are tapped, to make the inductance variable.



The pattern for one wavelength would be similar, but without the side lobes. As the band operating frequency is increased, so the antenna becomes electrically longer still.

Computer Produced

The computer produced diagram shown in part 1, Fig. 3, and the other radiation patterns, Figs. 2.5 and 6, are superimposed on a great circle map. They are orientated in accordance with the direction in which the antenna is laying, as indicated by (A).

Remember however, that these patterns are perfect, as if the antenna was located in free-space. The environment at ground level, limitation of garden space, and the suspension at a practical height, tends to distort the perfect, free-space radiation patterns of any h.f. band antenna.

Despite this, provided that as much of the antenna as possible is horizontal, the coverage for the higher frequency bands may not be too far removed from the ideal, 'perfect', antenna.

Overall Height

Much depends on the overall height of the antenna. This factor also determines the 'electrical' height above ground, in terms of wavelength at operational frequency.

For the lower frequency bands, vertical radiation will be at fairly high angles. This is unavoidable anyway, but it's not such a disadvantage.

For the higher frequency bands, 21MHz and higher, the angle of maximum radiation will be lower, in the region 20 to 30°. This figure is quite suitable for working DX when Ionospheric conditions are good, i.e. when the critical frequency is fairly high.

Electrically Long

When an antenna becomes electrically long in terms of wavelength, which it does as the frequency of operation is increased, then there are always four main lobes of radiation at one wavelength or longer.

Above one wavelength, as Fig. 3 in Part 1 for example, small side-lobes are generated. These side-lobes increase in number as the length of the antenna in wavelengths is increased.

The computer produced rectilinear patterns of horizontal radiation, shown in Fig. 2.7, indicate this quite clearly. The pattern, (a) shows that for an antenna four wavelengths long, the two main lobes and six side-lobes for half the antenna, amounts to four main and 12 side-lobes for the whole antenna.

The same applies to Fig. 2.7 (b), in which the full antenna would still have four main lobes but a total 28 side-lobes! The reason is that the current in every other half-wave along the antenna is in-phase.

There's a bonus for antennas operated in the way I've just mentioned. The bonus is that they can exhibit worthwhile gain from each main lobe, as in Fig. 2.7. The diagrams (a) and (b) indicate this and even a small amount from the larger magnitude side-lobes.

You should note however, that the main lobes become narrower as the length of the antenna (in wavelengths) is increased. Also, the angle of each main lobe relative to axis of the antenna becomes smaller. The angle for (a) and (b) is about 25 and 15° respectively.

The Practical Aspect

We have to remember the practical aspect. Not everyone has a long garden with a fairly tall house at one end! They may not even have a high tree, or space for a mast at the other end, from which to suspend even a 30m length of wire.

For these reasons, I have included Fig. 2.8, which shows a few ways of overcoming the space problem. The accompanying captions provide the details, but (c) is more or less the same arrangement I use for my own h.f. band antenna, mentioned earlier.

So, don't neglect the long wire, it's a practical antenna and it has proved itself to me and many other operators over many decades.

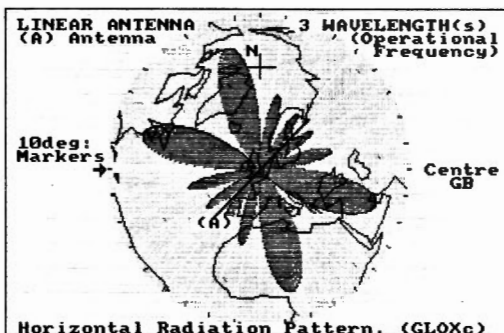


Fig. 2.5: Horizontal radiation. The antenna is three wavelengths long (at operational frequency) laying north-east/south-west.

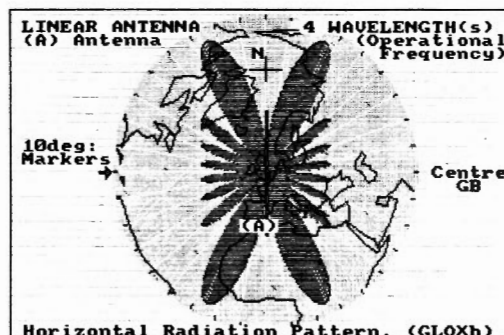


Fig. 2.6: Horizontal radiation. The antenna is four wavelengths long (at operational frequency) laying north-south.

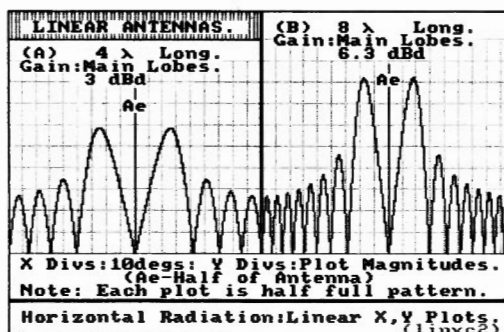


Fig. 2.7: Rectilinear plots of horizontal radiation illustrate main and side-lobes (note: shown for half the antenna only) and gain factor of main lobes from antennas four and eight wavelengths long. Other details in text.

Reference

Ref. *The Radio Amateur Antenna Handbook*. W. Orr. W6DSAI (available from the PW Book Service). This book contains chapters on antennas for h.f. bands operation, both horizontal and 'sloping'.

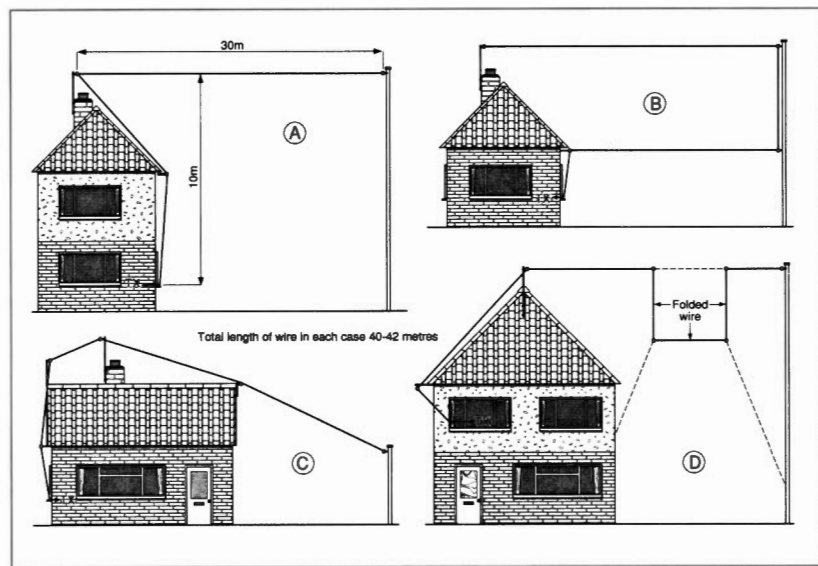


Fig. 2.8: Practical suggestions for fitting a long antenna into a limited space. (a) The optimum. A tall house, long garden and a good height. (b) A small house, short garden. The antenna is folded. (c) A bungalow, (long dimension) and small garden space (as at G2BCX's QTH). (d) A tall house, short garden and antenna folded.

A Practical Guide To Kit-Building



"Amateur Radio is more than a hobby. It is an ART that you can enjoy if you are willing to experiment with circuits"

Doug DeMaw W1FB writing in his W1FB's Design Notebook (ARRL)

I have been an amateur radio constructor for around 35 years. I cannot agree more with Doug DeMaw's view that it's an art form.

It's no surprise that the book, which is probably the best and most enjoyable work on electronics theory, is called *The Art Of Electronics* by Horowitz and Hill. There is something about building electronics projects that's far more than the mere execution of the practice of scientific theory.

For many years, I was against the use of kits in electronic construction. My opinion then was that kits were to real radio construction, what painting by numbers is to creative painting!

More recently, my views have changed and I now consider that good kits can be a real asset to our hobby.

Advantages Of Kits

The advantages of kits may be summed up simply: A well-

produced kit should produce a project which works first time. This is especially useful to the less experienced constructor. It's an unfortunate fact that people often leave electronic construction behind, having failed to make early projects work.

The building of a kit enables the builder to gain much experience. They learn techniques and practices which pave the way to more adventurous projects. The kit also provides a safe environment for learning the 'trade'.

A kit provides a short-cut to the finished project. The parts are supplied, usually with a printed circuit board, to enable a speedy building of the project.

For many beginners, or for that matter people who live away from sources of radio parts, finding the correct components for a project can be troublesome and expensive.

Which Kit?

Which kit should you try? Well, my advice is the same as I would suggest for all radio construction projects. A kit should be chosen that's within your capabilities as a constructor.

Many constructors fail at the

first hurdle in electronic building, because they attempt something too complex for their understanding or skill. You should enter into all your early projects with the confidence. In other words, you should expect a successful result.

The kit should produce something that will be useful. I say this, because many simple and small kits, produce something which is of novelty value rather than something of practical use.

Although the building process alone can be satisfying, it's so much more rewarding to make a project that will be used. To this end there are plenty of simple, but useful, kits around.

Value For Money

The chosen kit should also represent value for money. A manufacturer who bags up a selection of cheap parts with an over-simple instruction sheet, to build a project, is not a good kit producer.

But do bear in mind, that it's more expensive to build a project from a kit. The kit manufacturer may have been able to buy the components at favourable prices,

but producing kits for sale is very labour intensive.

All of the individual parts have to be sorted out and placed in bags. The documentation then has to be prepared and produced, which itself can be very time consuming.

The development work which is also needed to produce a reliable circuit, takes a lot of time. It's not a cheap business, and so far I've said nothing of overhead costs and advertising!

Batteries Not Included

How often do we read that 'batteries are not included'? But in this respect, just what should a constructor expect from a kit?

The minimum the buyer should expect in a kit, is a good set of quality components and probably a good quality printed circuit board. The detail of what's supplied varies according to the manufacturer, and the type of project.

Many manufacturers supply the printed circuit board and all the components to go on the board, but exclude the hardware. This may seem dubious, but it's actually quite a good idea.

When it comes to building practical projects, it's often a design by the Rev. George Dobbs G3RJV that we're tackling. So, we asked George to take an in-depth look at kits and kit building. He passes on many hints and tips on the way, after starting off with the obligatory G3RJV quotation!

Kit Building Special

Good soldering is absolutely essential for successful kit building.

Photo courtesy of Antex (Electronics) Ltd.

One of the surprising truths about modern electronics, soon evident to those who build their own equipment, is that the hardware (the case, knobs and front panel control hardware) can cost more than the actual electronic circuitry!

Many kit manufacturers concentrate on the the electronic circuit alone, and leave the builder to find the hardware. This approach can drastically reduce the cost of a kit.

The builder has to find, and pay for the case and hardware, although this can be an advantage. Some people enjoy making their own cases or re-using a case from a piece of scrap equipment.

Others, like me, chase bargains in hardware at radio rallies and conventions. It also moves away from the painting by numbers concept, in that the builder can introduce his own efforts and skill into the project. The other main advantage is that the completed project, need not look like everyone else's final product.

Supplied Board

The best kits are supplied with a tinned or plated printed circuit board. Some manufacturers provide a p.c.b. where all the copper tracks on the underside, have been covered by a protective layer.

The protective layer may be a sprayed varnish which can be soldered through, or a thin layer of solder, 'tinning' the tracks. Copper soon oxidises, and the bare metal tracks should be cleaned with fine emery paper or a p.c.b. cleaning block, until the copper shines.

The leads and connecting tags on individual components should also be clean, to ensure good solder joints. Some p.c.b.s may also have a silk-screened layout marked on the top of the board.

The layout printed on the top of the board can be very helpful in sorting out where each component is mounted. Because this extra process adds to the price of the board, not many kit manufacturers add these markings.

Documentation Vital

The documentation which comes with the kit is vital to its successful completion. Getting the

documentation right is very difficult, and this can be the weakest link in some kits.

The minimum requirement is a complete circuit diagram or diagrams of the project, and a clear layout drawing showing where all the parts fit on the board. There should also be a full inclusive list of all the component parts used in the project.

There may also be a general guide as to how to proceed with the building. Some manufacturers also provide a full step-by-step account of the assembly of the project.

The best documentation for kit building, was produced by HeathKit when they were in the amateur radio field. Their handbooks were works of art and logic.

As the building of a HeathKit project proceeded step-by-step, this manufacturer arranged the manual so that everything the builder was required to do was in sight. It's possible to do this for yourself, even if the provided instructions are inconveniently placed.

Before I begin a kit, I always photocopy every page from the instructions so that I have two copies. This enables me to have the circuit, the layout drawing and the parts list side-by-side on the workbench. This really does save a lot of turning backwards and forwards in the instructions.

Tick-Off Procedure

There may be step-by-step instructions that you tick-off as the work proceeds. It's best to do this

because the telephone always rings when you're deep into the project!

My advice, is that if a recommended order of building is included, that you follow it. As an experienced constructor, I have sometimes tried to short-cut these procedures. It's only after you do this, that you find that some parts are difficult to mount out of the suggested order.

The kit producers have probably built the project lots of times, and had other people build it to seek out potential problems. So, it's good practice to follow their advice.

The Kit Arrives

When the kit arrives and is unpacked, it will probably consist of a series of plastic bags containing the parts, the p.c.b., perhaps a hardware kit and the documentation. Go for the documentation first!

I begin by photocopying the documentation as described above. It really is important to read the paperwork before unpacking the rest of the kit.

The instructions may contain an introduction to the project and some general advice on how to proceed. Reading this is an important first stage and there is a lot of advantage in quickly reading through the whole set of instructions.

This preparation sets the scene for what is to follow and gives a reasonable idea of the task in hand. There will probably be a check list of all the parts provided with the kit. Do use this!

There's nothing worse than

finding that one little piece is missing, three quarters of the way through the project. But don't despair if you do lose something, a good manufacturer will very quickly supply any missing parts.

Preparing The Parts

I use the check list stage when preparing the parts ready to begin the work. Every kit contains a lot of individual small parts and they need careful handling.

Do not simply lay the components out on the table or workbench. It's so easy to lose small parts. Components with leads attach themselves to the sleeves of woollen sweaters, and tiny items hide under other parts.

The only sensible approach, is to sort out the various components, and restrain or contain them in some way. What you use is up to you, and some constructors use egg boxes, while others use plastics trays to contain collections of parts.

My preferred method is to use a polystyrene tile. The components with leads can be held firmly, by pushing one of the leads into the tile.

I push them into the tile in order. This order can follow the numbering of the components on the circuit and layout (for example, resistors in order of R1, R2, R3).

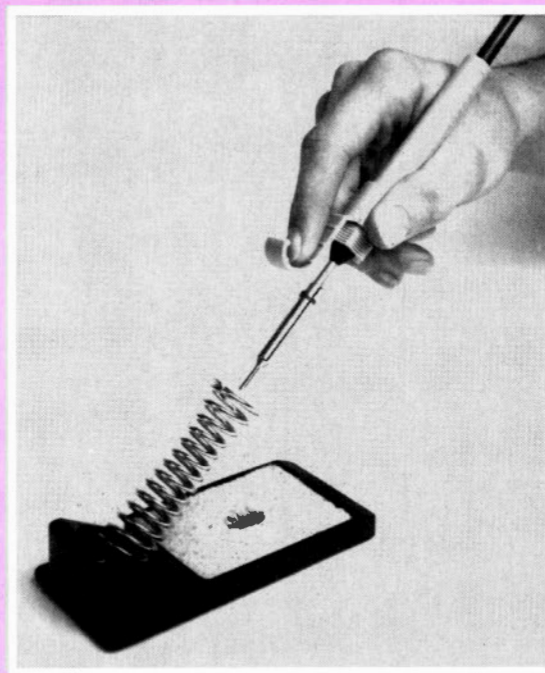
Sometimes I place them in order of component value, lowest on the left, highest on the right. I also group the components into types on the tile.

My method enables quick access to components during construction. It has the added advantage that all the individual components are identified before the work begins.

Identification Important

Identification of all the parts at the beginning is important. Many beginners, and even seasoned constructors, can be confused by the markings identifying individual components.

Ideally these markings should be indicated in the text, but sometimes substitute parts may be supplied. Kit manufacturers, like electronic equipment manufacturers, may have trouble with component supplies.





The supply problem can mean that a particular component may have an alternative marking, or even an alternative value. Where this happens, that part will have been chosen to be suitable for the circuit. Be prepared and you won't be confused!

Simple And Commonplace

The tools required to build a kit are simple and commonplace. Naturally, a suitable soldering iron is the starting point. A fine tipped soldering iron, with an element around 15 to 30W, is a good general choice.

The other main requirements are tools to cut, clean and bend wire leads. The minimum requirements here will be a good pair of small side cutters, a good pair of small long-nosed pliers and a pocket knife.

This group of tools enable wires to be cut, bent to fit the mounting holes and scraped clean, if the leads are dull. I also have a wet cleaning sponge for the soldering iron bit. Other tools will be required to make or convert a case to suit the project.

Good Soldering Essential

Good soldering is absolutely essential to successful kit building. Even the simplest projects may contain 100 solder joints. A 99% success rate on soldering joints

means that one will be wrong, and that could make the whole project fail.

If you don't have experience of soldering electronic boards, you should practice before building a kit. Most of the problems I've seen in projects built by beginners are due to badly soldered joints. The soldering will make or ruin the kit.

Use a good soldering iron. It's worth paying a little more for a well known make in the 15 to 30W range with a bit (or 'tip') of about 3mm in diameter. The Antex C or CS range are popular, widely available types.

Another popular type of soldering tools are the Weller TCP range of soldering irons. These are 24V powered models, and they come complete with transformer and stand.

Whatever iron is used a proper stand is essential for safety. The coil-spring type stands also help keep the bit cooler during the resting periods between soldering.

Another, very helpful idea is the use of a cleaning sponge. I always use a wet sponge to wipe the tip of the bit clean between soldering operations, and nowadays many stands include the sponges as standard.

Good Solder

Only use good resin-cored solder. The resin runs through the centre of the solder wire as a series of cores, and acts as a flux.

The most commonly used solder

is 60% tin, 40% lead alloy with a melting temperature of around 180°C. Buy a good sized reel, it's not cheap, but the larger reels are the least expensive way to buy it.

Here are few tips (sorry about the deliberate pun!) on soldering:

1: Soldering is **not** glueing, the joint should be firmly secured before the heat is applied. Bend leads around the fixing point or bend them at an angle in the hole in the board, so that the joint cannot move **BEFORE** it's soldered.

2: Solder only onto clean surfaces. Solder will only run into a clean joint to make a good connection. If in doubt, scrape leads with a knife blade until the metal shines. It can be an advantage to 'tin' the leads first. Tinning is done by heating the leads up, and then smearing a thin layer of solder along the area to be joined.

3: Make the 'job' melt the solder. Don't use the tip of the iron to melt the solder. Good joints require the ports to be joined, being hot enough for the solder to flow. A good way to check that it's ready, is to melt the solder by touching it on the joint. If it's hot enough, the solder will melt.

4: The solder should flow. When the joint melts the solder, allow some to flow over the area to be joined. It should be enough to give a good cover, but not too much.

The solder should flow freely before solidifying with a clean and bright surface. A dull, or grey

surface probably indicates a 'dry' or bad joint which should be remade. Soldering is really very simple, but do try to get it right before building any circuit boards.

When adding components with leads to a p.c.b., bend the leads to fit neatly into the board. Push them down to make a snug fit. Then bend the wires on the underside to hold them into place. Apply the iron tip and melt the solder on the lead/board junction. Finally, you should inspect the joint and trim off the excess wire from under the board.

Wrong Holes

It's possible to get lost on a p.c.b. layout, and put components into the wrong holes. Some boards have the previously mentioned silk-screened layout plan on the top, but this useful aid is not found in all kits.

I usually look for 'locator' components on the boards. These are parts which are probably larger, and have an odd 'footprint'. Because of the distinctive shape underneath the p.c.b., they cannot be mistaken for the pairs of holes for resistors and capacitors.

Board mounted preset controls are good for location, as are integrated circuit pins. The other essential locations are for those parts which could be mounted the wrong way round on a board.

Integrated circuits (i.c.s) must be placed and correctly orientated on

the board. This applies to transistors, diodes and polarised capacitors. Although a kit worth its salt will draw attention to these parts and their correct placement, a double check is worthwhile.

Order For Construction

If the instructions give an order for construction, then you should follow them. It will be the best way, as you can be sure that whoever wrote them, will have built that project before.

If there aren't any instructions, a good rule is to leave the active devices until last. These will include the transistors, other semiconductors and integrated circuits.

I like to begin with locator components like preset controls or coils. Then I usually add the resistors and capacitors next. Some people like to add all the resistors and then all the capacitors, but I prefer to work in clusters of both types of components on the board. This is so I can check out their location on the layout and the circuit diagram.

Complete Check

When the board is fully populated, carry out a complete check. Verify the locations of all the components. If there is a problem, it often emerges as the work proceeds, and missing or extra holes appear.

Check that the right values of component are in the right holes. Closely inspect the underside of the board, looking for bad solder joints.

Look for the little bridges of solder which can form between adjacent tracks. If you're in any doubt at all, remake the joint.

What Next?

What happens next depends upon the nature of the kit. In some cases, it's possible to bench-test the

board without mounting it in a case or box.

In most cases, the board will have to be mounted and interwired with the controls and off-board parts. This always takes much longer than expected. The stage between making the board and getting it working in the completed unit, often takes longer than the making of the board.

I will assume that you have a box, or have made a box with the appropriate controls mounted on the front panel. The instructions should include a section called 'module wiring' or 'interconnections'.

The section on interconnections will show you how to wire up the board to the controls, and other parts not on the board. Follow this very carefully, especially controls such as volume, a.f. and r.f. gain controls, as potentiometers are notorious for being wired the wrong way around. Finally, don't forget to observe all the good soldering rules.

Getting It Going

There may well be a 'getting it going' section in your kit instructions. Again, my advice is: **read this carefully before applying any power to the project.** This section may contain adjustments which must be carried out to ensure correct performance.

Don't get carried away with the burning desire to see or hear the project work, until you have read and done everything that is required. At this stage, the help of an experienced constructor (an "Elmer" as our learned Editor would say!) can be helpful.

If the project does not work, then retrace your steps. You'll probably find something very simple that you have failed to spot or do. Remember, the most likely explanation is a mistake by you. Faulty parts are unlikely and a faulty circuit less likely.

Some UK Kit Manufacturers

C.M. Howes Communications
Eydon, Daventry, Northants NN1 6PT.
Tel: (0327) 60178.

A well established kit company with a wide range of amateur radio kits including complete transmitters, receivers, etc.

Jandek
6 Fellows Avenue, Kingswinford, West Midlands. DY6 9ET.
Tel: (0384) 288900.
Good range of transmitters, receivers and some test equipment.

Kanga Products
3 Limes Road, Folkestone, Kent CT19 4AU.
Tel: (0303) 276171 or (0860) 363915.
Interesting range of amateur radio equipment from the very simple to the complex.

Lake Electronics
7 Middleton Close, Nuthall, Nottingham NG16 1BX.
Tel: (0602) 382509.
The only "down to the last nut" range of kits in the UK, everything's included.

Maplin Electronics (catalogue from W.H. Smith)
Includes a range of kits and an interesting 'Watch And Learn' system with video-tape programme and simple kit training system, ideal for the beginner.

Badger Boards
1180 Aldridge Road, Great Bar, Birmingham B44 8PE
Tel: 021- 366-6047.
Kits available from the basic to the advanced, using designs from various magazines.

Blue Rose Electronics
538 Liverpool Road, Great Sankey, Warrington WA5 3LU.
Tel: (0925) 727848.

A specialist company dealing in surface mount technology (s.m.t.) with an interesting range of kits, including a starter kit for surface mount device (s.m.d.) working, (see January 1991 PW special feature on surface mount technology for the radio amateur).

Cases & Boxes For Kit Projects

Minfordd Engineering, Sun Street, Ffestiniog, Gwynedd, Wales LL41 4NE.
Tel: (0766) 762572.
A good inexpensive range of project boxes and cases (catalogue).

Maplin Electronics
There's a selection of boxes and cases in the Maplin Electronics Catalogue (from Smith's).

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

Circuit have a good range of kit projects in the 1991/92 catalogue (from their Broxbourne headquarters), including a f.e.t. 'dip' meter.

Soldering Irons

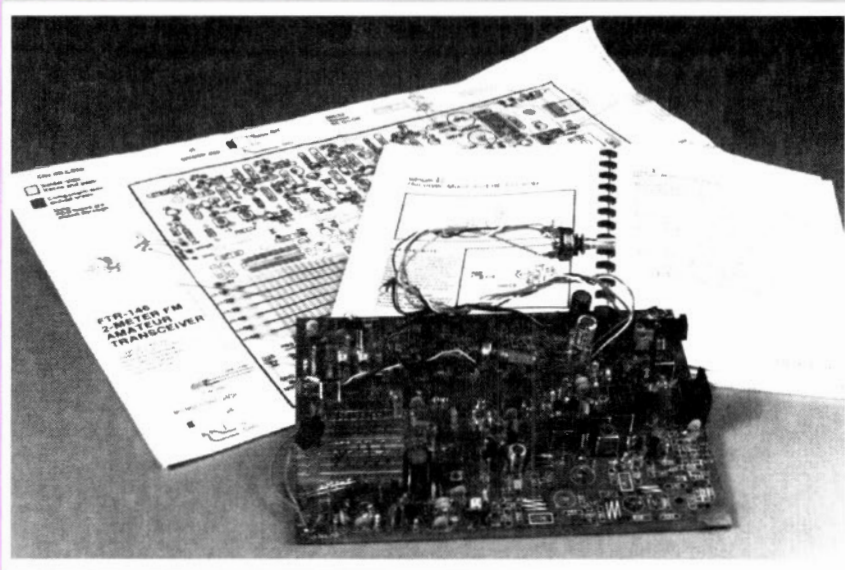
Antex (Electronics) Ltd. Information on the full range of Antex soldering irons, including a very useful 12V 25W portable instrument, can be obtained from their head office at:
2 Westbridge Industrial Estate, Tavistock, Devon PL29 8DE.
Tel. (0822) 613565.

Weller Soldering Irons. (Cooper Tools Ltd.). Information on the full range of Weller irons can be obtained from Cooper Tools Ltd., at Sedling Road, Wear, Washington, Tyne & Wear NE38 9BZ.

I wish you the best of luck. Take care and remember - good kits usually do work well.
So, it's up to you to be careful, take your time, stop and think, and most of all - enjoy your kit building!

PW Review

The Ramsey Electronics FTR-146 Kit 144MHz FM Transceiver



I first came across the Ramsey FTR-146 kit at the 1991 Dayton HamVention. It had only been on the market for a month or so, and it was selling like the proverbial 'hot cakes'.

As regular readers will know, I brought a selection of Ramsey kits home with me. Thanks to the trip, I've now got a lively little 50MHz f.m. receiver (reviewed in *PW* August issue) and the school club has the 144MHz version.

Ramsey Electronics have a big reputation in the USA, and I'm sure that their v.h.f. kits will become popular here in Europe. With this in mind, perhaps some of the UK-based kit manufacturers will come up with 50, 70 and 144MHz home-brew projects!

The Project

The project under review is a small (it measures 43 x 153 x 230mm) f.m. only transceiver. In fact, the Ramsey FTR-146 should be considered as a training exercise for intermediate-to-advanced constructors. This is because the kit provides training in the art of v.h.f. construction, phase-locked-loop synthesisers and programming.

As supplied, the rig is designed to work with six programmed channels, with the option of further modifications. In fact, the handbook suggests that the basic transceiver is just begging for user-modifications.

Ramsey Electronics have made much emphasis on the possibilities for using the rig on packet radio. The packet socket is supplied to fit

on the board and I've no doubt that this rig will be popular with packet enthusiasts. They're always looking for 'economy' stations for packet working!

The Kit

I've said it before, and I'll say it again: Ramsey Electronics produce an excellent manual to go with all their amateur radio kits. They are a delight to read, and cross-checking is made easy between the main circuit, the many block diagrams throughout the book and the main (large-scale) component placement diagram.

When the kit arrived from Raycom Communications (the UK agent), it arrived with the optional casing and as can be seen in Fig. 1., the major components were all in separate bags. With the kit were the excellent overlay component placing diagram, and the main circuit diagram.

Construction

I had to phase in the construction side with many other jobs. Much of my work had to be done in the evening and under artificial light. Fortunately the p.c.b. is an excellent design and has a good component guide on the top, so that facility really did help, especially as I wear bifocal spectacles nowadays!

This board has 'plated through' holes, and as such I would be wary in letting anyone attempt construction unless they had a fair

bit of experience. I consider myself an experienced constructor, albeit slower because of my artificial hand, but I managed to place several components wrongly!

De-soldering a component in a 'plated through' board (where copper tracking is linked through the board via a continuation of the copper itself) can be difficult. It's an awkward job, because to remove a component, you have to melt the solder on the board, and the 'plated through' section at the same time.

The process usually seems to require three hands: one to hold the job, one to hold the soldering iron and one to pull! The manual warns you to be careful....and that's **VERY** wise advice.

Component identification can also be difficult, especially as many components are very small. A magnifying glass and special techniques are called for even if you don't wear glasses.

I strongly recommend that you read the Ramsey manual thoroughly, and George Dobbs G3RJV's 'A Practical Guide To Kit Building' in this issue. I also especially recommend George's polystyrene tile method of keeping components together!

Using the tile method will enable you to correctly group components. Some of the parts don't have markings, have reference numbers that are faded or smudged, or have figures so small they'll have to be prepared very carefully when you've decided what they are.

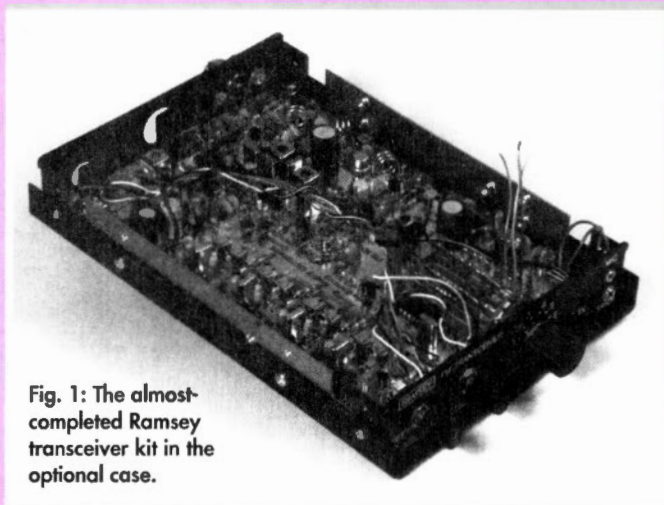


Fig. 1: The almost-completed Ramsey transceiver kit in the optional case.

Kit Building Special

As we have a kit theme in this issue, we thought it was a good idea to give the editor an extra job to do! So, rising to the challenge, Rob Mannion G3XFD has been busy building the neat little Ramsey Electronics kit transceiver from the USA.

This process applies especially to the many diodes used. You'll find the majority easy to identify, but some (pin diodes in particular) can be difficult to identify and place.

Good lighting and good eyesight are very necessary to do this, and any kit project. So, be prepared, and if you are careful the transceiver will work first time.

Final Note

To round off on a final construction note, I suggest that anyone attempting this kit should do so with a soldering iron of at least 25W. The iron should have a fine tip, to avoid solder-bridging.

I'm also going to mention the stage-by-stage checking which is available in the early sections of the project. I found it reassuring to know what I'd just finished, worked correctly! I also found the supplied (I'd never come across this feature before) 'checking for soldering bridges' template an excellent aid when checking the p.c.b.

Summary

I enjoyed making this kit, and it took me hours to complete the project*. It will provide the more experienced constructor with a great deal of fun.

The Ramsey FTR-146 project also provides a good introduction to diode-matrix programming and synthesiser work. To this end, the manufacturers have thoughtfully left plenty of programming sheets for the constructor to use.

On the air it proved to be a good little rig. The receiver is sensitive, and selectivity is more than adequate for equipment in this price bracket.

The builder has a choice of microphones to use on the air, although it's designed to use the speaker-mike found on many hand-held transceivers (the type using one 3.5 and one 2.5mm plug). But, the biggest satisfaction I can report is that I built it myself, and enjoyed using it because it was my own work.

Our thanks go to Raycom Communications of International House, 963 Wolverhampton Road, Oldbury, West Midlands B69 4RJ. Tel: 021-552 0073, for supplying the transceiver kit for review. The kit is available from them at £99.95, plus post and packing and the optional casing kit costs £19.95 plus post and packing.

* How long did it take for Rob Mannion G3XFD to complete the kit? Look out for our special competition next month. You could win the completed Ramsey FTR-146 for yourself, your club or group by answering a tie-breaker and this question: Just how long did it take?

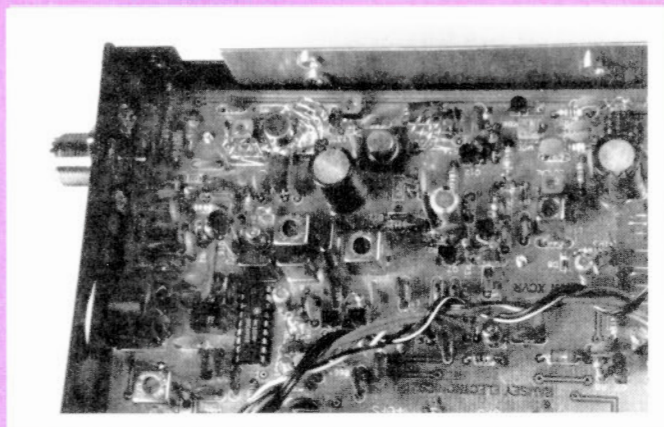


Fig. 2: A close-up view of the project, showing the neat layout.

Specifications

Frequency range	143.000 to 148.110MHz
Tuning	Diode-programmable p.l.l. synthesiser, six panel selected frequency pairs.
Synthesiser programming	Choice of 5 or 10kHz steps (10kHz steps with ± 5 kHz shift)
Transmit off-set	Programmable on matrix (simplex) or ± 600 kHz
Modulation	f.m.
Power requirements	13.8V d.c. (negative ground) nominal
Power consumption	1A transmit (for 5W r.f. output) 200mA receive (no signal)
Antenna impedance	50 Ω
Microphone	See text
Semiconductors	4 i.c.s, 26 transistors, 25 diodes (plus programming diodes).
Transmitter	
Power output	4 to 6W
Power amplifier stage	MRF237 or equivalent
Modulation	Voltage controlled oscillator (v.c.o.)
Receiver	
Type	Double conversion superhet
Intermediate frequencies	1st i.f. 10.7MHz, 2nd. 455kHz
Sensitivity	12dB SINAD < 0.35 μ V
Selectivity	-6dB at ± 7 kHz -60dB at ± 15 kHz
Filter	4-pole filter at 10.7MHz
Squelch sensitivity	< 0.25 μ V
Audio output	> 2W

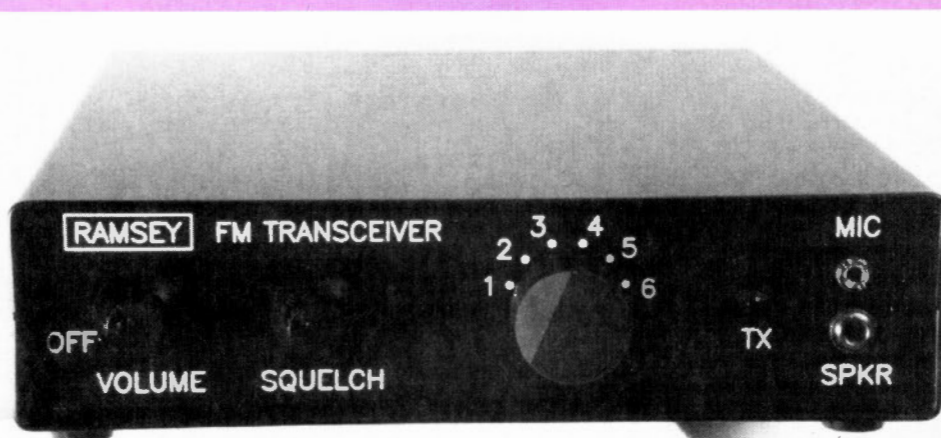


Fig. 3: All finished and ready for use on 144MHz f.m.

Kit Building Special

Kit Building From The Novice Point Of View

Under the guidance of Ken Smith G3JIX, Keith G7JRZ, Ross G7JUT, and other keen young enthusiasts from the Thanet Electronics Club, present this review of the Howes AT160 1.8 and 3.5MHz transmitter kit, from the novice point of view. Keith G7JRZ leads off with his comments.

The kit market appears large and varied these days and it seems to be growing by the minute. In the three years since I got involved, first with short wave listening and then amateur radio, kits were the only way to afford a station of any sort.

The money problem applies especially to young people, and in the muddle of kit suppliers, the Howes products seem to remain popular, reliable and value for money.

So, it was with great interest when the young members of our group, the Thanet Electronics Club, were asked to pile in and review one of the Howes' kits. We started building the kits and as Junior leader of the other members, I have written this on behalf of the club.

The Transmitter

The AT160 a.m./d.s.b./c.w. transmitter forms the centre piece for a set-up to compete with a black box at ten times the price. The basic unit is the transmitter, and the additional kit is for a v.f.o., as the basic transmitter is

crystal controlled.

A direct conversion receiver is also available. If you wish, you can go as far as fitting a digital frequency read-out, microphone amplifier and various filters. We also built the microphone amplifier, but did not review the other kits mentioned.

The Kits

The kits arrived in a little cardboard box that slips through the letter box, so you won't have to sit and wait for the postman to knock. They come in the form of three plastic bags of components, a p.c.b., and instructions.

After fiddling with all the components, I read the instructions twice before starting. I was at once impressed with them. The instructions were not full of colour photo's and reams of technical information, but they were very well thought out.

I found the logical order of the instructions very refreshing. It seems that the information was written by someone who actually builds the kits.

After the brief specifications, giving all the important technical information, the instructions clearly list the tools required for the project. Despite the clear, concise instructions, a number of times I got

halfway through something, only to find a simple yet vital tool was missing. Don't make the mistakes I did!

Logical Sequence

The assembly of the kit falls into a logical sequence, starting with the simplest components. The resistors are first in, and anyone unused to soldering can gain experience on the least expensive ports first.

The instructions are clear with good tips on soldering, and all the resistors are listed in a table with colour codes. The more complex components, the semiconductors, are described in detail, complete down to diagrams for mounting on the p.c.b.

The most difficult part, in our opinion, was the winding of the inductors. Care must be taken in winding and connection to the board, as wires tend to mix themselves up.

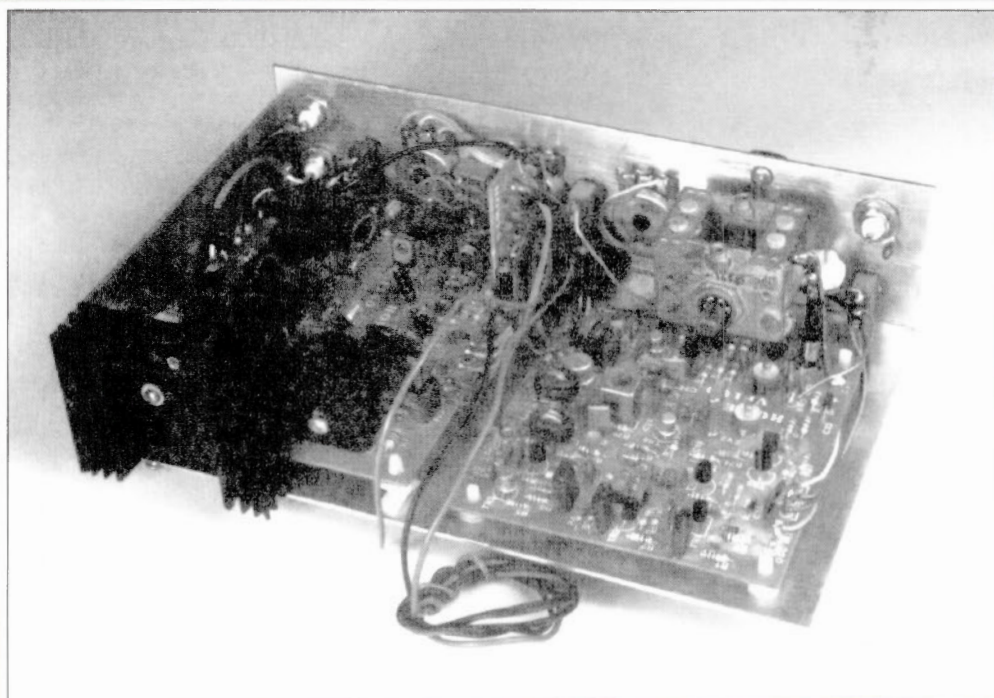
The instructions provided with the kit devote over a page to the inductors. So, with a little care anyone should be able to succeed.

Young Members

The club has members who are quite young, and the group that worked on this project was no exception. If the kit instructions are followed and care is taken, we do not think problems should occur for anyone.

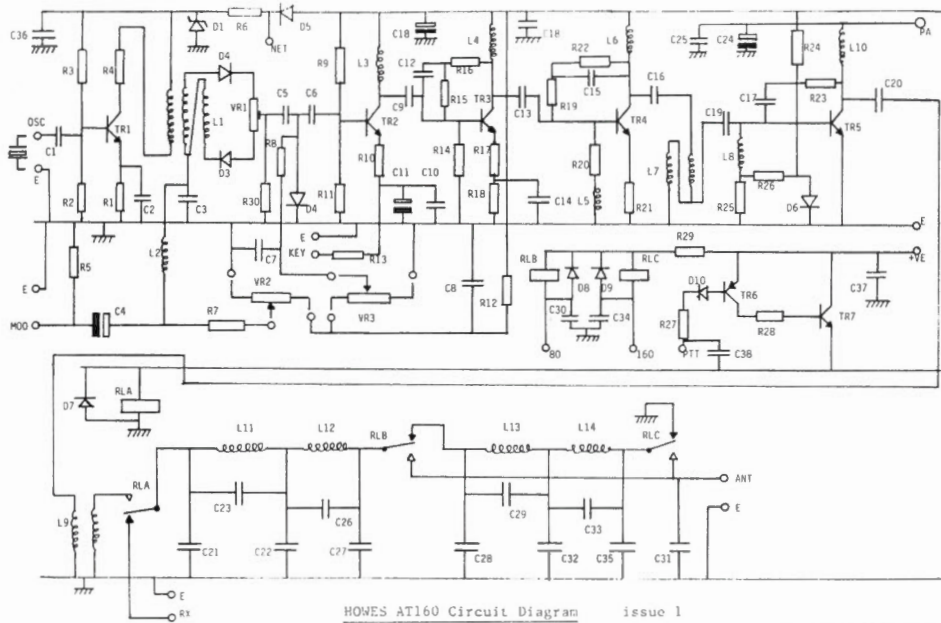
A tip which we feel would be useful, is to have one of the miniature vices or a **helping hand**, or something to hold the inductor cores. This is helpful while winding.

Spend a few evenings building the transmitter, and if all goes well, then you are ready to begin on the v.f.o.



The finally completed Howes AT160 kit and v.f.o. as built by the Thanet Electronics Club.

Kit Building Special



HOWES AT160 Circuit Diagram

Issue 1

© C. M. HOWES COMMUNICATIONS
1988

The circuit diagram supplied with the AT160 kit.

Separate Kit

The v.f.o. comes as a separate kit, boxed and with its own set of instructions, just as good and as extensive as those for the AT160. The v.f.o. covers 1.8 to 2 and 3.5 to 3.8MHz and is designed to work with the AT160 transmitter. It has an additional 10.7MHz output above the transmitter frequency, to give a local oscillator for a superheterodyne receiver.

The v.f.o. is, once again, simple to build, but I felt that the board was slightly more crowded than for the transmitter. But it has all been designed with the constructor in mind, and the instructions if followed, will see you through.

When built, the job of connecting the unit in with other modules is the next thing to do. Fortunately, the instructions provide all the information for connecting the v.f.o. with the other sections.

On The Air

The first problem when we got on the air, was that we didn't have a receiver we had made ourselves, so we used the receiver on the club's h.f. rig.

Being on the air, on h.f. with our club callsign GX3SRE was a thrill for all members. It especially provided experience for all our Novice students, and having helped to build it they actually knew a bit of what was going on.

I must admit that being a B licensee on h.f. was a bit of a shock, but I am going to work hard towards my Morse test now!

Notes From Members

Richard 2E1AAQ: I have not put together a board with resistors and other parts stuck through little holes before. I was worried that I might put the wires through the wrong holes, but it turned out to be easy.

It was easy because the people who made kit up for the 1.8MHz transmitter rig, printed the components as signs on the top of the board.

This was a great help, and I put in all the parts quickly. The next worry was the soldering. The places for the soldering seemed close together and I thought the solder would run all over them.

But it was great fun getting it right with a soldering iron having a sharp point. I only got two wrong joints, our club leader called them 'solder bridges', but we got rid of them.

I didn't test the board as it needed the other part, the one called the 'v.f.o.'. But we all waited eagerly for Ken G3JIX to put on the power to see if any r.f. came out and it did!

Richard 2E1AAQ

Daniel's report: My bit helping with the kits was the base. The kits are boards with components. Mr Howes gives pictures of how the boards can go in a box, but you make the box yourself.

I was asked to drill holes and bend the metal base. I have not done these things before with a machine, but it was great.

I wonder why in our school, we

don't do any more metal work like that. I learnt a lot.

You must make sure the hole positions get marked out right. Then you have to hold the metal on the drill. If you don't hold it by fixing, it might suddenly turn and slice your fingers, so fix it down to a wood block first!

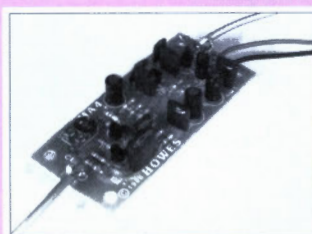
Then file off all the sharp edges on the holes. Bend up the edges in the proper places, help everyone bolt on the parts and dials and the boards. When it all works, you have a radio!

This one is a transmitter and I really think it is a great kit for Novices (I hope to do the course soon with the club leader G3JIX), and you people out there should build one. If you do, write to us and let us know.

Daniel (Novice student)

Club Conclusions

Keith G7JRZ and Ross G7JUT sum up the club conclusions: Although Ross and myself are class B licensees, and Richard is a B class Novice with the others being Novice students, we can still say



The completed Howes MA4 microphone amplifier kit.

the AT160 with v.f.o. is a very acceptable starter rig.

The rig covers two bands, in which to gain experience on h.f. with the relatively local stations. On the other hand, it would be great to hear of the first transatlantic QSO with an AT160, perhaps by a Novice!

The transmitter puts out a generous 10W p.e.p., or if you prefer QRP, it can be varied down to 500mW. The only drawback is that an antenna for these bands is very long. That might limit the appeal of this kit if you live in a house with a small garden. But a centre loaded whip can give a good account of itself on 1.8MHz, when used in small spaces.

Specifications Very Good

The specifications seem very good, at least to my relatively inexperienced eye. Carrier suppression is 0 to 40dB, therefore you can use a.m. part suppressed carrier, or wholly suppressed carrier, double-sideband transmission.

Harmonic suppression of 40dB or better at full-rated power. The power required is 12 to 14V d.c. at 2A, so no expensive power supply is needed.

Operation is simple, as there is only a carrier level control and transmitter power control, apart from the frequency control, on/off, mode and TX/RX switches.

The AT160 provides the basis for a very good station, but I felt that as it produces c.w., a.m., and

Kit Building Special

"The Howes 1.8 and 3.5MHz transmitter and v.f.o. kits proved to be quite within Novice licence holders' construction ability" G3JIX.

d.s.b., it will be ideal for local nets. With this in mind, I would like to now ask if any similar clubs to ours, would be interested in starting a 1.8MHz a.m. 'Club Net', or maybe a c.w. net? What about a '160 Metre' group in the Novice gang?

73s from The Thanet Electronics club.

Keith Stallan G7JRZ and Ross Collins G7JUT, on behalf of the Thanet Electronics Club members.

Note: The Thanet Electronics club is based in Margate, Kent. It has been established for over ten years, and is led by Ken Smith G3JIX. At present the club is promoting amateur radio and the Novice licence in Thanet.

Summary

The Howes 1.8 and 3.5MHz v.f.o. and transmitter kits proved to be quite within Novice licence holders' construction ability.

I believe the practical part of the Novice Course has made a very large step forward in reviving

amateur radio home equipment building. The young people taking part in the team effort to build the kits enjoyed themselves and learned a great deal.

The testing stage needed some simple equipment, a little help from me and a receiver. But once we started to see indications of the r.f. output, and a dummy load lamp lighting up brightly, that was really all that was required.

The nulling out of the carrier for the d.s.b.s.c. (double-sideband suppressed carrier) mode caused no trouble. On c.w. the note is clear and completely chirpless,

providing a T9 note. Everyone at the Thanet Youth Electronics Club were very impressed with the value of the kits, for both experience and educational purposes.

Top Band CW Net

As Keith has already said, if any other members from similar club reading this article, is interested in a 1.8MHz c.w. net, we would be pleased to hear from them. We would be especially interested especially if they have or intend building the kits reviewed in this article.

Manufacturers Specifications (Typical test results for a correctly constructed unit)

Transmitter output power
Carrier suppression (adjustable)
Harmonic suppression
CW carrier leakage (key up)
Frequency control
Frequency coverage with external v.f.o.
Modulation input for full modulation
Power requirements
Current consumption

10W p.e.p. (2.5W carrier on a.m.) variable down to less than 500mW.
from 0 to 40dB
40dB or better at full rated power
-50dB or better
Crystal or ext. v.f.o., of -10dBm
1.8-2MHz and 3.5-3.8MHz
approx. 500mV p.p.
12-14V (13.8V recommended)
2A (approximate)

We must thank C. M. Howes Communications for the opportunity to build, test and try the kits to make up the AT160. The AT160 costs £39.90 and the VF160 costs £22.80 plus post and packing at £1.20 and they are available direct from the company at Eydon, Daventry Northamptonshire NN11 6PT, tel: (0327) 60178.

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AA2 Kit: £8.50

Assembled PCB module: £12.90

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AA4 Kit: £19.80

Assembled PCB modules: £26.80

SPA4 BROADBAND PRE-AMP

The HOWES SPA4 is a low noise IC pre-amp covering 4 to 1300MHz for use with wideband passive antennas (discones etc). If signals tend to be rather weak in your area, then the SPA4 could be just what you need!

SPA4 Kit: £14.90

Assembled PCB modules: £20.90



ADD-ON DIGITAL READ OUT

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The DFD4 can accommodate any IF frequency offset, VFOs that tune normally or "backwards" - all with a resolution of 100Hz. Versatile indeed! A small buffer module for easy connection to the radio is included in the kit. Why not give me a ring to discuss its use with your rig, or send an SAE for more details?

DFD4 Kit: £39.90

Assembled PCB modules: £59.90

PLEASE ADD £1.20 P&P to your total kit order (£3.00 for hardware).

HOWES KITS are produced by a professional RF design and manufacturing company. They contain a good quality printed circuit board with screen printed parts locations, full clear instructions and all board mounted components. Sales and technical advice are available by phone during office hours. Please send an SAE for our free catalogue or specific product data sheets. Normally all kits are in stock and delivery is within 7 days.

72 & 73 from Dave G4KQH, Technical Manager

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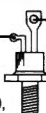
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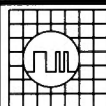
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73 John G3TLU

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Reflections

Ron Ham chats about typewriters this month, and then leads on to discuss the descendants - the word processor and computer!

Joan and I have worked as free-lance journalists for many years. Throughout that time, we have tried to make life easy for all concerned by having good quality 'print bashers'. They are a vital tool that commits our work to paper, in whatever way that our respective editors and paymasters require.

Sturdy Typewriter

Nearly 40 years ago we jointly used a sturdy, mid-1930s Underwood typewriter. This sufficed for some time until the 1960s, when a Smiths portable joined the team. The 'expert' advice that such a machine would not last, turned out to be utter rot because this relatively light-weight machine proved very reliable. As a result the Underwood was pensioned off, and

another light-weight, a Brother portable, began work in our office at home. This, like the Smiths, did a super job and really worked beyond the call of duty.

As time went by the portables were replaced by a couple of Olympia business machines. These machines were followed by a pair of Smiths Corona electrics which took us into the 'computer' era. We kept to the same tools so that we could ease each other's workload, and there was always a spare machine in the event of a breakdown. It is unwise for a journalist to rely on a single typewriter because editors have deadline dates for copy which must be met, and if the 'gremlins' do get in to the works it will of course be at that important time. Having said that, after the 1987 hurricane we had no electricity for 12

days. I had to move my Amstrad PCW to a friend's house, where the supply had been restored, to complete my work for the *PW* deadline.

Computers

The first computer I purchased, some 15 years ago, was a beautifully made Sharp MZ80. This was an all-in-one package with its mono-monitor and tape deck fixed to the top of the keyboard. I learnt the fundamentals of computing on that Sharp and a bit more on an Oric.

However, following a request to include slow-scan television in my writings for *PW*, I changed to a Sinclair 48k Spectrum which proved ideal for the job. The 'twittering' tones of the SSTV signal were taken from the audio output of a Kenwood communica-

tions receiver and fed, via a screened lead, to a jack socket on the rear of the Spectrum. The software was loaded from a tape recorder, and the pictures were seen on the computer's monitor, a JVC TV receiver and an Alphacom 32 printer was used for hard copy, an example of which is shown in Fig. 1. This was received by John Scott (Glasgow) at around 14.230MHz, who had a similar system.

I also reduced the computer radio interference to a tolerable level by keeping it well away from the receiver, and screening the long wire antenna between its point of entry at the window and the socket on the set. No doubt I could have done more but this was enough for my particular needs. The electric typewriters finally gave way in the 1980s to word processing on Tatung Einstein computers, and although I used mine mainly for *PW* work, Joan wrote the whole of her third book, on Storrington, on hers.

Compatibility between our computers is just as essential as it was with the typewriters, but now we could have the best of both worlds. Joan had an Amstrad DMP2000 (dot matrix) printer connected to her Einstein and I had a Silver Reed (daisy wheel) with mine. By now 'PW Publishing' were taking work on disk and in order to be compatible with them, we changed to the Amstrad 8000 series computers and installed a couple of PCWs.

Using word processors meant no more running eraser ribbons or dipping into the Tipp-Ex, to correct typing or spelling errors (not that we made any, hi) or bashing out an extra sheet of A4 when a late, but important letter, arrived from a reader. This could all be done on screen with LocoScript software, saved to 3in disk and posted to *PW* on that media. To satisfy our requirements for larger storage, I fitted additional memory chips and an external 3.5in drive, centre right in Fig. 2, to each machine thus giving us an extra 720kb of disc storage space and the ability to use much cheaper discs. In June 1989, I added an Amstrad PC2086 with double 3.5in drives, high resolution colour monitor and mouse to my office. This enabled me to make sketches and illustrations for my articles with 'Windows'

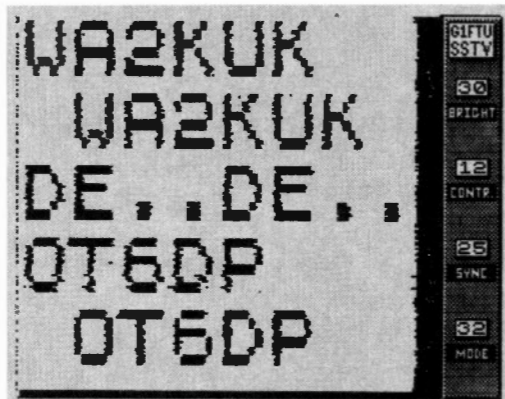


Fig. 1: SSTV print-out by John Scott (Glasgow).

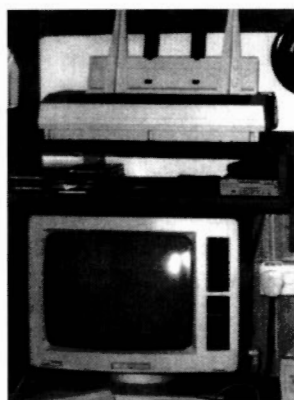


Fig. 2: PCW showing external 3.5 disc drive.

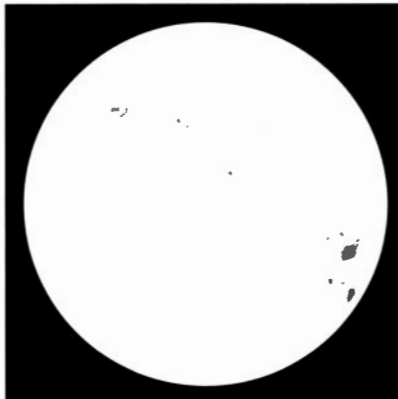


Fig. 3: Sunspots on September 25th.

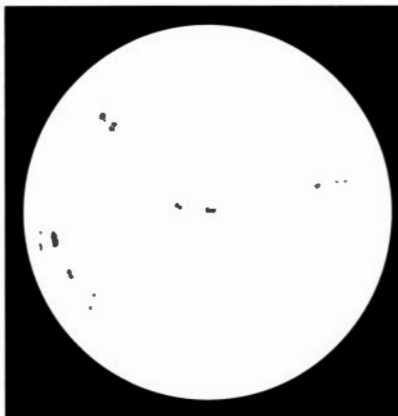


Fig. 4: Sunspots on October 7th.

software and the ability to run more astronomical programs.

Recently we finally ended the PCW era by moving the 2086 to Joan's department and installing an Amstrad PC2286, with a 40MB hard disc, in mine. Then came a problem (just one, hi), most of Joan's research work and some of mine was stored on about 50 PCW formatted discs, most of which would have to be transferred to MS-DOS to run on the PCs. Fortunately the extra drives on the PCWs were 3.5in, the same as the new PCs, which meant we could use the 'pcw-2in1, Version 2' program, supplied by Moonstone Computing, Unit 14, Strathclyde Business Centre, Clyde Street, Clydebank G81 1PF, at £29.95 inc. VAT & postage in the UK.

Disk Conversion

I found that the '2in1' program is very user friendly, especially as all the instructions are on screen and you can watch the work taking place. The procedure is to load CP/M into the PCW, and at the 'A' prompt, insert the program disk into drive 'A' and type '2in1'.

When loaded the screen is divided into four squares. The top left is highlighted with the instructions, lower left, Drive M, is a RAM disk and the upper and lower right represents the PCW's 'A' and 'B' drives respectively. These panels are selected by the TAB key and the files by the cursor keys. Briefly, the 3in disk with my work was placed in drive 'A' and by pressing 'L' the disk was logged in and my four LocoScript files were shown in the square. These were then tagged by the '+' key and transferred to drive 'M' by typing 'C' (Copy Tagged Files). I then instructed the program to 'Format' drive 'B' and it replied with a menu from which I selected MS/PC-DOS 720K. After this I tagged the files in drive 'M' and asked the program to 'C'opy them to the new format on drive 'B'.

All of our files that I converted by this method worked inside LocoScript version 1.5 on our PCs. I have also used '2in1' for sorting files on our 3in discs. It is worth a phone call to 041-941 3120, or letter, to Moonstone to see if this program will meet your particular needs.

Astronomy Yearbook

The 1992 Yearbook of Astronomy, edited by Patrick Moore (Selsey), is currently available in hardback (ISBN 0-283-06094-8) at £12.99 and in paperback (ISBN 0-283-06095-6) at £9.99. The book contains star charts 1992, as seen from both hemispheres, in addition to details about eclipses, comets, meteor-showers, phases of the moon and position of the planets. Those of you who are active in the fields of both radio and astronomy should find this work a super refer-

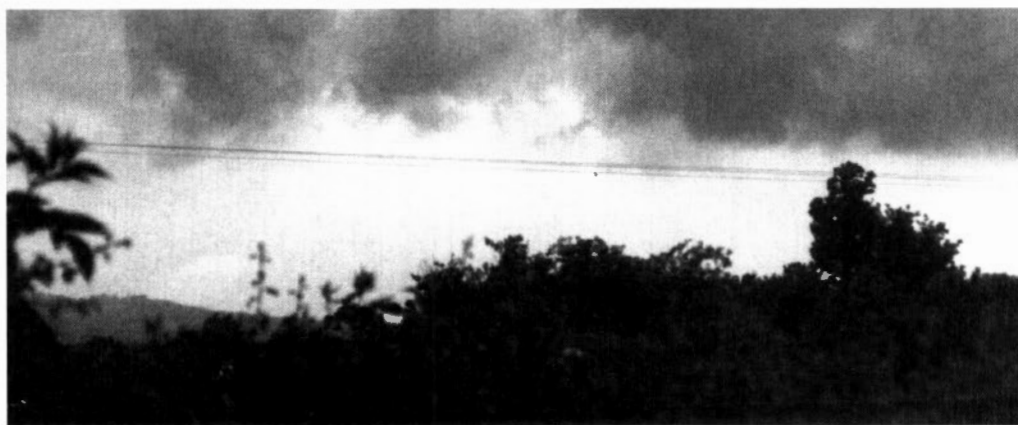


Fig. 5: Storm clouds over Sussex.



Fig. 6: Storm clouds over Kent.

ence book throughout the coming year.

At least a dozen various types of astronomical programs for the PCs are listed by 'The Public Domain And Shareware Library' (PDSL), Winscombe House, Beacon Rd, Crowborough, Sussex TN6 1UL. A call to Rod Smith on (0892) 663298 will give you the latest gen. I have their excellent program 'The Night Sky' which I hope to review fully in the future. What I have seen so far is fascinating, especially the way it produces star maps for almost anywhere on earth. It also prints the names of some stars on screen, plots the constellations and gives information about the sun, moon and the planets.

Solar Reports

Patrick Moore starts off the solar reports and kindly provided the drawings of the large sunspot group that he observed, by the projection method, at 1900 on September 25, Fig. 3 and the 'spotty' state of the sun's disc at 1510 on October 7, Fig. 4. Cmdr Henry Hatfield (Sevenoaks), using his spectroheliograph, located two sunspot groups, 17 filaments, four quiescent prominences (qp), a large 'hedgerow' qp on the SE-limb and a medium pillar prominence on the East-limb of the sun at 1145 on September 17 and 14 filaments and eight small qps at 1317 on the 22nd. He also recorded individual bursts of solar radio noise, at 136MHz, on the 16th and 25th. Ted Waring (Bristol) counted 15 sunspots on the 19th and in Glasgow, Ron Livesey using a 2in

refractor and a 38mm projection screen, located five active areas on the sun's disc on the 12th and four on the 25th and 26th. Clive Brook (Plymouth) using a 60mm refractor and projection screen, observed three sunspot groups on days 17, 18, 20 and 22 and four on the 21st and 25th.

Lightning Response

Your response to my raising the issue of thunder and lightning in this column, prompted me to include the 'stormy' photographs that I took from home, Fig. 5, on June 13 and from Sissinghurst Castle in Kent, Fig. 6, on the 14th. Anything is possible with clouds like that. However, your letters have also mentioned 'ball-lightning' and 'Saint Elmo's Fire', so I looked these up, especially after reading the following note from John Woodcock (Basingstoke);

"A few years ago a friend told me of a daylight thunder-storm he had been watching in the village where he lived. He saw a yellow/orange ball of light drifting along the tops of an avenue of trees about 100 yards away, when it exploded with a bang 'like an airburst shell in WWI' to quote his words."

John wonders if that was ball-lightning and he also told me that his aunts, like mine, would shut the windows and cover the mirror during a thunder-storm. One of my weather books says of ball-lightning, "A number have been observed to drift through the air and vanish harmlessly, but at other times they will enter buildings, even penetrating window

panes and then explode."

A science book refers to St. Elmo's Fire as, "A discharge of electricity which takes place particularly from objects which project into the atmosphere, such as the propellers and wings of aircraft, or the masts of ships." An engineer once told me that he was sure he had seen it, during a storm after heavy rain, looking like a blue glow around a tall radio mast. No doubt I will have more on this subject in future issues.

Tropospheric Openings

During the tropospheric openings effecting Band II on September 18 and October 6, Simon Hamer (New Radnor) received programmes from Germany and Scandinavia and Michael Larsson (Cheadle) received French and German stations respectively.

The HF Bands

I received a report, via my editor, from Alan Clayton (Nottingham) who uses an Icom 735 and a long-wire antenna. In addition to logging the 28MHz beacons LA5TEN and Z21ANB on September 9, he also noted "plenty" of QSOs to Canada and the USA and, at 2200, on 14.200MHz he heard a contact between 'G4' and 'VP'. I could not reply to your card Alan because you did not give your address.

Reflections



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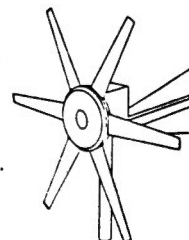
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"..... their trackless way, I shall arrive! What time? What circuit first? I ask not." Robert Browning. Paracelsus Part 1.

My enthusiasm for quotations has earned me a well-deserved reputation, but my offering this time is rather stretching a quote out of context, but it seemed too good not to use! Browning goes on to say "He guides me and the bird, in His good way."

Whenever we look at a built-up electronic circuit these days, we expect to see a printed circuit board (p.c.b.). This type of construction is virtually standard nowadays.

You must already know the p.c.b. technique. They are made on insulated boards, the best being made of a glass fibre composition, with the components mounted on the top, with their leads going through holes.

On the underside of the board is an arrangement of copper tracks. The tracks provide the interconnections between the components.

Construction using a printed circuit board appears to be simple. All the constructor has to do, is to pass the component leads through the appropriate holes on the board, before soldering them in place to the track on the underside.

Appropriate Construction?

There is something of a debate, questioning whether or not p.c.b. techniques are always appropriate to amateur radio construction. Amateur projects are usually built as 'one-off' projects, whereas printed circuit boards come into their own when many replicas of a circuit are to be produced.

Some radio amateurs build very complex equipment using 'ugly' techniques. One of the most attractive miniature amateur band transceivers I've seen, is the 'Optimised Transceiver'. This project was designed and built by Roy Lewellen W7EL.

Its compact size and stability, depends upon it being built by direct wiring of components. On the other hand however, many amateur constructors make their own p.c.b.s for every single project they build.

Not Difficult

Designing and making p.c.b.s is not difficult, and I will show how this can be done later in the series. It's also possible to duplicate printed circuit board layouts without using an actual printed board.

There are several non-chemical techniques to place

copper tracks on the underside of a board. It is also possible to use boards and directly wire the interconnections between the components.

We will begin our use of circuit boards with a simple, but useful circuit built on a medium sometimes called a 'perfboard'. This technique also has the less romantic name of 'SRBP matrix board' (Synthetic Resin Bonded Paper).

This method uses an insulated board, which is punched with holes on a 0.1 inch matrix. There is also a version with copper strips which run across the underside of the boards. This is known as strip-board, and it's available commercially as 'Veroboard'.

For this month's project, we will be using the type without the copper strips (with the option of a p.c.b. design). Although many constructors are avid users of Veroboard, I consider it an unsuitable method for a beginner. This is because this type of board requires very careful soldering to avoid bad joints and intertrack bridges.

The Project

The project we're going to build this month is shown in circuit form in Fig. 1. It's a type of oscillator, often called a multivibrator, and it produces a continuous stream of pulses.

As you'll remember, we've discussed and built oscillators earlier in this series. Oscillator circuits are those in which some of the output is fed back into the input. If the 'feedback' is correctly phased (or timed) and the signal adds to, and does not detract from the process, the resulting continuous feedback process is called oscillation.

A quick inspection of the circuit in Fig. 1, shows it to be two identical transistor circuits connected back-to-back. The circuit oscillates because of the cross-coupling between TR1 and TR2.

Theory

This month, the Rev. George Dobbs G3RJV deals with circuit boards and layouts for beginners, before delving into the world of flip-flops and ending up with a practical and extremely useful project.

Fig. 1: The multivibrator circuit diagram. See text for explanation of how it works, and the necessity of only using BC183s for this particular p.c.b. and matrix board project.

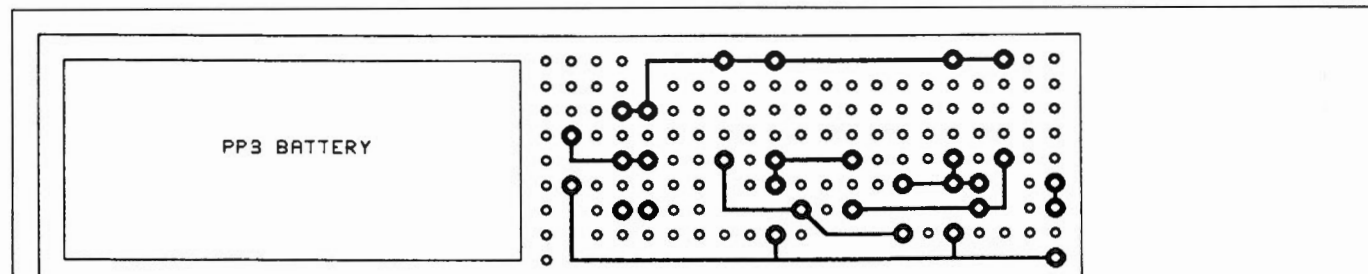
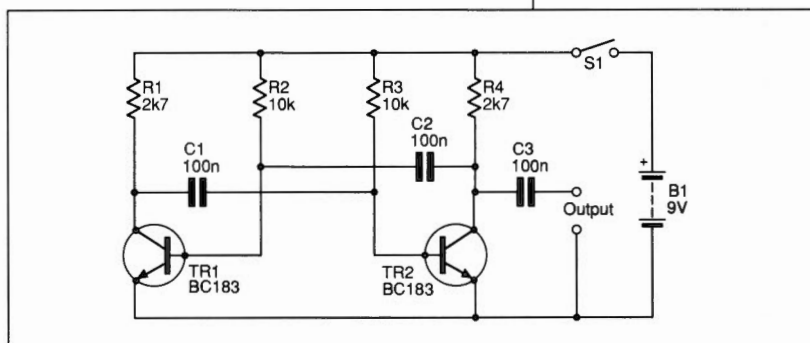


Fig. 2: The multivibrator project can be built using matrix board. This method is an ideal 'stepping stone' on the way to full p.c.b. project. Readers using this method can follow the same component placing and wiring layout as used in the p.c.b. version, employing connecting wire instead of copper tracking.

Fig. 3: The p.c.b. copper track layout for the multivibrator. This layout can be used in conjunction with the component overlay in Fig. 4, if the matrix board method is employed. Although the p.c.b. design accepts a sub-miniature double-pole change-over type slide switch, a single-pole on-off switch on flying leads is perfectly acceptable. If an off-board switch is required, it should be connected to the connections labelled as S1 on Fig. 4.

Fig. 4: The p.c.b. overlay diagram. The view is from the top, looking down at the board, with the copper tracks (underneath) shown in shadowy detail. Component connections are made through the holes to the underside, which are then soldered in the usual way.

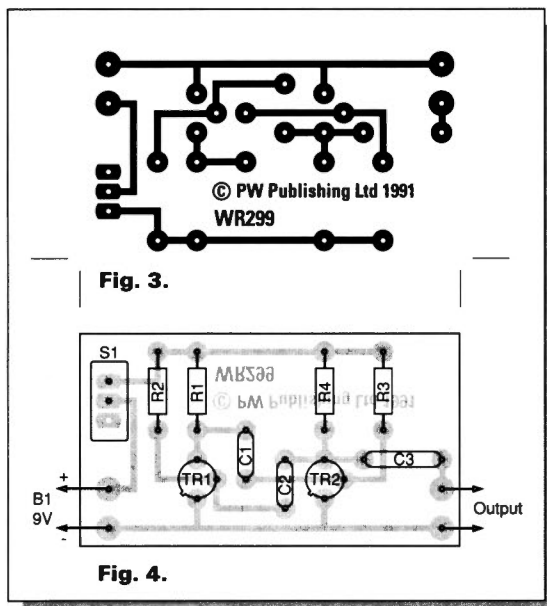


Fig. 3.

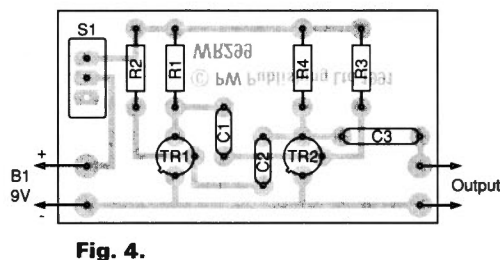


Fig. 4.

The collector (output) of TR1 is coupled to the base (input) of TR2 using C1. The collector of TR2 is coupled to the base of TR1 using C2. These pathways provide a feedback route between TR1 and TR2.

Another capacitor, C3, provides an output. This particular circuit is called an 'astable' multivibrator because of its continuous free running action.

Two State Circuit

Two states exist in this circuit. Either TR1 is conducting and TR2 non-conducting, or TR2 is conducting and TR1 non-conducting. The circuit 'flips' between these two states, which is why it's often called a 'flip-flop'.

The frequency at which each stage is turned on and off, depends upon the rate at which C1 charges up through R3, and C2 charges up through R2. The frequency (speed) of the transistors switching on and off, which produces the pulse 'oscillations', can be varied by changing the values of these components (*see the explanation at the end of the text).

The component values are normally equal in both halves of the circuit, to give a time cycle the same length for both transistors. The particular values here, are chosen to produce a high-pitched audio sound.

Square Wave

The on-off action of this multivibrator-type oscillator produces a signal which is called a square wave. The shape simply reflects the on-off states of the circuit. At audio frequencies, the square wave produces a very harsh sound and the signal is very rich in harmonics.

You may already know the term harmonic from music. When oscillation occurs, it does so at a 'fundamental frequency' expressed in Hertz (Hz) which is the internationally used term for the number (or frequency) of cycles of oscillation in a second.

This oscillator produces harmonics which are detectable as weaker signals at higher frequencies. This effect can be very useful, as you will find out when you complete the project.

The Board

The diagram, Fig. 2, shows how the circuit can be laid out as a perforated matrix-board project. The matrix board version is longer than necessary, to allow the PP3 battery to be mounted on the assembly. This layout has been designed to follow closely the drawing

of the circuit. It's easy to see how the circuit relates directly to the board.

The pattern of tracks required to interconnect the components is also shown in Fig. 2. This is like an X-Ray view of a printed circuit board.

Underside View

The illustration, Fig. 3, shows the underside view of the board as a p.c.b project. This is the view of the copper tracks as they would appear on the board.

The illustration underneath, Fig. 4, is known as a p.c.b. 'overlay'. It has this name because it shows the components on the upper side of the board, apparently laid over the copper tracks (these are shown as a fainter tint). Overlays are a very useful guide to placing components and checking circuits.

Notice that the p.c.b. design is somewhat shorter than the matrix board version. This is done to save p.c.b. material. However, if you want a PP3 battery to be attached to provide power, you can either make your board longer, or bond an extension piece of plain board onto the p.c.b. you can buy from the PCB Service.

You may decide to put the project into a case, and an old plastics torch is ideal for this job. If a casing of this type is used, the PP3 battery can be placed at the far end of the torch. It can then be supported by a small piece of foam plastics removing the need for the p.c.b. extension.

It's a good exercise to compare Fig. 1 with Fig. 2 and then with Fig. 3. This gives a complete overall view of a simple printed circuit.

Layout Sequence

The layout sequence is completed by Fig. 4, which is really a repeat of Fig. 2, but with the components marked and the copper tracks (underneath in this view) in shadowy outline.

If you decide to use the matrix board method, you can use the overlay diagram to lay out your project. All you do is lay out the components on the matrix of holes found on the perforated board. This is done in the same way you would if it was a p.c.b., using Fig. 4 as a guide and connecting wire instead of the copper tracks..

If you decide to adopt the matrix board method of construction, you won't find it difficult. This method is a natural way to practice before designing your own p.c.b. and then etching it yourself.

Matrix Board Connections

The matrix board connections are very simple. Thin wire, say 5A fuse material, can be used for this purpose. However, in most cases there's enough surplus wire on the component leads to make the under-board connections.

The best technique is to bend the surplus wire towards the next component wire, where a connection is required. You should then bend it around that wire, using a pair of pointed nose pliers. A good solder joint should then be made and any surplus wire cut off.

Mounting The Switch

Both methods of making the board includes an on-off switch, S1. The easiest way to deal with the mounting of S1, is to drill holes in the board to suit the switch connection tags. These can then be pushed into the board and wired from the underside.

The toggle switch I used is a miniature double-pole switch but only used as an on-off switch. I wired the two sections of the switch in parallel. There is space on the board to mount the PP3 battery using an elastic band or double-sided adhesive tape.

Finally, you should solder a short length (an off-cut from a capacitor lead will do) to the output side (unconnected end) of C3. This length of wire will form the output probe for the multivibrator.

You may also find it helpful to have a flying lead connection, complete with a crocodile-clip, soldered to the -9V 'earth' line at the output. This extra connection (the lower arrow on Fig. 4), will help in getting the best signal from the multivibrator to the unit to be tested.

Testing The Board

The board may be tested by connecting the output to a pair of headphones, or even a small loudspeaker. You should hear quite a high pitched sound via the headphones or the speaker.

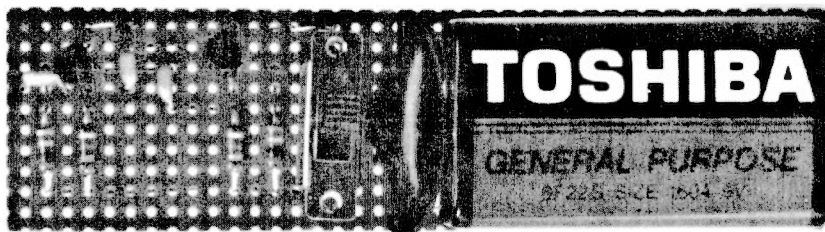
The frequency by this simple project is such that it can be used to test audio circuits. The high harmonic content meant that I could hear the signal well into the radio frequencies range. Try it out on your own radio! (Note: I advise that you only carry out tests on battery-powered receivers. Avoid mains-powered equipment for your own safety!).

A future use for the board could be a signal injector, to introduce a signal into audio and radio circuits to see if they are working.

Have A Go!

I suggest that you have a go at this little project. You'll find it very useful for testing some of the more complex projects later on in the series.

It's also a good example to try your hand out preparing matrix board and p.c.b. layouts. Have fun, and keep that soldering iron hot and busy!



The 'perf-board' prototype. In this view the negative line is at the top of the board and the positive line is at the bottom. From left to right the resistors are: R3, R4, R1 and R2.

Shopping List

Resistors

Carbon film 5% 0.25W

2.7kΩ

2

R1, 4

10kΩ

2

R2, 3

Capacitors

Polyester or miniature disc ceramic

100nF

3

C1, 2, 3

Semiconductors

BC183

2

TR1, 2* See note below

Miscellaneous

Transistors available from Marco Trading or Electrovalue. *Note: DO NOT USE the BC183L version which has different connections. Sub-miniature slide switch (RS Components ref. 664-200 (S1) or single-pole on-off switch (for off-board use), PP3 battery and snap-on connector. 'Perfboard' 0.1 inch matrix 100mm x 22mm Marco s.r.b.p. plain board, order code 02-0134D, or Maplin s.r.b.p. matrix board JP35H. Note: both of these boards are much larger than required, but they can be used for further projects. Connecting wire, short length of stiff wire for oscillator output probe, p.c.b. (if required) from PW PCB Service.

* Note: The rate at which the pair of transistors change state, (or 'toggle' or 'flip-flop') is dependent on the charging times of C1 with R3 and R2 with C2. This rate, or frequency, may be altered by changing one or both of those combinations. More capacitance or more resistance will cause the frequency to fall, and less resistance or capacitance will cause the frequency to rise.

Editorial note: We tested and demonstrated George's multivibrator on one of the office radio receivers. The signal coming from this handy little project, when it was connected directly to the radio itself, could be heard up as high as 100MHz on Band II. As this unit will prove to be very useful (to test a.f. and r.f. stages), we shall be providing a prepared board from the PW PCB Service for those who don't wish to make their own p.c.b.

BARGAIN BASEMENT

Write out your advertisement in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it together with your payment of £2.35, and corner flash or subscriber dispatch label to: Donna Vincent, PW Bargain Basement, Enecfo House, The Quay, Poole, Dorset BH15 1PP.

Subscribers must include the dispatch label bearing their address and subscription number to qualify for their free advert.

Advertisements from traders, apparent traders or for equipment which it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

For Sale Trio 144MHz TX/RX, TS9000 mobile multi-mode, very good, £285 o.n.o. Standard C5800 144MHz mobile multi-mode TX/RX, very good, £285. FT101B TX/RX excellent performer, £285 o.n.o. Ham base pwr mic, £12. Text base mic, as new, £12. Tel: Stratford-on-Avon (0789) 297158.

For Sale Trio R2000 communications receiver, £350. Pioneer CT5151 cassette stereo tape recorder, £55. Both little used. Tel: Melrose (0896) 822598 after 6pm.

Wanted Repanco coil type RD3 1.3MHz-4.3MHz. Mr D. Barnes, 47 High Street, Hawick, Roxburghshire. Tel: (0450) 74196 evenings.

For Sale Boxed new tested unused Datong Morse tutor, £25. Hi-mound HK 702 morse key, £25. Sony 2001D receiver, £150. Tel: (0438) 354857. Buyer inspects, collects.

Wanted R308, R206 and handbooks. Case for WS18. Dial for Eddystone 680X. WS19 p.s.u. Eddystone 830. 880 or EA12. WSC12 a.t.u. WS22 complete valves 6973 8CV7, 6AN8 6EU7. Jim G4XWD, Kidderminster. Tel: (0562) 823674.

For Sale Scanner Jupiter II, boxed with rechargeables, charging lead, telescopic antenna, case and strap 10 months old, like new, little used, £180 o.n.o. Mr Wells, 53 Stock Road, Billericay, Essex. Tel: (0277) 623530.

For Sale Urgent sale due to h.f. requirements. Yaesu FT-290 MkII v.g.c., heavy duty NiCads, £325. FT-77 3.5MHz-28MHz inc WARC bands, f.m. fitted, £325. Cash, no time wasters, close offers considered. Keith G00ZK (QTHR G8YBF) or leave message. Tel: Stockport 061-477 5303.

For Sale R100 scanner with s.s.b., £350 o.n.o. Icom 72E fitted f.m., £500 o.n.o., and global AT 1000, £40. All good condition. Tel: Alfreton (0773) 520656.

Wanted Ten-Tac Argosy, Argonaut-515 or Century-22 transceiver. Must be working perfectly. **For Sale** s.e.m. audio multimeter, mint condition. N. Cameron E14DZ, 16 St. Mary's Crescent, Westport, Co. Mayo, Eire.

For Sale Commodore PC-512K RAM computer with CGA mono monitor, possible radio applications, only, £190 o.n.o. (£375 new). ERA Microreader MkII boxed as new 12 months old, £95 o.n.o. Tel: Exeter Devon (0392) 73714 after 6pm.

For Sale Racal RA17L receiver c.w. Racal case manual circuit, £200. Grundig Satellite general coverage receiver. Two clocks 42 memories c.w. manual rechargeable cells and Grundig NR90 charger, £235. G3RDG QTHR. Tel: 081-455 8831.

For Sale Yaesu FT4700 RH dual-band, 50W 144MHz/40W 430MHz c.t.c.s.s. and boot mounting kit, £350. Sony 2001D plus AN1 active antenna, £180. Comex CD660 decoder c.w. RTTY ASCII TOR, £80. All boxed v.g.c. Tel: Luton (0582) 668648.

For Sale Air Ministry v.h.f. receiver R1132A, £30. A&R high quality f.m. tuner, £40. Sony record deck, £30. Multimeters offers. 3641256 RAMS, £20. Kevin Wheeler G7LCX, 241 Newcastle Road, Trent Vale, Stoke, Staffs. Tel: (0782) 410132.

For Sale Marconi TF-2008 signal generator 10kHz-510MHz with matching Racal 9839 frequency counter, excellent condition. Buyer collects, £330. Tel: Cumbria (0539) 726909.

For Sale Regency R4020 100 channel hand-held scanner, complete with a.c. adaptor rechargeable NiCads only four months old still boxed and under warranty. New scanner forces sale, £120. Tel: Chesterfield Derbyshire (0246) 232619.

For Sale New (still boxed) R535 v.h.f./u.h.f. receiver plus p.s.u. and whip antenna, £220 o.v.n.o. Tel: (0425) 620413.

For Sale Yaesu FRG8800 with FRV8800, £500. FRA7700, £35. FR77700, £35. All boxed, house move forces sale. Write to John Davidson, 23 Oakham Close, Swindon SN5 8DZ.

Wanted Zenith Trans-Oceanic e.m./f.m. multi-band receiver. Also wanted Ekco A065 or AD76. Good price for good condition. James Duckworth, Barnet Herts. Tel: 081-449 3921.

Exchange rechargeable sealed lead acid maintenance-free batteries (see page 59 Maplin catalogue) 10x12v24AH, 10x12v15AH, 5x12v6AH. All in g.w.o.

used in stand-by mode for 18 months, will split. Starting s.w.l. needs receiver etc., or w.h.y. Can deliver E. Anglia. Tel: Andy (0760) 22337.

For Sale Kenwood R5000 with manuals, also ERA Microreader all very good condition, £650 the lot no offers. Tel: (0274) 818044 evenings only.

For Sale Small mahogany cased test meter built to plans in *Practical Wireless* December 30th 1933, plans also included. Anyone interested ring John on (0742) 331297.

For Sale Bearcat UBC 100 XLT 11 months old v.g.c. complete with charger and case, boxed as new £130. Tel: 021-430 3846.

For Sale Sony ICF-2001D complete with mains adaptor, antenna and instructions, still under guarantee, £200. Tel: Woodbridge Suffolk (0473) 622335.

For Sale Radio Mast approx 60ft 'Tubewright Tripole' freestanding 3 sections dismantled (no base) best offer 28 days. Buyer collects. Tel: Ron on Amersham (0494) 726813 day-time.

For Sale No VAT to pay. Special low prices. Delivered to your door. All items new...unused...latest styles. Oscilloscopes, frequency counters, l.c.r. bridges, dip meters. Small speakers, power supplies. r.f.-preamps...h.f. ranges, £22 less. SWR field strength meters. Frequency counters. Coaxial switch units. Signal generators digital and analogue. Silly prices. Ken Hatton G4IZW, Hamilton House, Boat Road, Bellingham, Hexham Northumberland NE48 2AP.

RM-1 Transponder

The strange new signals on 145.800MHz, that so many of you enquired about, were emanating from OSCAR-21's (RS-14) RM-1 transponder. They formed part of a series of checkout tests to ascertain the cause of the command failure.

Resets and powering off the main GEOS satellite supply eventually resulted in success. So, the RUDAK and transponders were placed on once more, hopefully to stay on this time.

SARA-OSCAR-23

The 'buzz'-like signals now on 145.955MHz are coming from SARA-OSCAR-23, and is the telemetry resulting from the metering of Jupiter's radio emissions. Whilst less strong than OSCAR-11 and DO-17, it is fully quieting, seeming stronger during daytime passes.

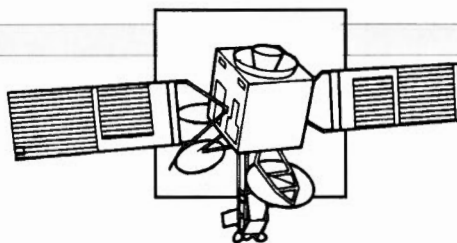
One explanation for this anomaly is that SARA is not voltage stabilised, so when in sunlight and charging, the higher voltage may enhance the transmitter output.

Some considerable discussion is underway on the status of SARA, as to whether it is an amateur-radio satellite, an amateur-satellite, or an intruder into the space band. Although it was both built and run by radio amateurs, it is licensed as FX0SAT by the French authorities and is registered by the IFRB. In some minds doubt exists if the telemetry decoding will be made freely available, and thus if it can be used by all amateurs.

AREMIR

The Austrian Amateur Radio Experiment on MIR went to the space station via SOYUZ-TM-13 on October 2 as planned. The experiment accompanied visiting cosmonauts Tokar Aibalorpv from Kazakhstan SSR, and Franz Viehboeck from Austria.

The AREMIR came on two days later, not on 145.995MHz as expected, but on 145.975MHz, a UoSAT-3 uplink! The signal was alternating between 1200 bauds AX.25 packet radio and Morse code signals carrying greetings messages. The PACKET message read: 'AREMIR> CQ: ARTSAT:AUSTRO SOVIET-RADIO-TIME-SPACE-ART-TELECREATION. WELTRAUM KULTURRAUM. RCCW TU GRAZ 1991 AREMIR'.



SATELLITE SCENE

by Pat Gowen G3IOR

This month, Pat Gowen provides an explanation for the new signals heard in the 145MHz space band, deals with the interesting propagational phenomena and DX possibilities with RS-12 on Mode K, and suggests how you might try it for yourselves.

The c.w. beacon, first spotted by GM4IHJ, was repeating 'DE SPACE STATION MIR AREMIR OE VSV AND RSF 73'. Later uploading will produce digitised speech bulletins, carrying updated useful information to all earth radio amateurs.

The SOYUZ-TM-12 came back on October 10 with the two visitors, plus cosmonaut Anatoli Artsebarski who had completed 145 days in space. Left aboard MIR were Sergei Krikalev U5MIR and Alexander Volkov U9MIR, who had a 64-day MIR mission in September 1985 and the TM-13 was also left attached for this crews' later use.

RS-12 Mode 'K' DX

The RS-12, the 21MHz uplink to 29MHz downlink satellite, is offering excellent DX. This is because as under the present high m.u.f. propagation conditions, the satellite may be both accessed and heard, when it is well below the user's horizon.

I have made good QSOs with W1, 2, 3, 5, 8, 9 and 0, VE1 and 3, PY2, and UA0. I have also worked many European users, including F9EA, DJ5XO, and fellow 'G' stations such as G2UK and G3DDG at such times.

John Branegan GM4IHJ, found in late September that RS-12 was providing excellent DX when it was sub-horizon. The 29MHz downlink was coming in full swing to him around 1234 and 1718UTC on both September 18 and 19. This was when the satellite was over the Pacific at 1450W 460N, plus when on the path up from Antarctica to Perth in Western Australia around

1700-1800UTC.

John says that "This ties in with the signal getting down through the thin pre-dawn Pacific ionosphere, then chordal hop to the underside of the ionosphere over Newfoundland/Labrador, thence ionospheric propagation to the UK".

RS-12 Effects Not New

The propagation effects demonstrated by RS-12 are not new, as DJ2RE pointed them out on OSCAR-6. In fact I published a paper on this phenomena in the ARRL Technical Symposium on Space Communications in 1973.

My own conclusion was that it correlated with high E-layer ion densities, as it was most pronounced when short-skip was in evidence on the h.f. bands. Prior to this, it was generally thought that signals coming from above the ionosphere would be reflected out again. It was then thought that they would only pass through the layers when the m.u.f. was below that of the source signal.

Far higher frequencies are also re-angulated in high solar flux times. My 145MHz uplink has been transponded from RS-10 on 29MHz, when the satellite has been post or pre-LOS by up to seven minutes. John Branegan even got excellent copy of a block of packets from the UoSAT-3 9600 bauds on 435MHz at 1230UTC on 3 November 1990. This occurred when the satellite was six minutes before AOS!

Even 144MHz e.m.e. stations were finding that when they accurately targeted the moon, they had no echoes, but, on elevating

their arrays by some 5-10°, returns came. Obviously, even at u.h.f., the high solar flux propagates the path, which at times is obviously not the pure line-of-sight that we originally assumed it to be.

Using his inverted-V and Kenwood 930, Les G0FFD has been monitoring the RS-10 h.f. beacon for some time. He can pick up the beacon signal some five to 15 minutes before the calculated AOS. He wrote "During the shorter tail-ins, the signal disappears into noise after two or three minutes or more to resurge steadily as RS-10 evidently comes above horizon. During the longer, there may be a temporary re-appearance above noise during the 'lost' period before resurge". He concludes that these effects may well be compatible with F-region anomalies, e.g. ducting, but if this is so, he has "...greater cause to think because at the end of the pass the signal falls rapidly, not to re-appear as RS-10 seems to plunge below horizon".

Les found that the maximum signal from the beacon on a pass of maximum elevation 60-90°, would be 25-30dB above noise, while the 'tail-in' signal varied from equal to +3dB above noise. A 6dB signal climb was a good indication of AOS. He found that at the end of the pass the signal fell some 10-20dB within one to two minutes.

Doppler Differential

Following the evidence of Doppler differential, GM4IHJ and myself, who had noticed the 'split' of the 29MHz downlink signal at high m.u.f. pre-auroral times, Les had a look for it and found it! He measured the split frequencies as being 700Hz apart, and wrote "This equates to a time delay in the weaker signal which might be due to ionosphere scatter from some point, or to magneto-ionic splitting in the Earth's field in a region of high electron density, giving two polarised waves, left-hand and right-hand, similar to the ordinary and extra-ordinary waves near the critical frequency at vertical incidence". "But" he continued, "700Hz is roughly half the total Doppler in a high elevation pass! It is thus difficult to explain a delay of this magnitude".

Telephone Call

During a fairly quiet solar period last year, a telephone call came from Richard Newstead G3CWI, nee VP8ANT. Richard

was calling from his parent company RACAL, to ask for frequencies plus a few passes of some of the h.f. transmitting satellites. He needed them to test out a new piece of portable d.f. equipment that enables highly accurate azimuth and elevation pinpointing of the signal source to be made, as well as precise frequency measurement and spectrum content.

My ageing, but still faithful 'Spectrum' computer, armed with GM4IHJ's tracking programs and the current Keplerian elements, duly calculated some coming passes of audibility for the beacons of RS-10 on 29.367 and 29.402MHz. Armed with this data, Richard duly prepared for the tests.

Then came the day of reckoning, and the new piece of apparatus was put to the test in tracking the satellites, to give a comparison of the found and known positions.

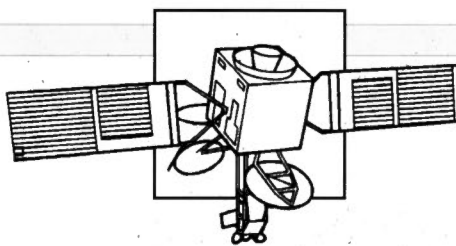
Equipment Dream

The d.f. equipment under test is the dream of any amateur interested in propagational studies. The system is a sheer delight to anyone who is especially interested in following the fascinating routes, taken by signals emanating from satellites in or above the F2 layer.

The equipment consists of an h.f. (1-30MHz) interferometer d.f. system, known as the RDF-3210. For an antenna it uses a portable 5-element crossed loop circular array with a central reference element. The individual antennas of the array are combined through 90° hybrid networks to give omni-directional coverage, vertically polarised low angle and circularly polarised high angle reception.

The system operates by the rapid electronic switching of the antenna selection, measuring the phase of the signal found at each of the five individual antennas against the central reference element. It provides a bearing of high accuracy of 0.3° standard deviation, with a sampling rate of 30 bearings per second!

While such an advanced direction finding system may be bad news for any hitherto, existing, or potential pirate, and makes some of the amateur location methods of 'fox-hunting' appear rather primitive by comparison, it is certainly a wonderful method of seeing the multi-path capabilities of signals coming to us from way above earth's atmosphere.



Third from left is Leo Labutin UA3CR, originator of the RS-12 Mode K idea. Standing with Marty Davidoff K2UBC, author of *The Satellite Experimenters' Handbook* (left), Doug Loughmiller K05I, AMSAT President (2nd left) and Joe Kasser G3ZCZ, on the far right.

Test Results

The test results showed that one of the satellite passes had an AOS of 1233UTC at 350° azimuth, a TCA of 1242:30 at 078° azimuth and elevation 58°, and a LOS of 1251:16 at 160° azimuth. The result of the track of this RS-10 pass was seen on the RDF-3210 v.d.u. display as two separate curves, one showing azimuth, the other the elevation angle.

The horizontal screen display showed the azimuth from that part of the pass going from NNE to SE, while the full curve of the elevation slope captured could be seen in the right-hand vertical rectangle section of the display. The spectrum display, that of Morse code c.w. only, was shown along the baseline.

The results were quite fascinating, as it could be seen that the azimuth track was slightly broken whilst the satellite was to the north. As it approached the highest angle of elevation, multi-pathing was evidenced by the additional presence on the screen of the signal intermittently emanating from other azimuths and elevations. This was mainly to the southern equatorial zone, but sometimes back to the auroral zone. Sadly, the screen print-out wasn't of good enough quality to print in *PW*.

Richard, judging by his comments, seems to have expected more ionospheric effects, particu-

larly as the pass was at around mid-day, i.e. maximum ionisation time. But h.f. terrestrial DX and European contact conditions on 28MHz that day, had dropped considerably from the previous excellent conditions. The research possibilities into satellite path propagation with such a device are enormous, and they are to be recommended as a basis for enthusiasts who could build a similar apparatus.

RS-12 Starter Satellite

The RS-12 is a particularly good 'starter' satellite, as virtually every amateur world-wide will already have everything which is needed to use the h.f. 'K' mode transponder. All you need is a 21MHz transmitter, a 29MHz receiver, and a simple antenna for each band, that need not be high nor have high gain.

All you then need to do is to listen. This is done, preferably on c.w., to distinguish the satellite users from the unintentional terrestrial users heard between 29.410 and 29.450MHz, resulting in the signals you hear transponded from 21.210 to 21.250MHz.

Times To Try

Here are some times to try, when the satellite will be above the UK horizon on Saturday 14

December 1991. The satellite will appear above the UK SE horizon on orbit 4292 at 1604, travelling north to set in the NNE at 1621UTC. The following pass is from SSW to N from 1750 to 1806UTC, and the next from W to NNW from 1939 to 1952UTC.

At this time there are likely to be terrestrial users mixed in with the uplinked satellite signals. There is also a possibility of f.m. simplex intrusion into the space allocated downlink. So, you may prefer to be a night owl when you will have it all to yourself in the early hours of Sunday 15 December!

The descending pass orbit 4298 will commence in the NNW at 0254, finishing in the SE at 0312. The next is from 0440 to 0457, travelling from NW to SSW. Later that same day, ascending passes will commence with orbit 4306 going from S to NNE between 1632 and 1650, with the next pass from SW to N between 1819 and 1837UTC.

Getting Aboard

Getting aboard is achieved by listening first for the 29.407MHz c.w. beacon sending its 'RS12' callsign interspersed with telemetry, and then tuning up from 29.411 to 29.451MHz for transponded signals.

If you place your transmitter on, say 21.215MHz, you should hear yourself on 29.416MHz. If you move your 21MHz uplink to 21.220MHz you will come down on 29.421MHz, and so on.

Try a 'CQ RS 12' and see who comes back to you, or alternatively, listen for another station calling CQ on, let's say 29.420MHz. You then adjust your transmit frequency to that coming out, e.g. 21.219MHz, and call them. You should then make what may be your first satellite QSO.

During the daytime passes, do not be surprised to produce signals long before or after the pass times given, as the re-angulation at h.f. can be substantial to the north especially. When the signal source emanates from, or passes through a highly ionised zone such as the auroral ova or the trans-equatorial belt, multi-Doppler effects can degrade the c.w. tone to a rough hissing note, and make s.s.b. signals virtually unreadable. Do not be surprised if your returned tone resembles that of a broken band-saw, there is no need to replace your smoothing capacitors!

PACKET PANORAMA

The UK's national group for data communications via amateur radio, BARTG - British Amateur Radio Teledata Group, have announced the name of their new membership secretary. Peter Adams G6LZB took over the post prior to the group's AGM in mid November. Old news by the time you read this perhaps, but such is the effect of deadlines! To join BARTG send your name, address, callsign and fee (£10 subs per year) to: Peter Adams G6LZB, 464 Whippendell Road, Watford, Herts WD1 7PT.

Formed in the late fifties (I was one of the original members!) BARTG was concerned mainly with RTTY. Since then AMTOR and packet radio have come along, with the inevitable h.f. band cramming.

On this subject, I've received comments from Tom OD5NG, who operates several modes. He sent one message with suggested new band-plans for the lower portion of 14MHz. One of his suggestions was, that Morse occupy 14-14.050, AMTOR 14.050-14.070, RTTY 14.070-14.090 and packet 14.090-14.110MHz. I've long been advocating separate slots for each mode, so let's hope that at the IARU conference next year, this problem can be resolved.

I am in the process of preparing a paper for the IARU, addressing the band-planning situation in the hope that we can find a band-plan acceptable to all interested parties. It would also help the UK network, if more data channels were available on v.h.f./u.h.f.

You could help support the cause by sending your thoughts to Neil Lasher G6HIU at 61A Stile Lane Gardens, London W4 3BT.

At long last, Roger Cooke G3LDI brings you the stories and pictures of his trip to America. But before that, he's got some news.

'NOSview' Package

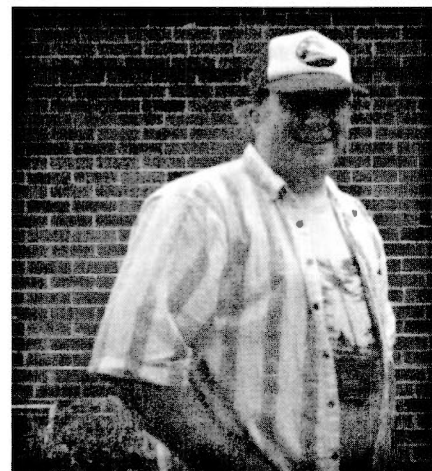
'NOSview' for DOS' is an on-line documentation package for the KA9Q Network Operating System (NOS). You'll find 'NOSview' is probably the only complete reference work describing all the major commands found in most versions of NOS. Ian Wade G3NRW (@ GB7BIL) recently sent me a copy of his very useful package. Barry DC0HK, tells me that this product has just about flooded Germany where NOS is widely used and popular.

As Ian wrote, "Over the years, many documents have appeared on the networks describing the features of NOS. Much of that material was incomplete, inconsistent and worse, it was sometimes inaccurate. In 'NOSview' I have attempted to pull together all the available documentation and massage it into a consistent whole.

"All of the NOS commands

are described in detail, with actual examples showing the way to enter them into the system. There are many examples of displayed results of the command execution. This is only half the story. The real power of 'NOSview' comes into its own when it is used with a 'pop-up' (t.s.r.) file-viewing program such as 'Clockwork View' from Clockwork Software. Using this shareware program you can 'hot-key' to a menu listing the files in a particular directory. Pick the file of interest, and it's displayed on-screen. As a 'freebie', you can use 'Clockwork View' to examine any file in the system, text or binary.

"Scrolling up and down the file allows you to read it at leisure. To make best use of 'Clockwork View', 'NOSview' files are provided as over 80 separate descriptive files, one for each command. Imagine you're are using NOS and can't remember the command



layout. You 'hot-key' into 'Clockwork View' and read the command description file. All without breaking out of NOS. It is this on-line feature of 'NOSview' which makes it an exceptionally useful tool.

"Because 'NOSview' consists of many small files it'll be much easier to maintain and maybe less wasteful of trees. Indeed this program makes the NOS 'more' and 'tail' commands redundant. Yet another feature of 'NOSview', is that it contains a separate set of NOS template files, such as AUTOEXEC.NET, FTPUSERS, etc. These you can use on your system, as each of the files is accompanied by a full description. There are warnings about 'gotchas', or pitfalls that cause a lot of frustration if you are unaware of them. You can edit these template files to match your system. In most cases, by simply modifying callsigns and directory paths, you can create a ready-made environment to try out NOS.

"To make life easier, 'NOSview' files are provided in plain ASCII text format, with no hidden codes. Every line is terminated with CR/LF. Words are separated with spaces, and there are no headers, footers or page numbers. Each line is no more than 65 characters long, giving plenty of margin space when printed using the DOS 'print' command. You can also import 'NOSview' files into any word processor and edit them.

"By now 'NOSview' should be available on the major telephone bulletin boards throughout the world. Look for a file with a name of the form NOSVWnnn.ZIP, where 'nnn'

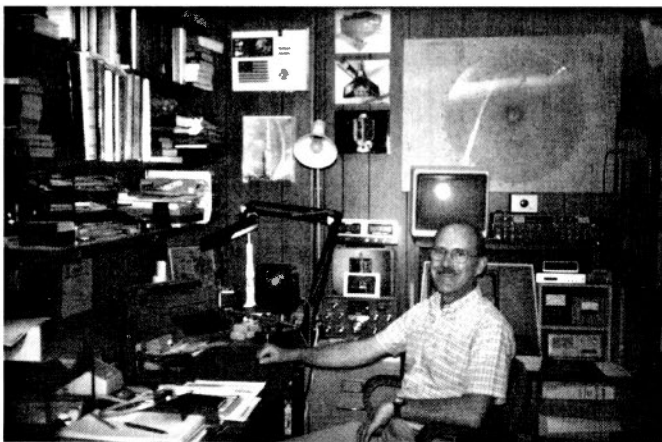


Fig. 1: Dick Daniels W4PUJ, pictured in his shack.



Fig. 2: Jack Colson W3TMZ, pictured in his shack.

PACKET PANORAMA

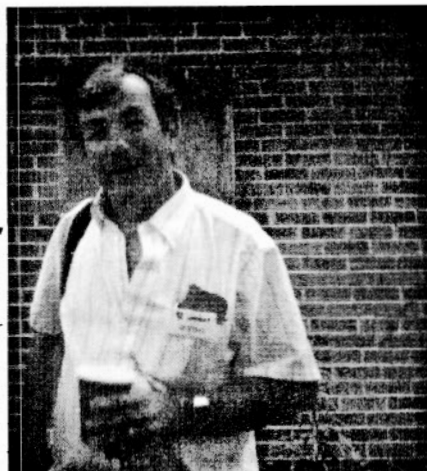


Fig. 3: Tom Abernethy WA3TAI along with Jack W3TMZ.

He's active only on v.h.f./u.h.f. mostly satellite operation, as he's heavily involved with AMSAT in the USA. Dick's a very modest man, and I only found out just how dedicated he is to AMSAT, by the awards seen on the wall of the room in which I slept. He uses packet almost exclusively for downloading Keplerian elements to help with his satellite operation. Like many amateurs 'across the pond', Dick has his shack installation in the basement.

Our next port of call was to Mount Airy in Maryland, staying with Jack Colson W3TMZ. Jack was the person who helped me get an h.f. BBS working, using an old Xerox 820 computer with 8inch disk-drives. He'd originally brought the Xerox over to England, when he stayed at my place in 1985. Jack was my USA forwarding partner, until work claimed too much of his time so he had to stop running a full-time BBS. However, he is still active on packet, mostly on v.h.f. as a user now.

Jack, pictured in his shack in **Fig. 2**, works for the John Hopkins Institute, travelling

world-wide with his job. So he can't run a BBS, which would be too time consuming. His interest in satellites is being rekindled with the advent of UOSAT-14. I'd heard of this and took him a G3RUH board to build up. The last I heard, it was finished and the antennas were up!

Novel Experience

Several evenings during my visit, I managed to talk back home from Mount Airy on h.f. I spoke with quite a few of the Norwich amateurs. I even managed to put a few messages directly into my h.f. BBS, quite a novel experience.

Whilst staying in the Washington area, we visited Alfred K3ZO at his annual barbecue. I met several amateurs I'd spoken to on-air before, including one who I used to talk to using s.s.b. in the 3.5MHz band. That was using a delta loop antenna at my previous QTH in Wymondham.

Pictured in **Fig. 3** with Jack, is Tom WA3TAI. Tom is my present forwarding partner and lives in Accokeek Maryland. I was planning to visit Tom, but he couldn't get off work until halfway through

the afternoon, leaving time for only a short stay. He's a policeman in Washington, and he told me several hairy tales about his profession. It's not the sort of job to encourage your son to take up!

Tom's in the process of putting up five 60m towers, and planning a five-station contest station in his basement. Shown in **Fig. 4** is Tom with one of the designers of the antenna system at K3ZO. This gentleman, whose name and even callsign eludes me, is over 80 years old and STILL climbs the tower (only 60m!) at K3ZO.

Still active on packet, but only from the DX point of view, K3ZO runs major contests from his place. He has four towers in the garden, and his complete basement is devoted to amateur radio. He runs the K1EA contest program at each operating position and remains connected to the DX-Cluster permanently throughout the contest. This up-dates each band with multipliers, etc.

What A Whopper

Another interesting visitor to the barbecue, the holder of a KP4 callsign, was the driver of the Honda 'Gold Wing' motorcycle, pictured in **Fig. 5**. He had a rig built into the fairing at the front of the bike. There are antennas (four of them!) mounted on a specially made bracket at the back of the bike. Guess what's stowed in the trailer? No, not a tent, but a 2kW linear. What a way to go!

That's all I can pack in this month, so I'll carry on with my trip next month with more pictures. 73 and happy packeting de Roger, G3LDI @ GB7LDI. Tel: (0508) 70278.

is the release number; e.g. 'NOSVW137.ZIP.'

You can obtain a copy of the program on disk direct from Ian by sending a formatted 5¹/₄" 1.2MB MSDOS format disk in a well-protected mailer. Also enclose a self-addressed return label plus enough return postage stamps or equivalent in IRC's to: Mr Ian Wade G3NRW, 7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF."

Ian is also writing a book, and he's said that when its done, he'll let me have a copy, to review in the column.

Packet Over The Pond

I recently spent a month in Canada and the USA, and obviously, had to find out about their packet scene 'over the pond'. What an eye-opening experience that turned out to be! I'd received several invitations to visit amateurs, but as I'd taken my family, I tried to leave packet alone for at least one week! The first week of the holiday we spent in Florida doing the 'tourist' things at places like Disneyland, Epcot and Sea-world, etc. However, the rest of the holiday was spent with amateurs, staying with them and trying their local packet networks. We did an enormous amount of sight-seeing as well though! It was interesting to find out what their interests were, as far as packet was concerned.

The first amateur we stayed with was Dick Daniels W4PUJ, pictured in **Fig. 1**. Dick lives in Arlington, Virginia and works for NASA administration in Washington.

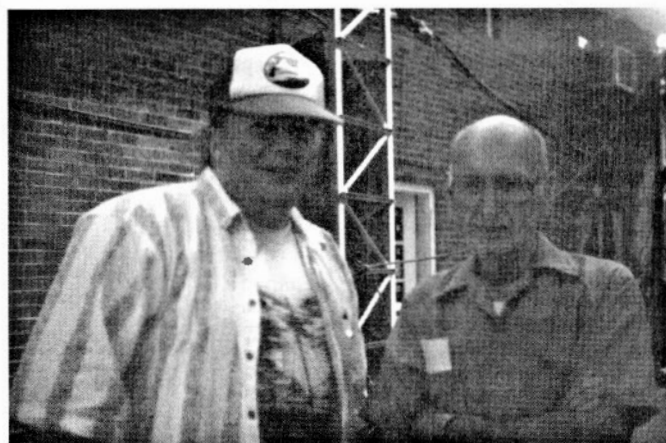


Fig. 4: Tom WA3TAI pictured with a man whose name eludes me, but who at 80 still climbs the towers of the antennas he designs!

Fig. 5: Fancy going mobile on h.f.? What about this setup? The 2kW, yes two thousand watts, linear amplifier is in the trailer.



Mathematics For The RAE

Theory

Before I actually start describing the maths, I'll put you out of your misery by giving you the answers to last month's questions!

- | | | |
|---------|----------|---------|
| (i) b | (ii) d | (iii) a |
| (iv) b | (v) d | (vi) b |
| (vii) c | (viii) a | (ix) b |
| (x) c | | |

They really weren't that difficult, now were they?

But let's return to the subject for this month. Resistors come in a step-series of values known as the E6, E12 or E24 ranges. This is effectively the number of discrete steps in a 'decade' range. The E12 series is 1, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2, and 10, or multiples (submultiples) of these steps. Sometimes though, it is necessary to have a value which is not available in any of the series. If, for instance we need a 31.5Ω, or a 77.2Ω resistor, we have to create this new value. The question is, HOW?

Resistors may be combined in series (one behind another in line), in parallel (side by side) or a combination of both methods.

Resistors In Series

Let's consider resistors in series, as this combination is the simplest of all to calculate the new value. All you have to do is simply add together the values of all the resistors. See the example in Fig. 1.

$R_{(A-B)} = R_1 + R_2$. For example if $R_1 = 56\Omega$, $R_2 = 39\Omega$, the value of resistance measured between A and B, $R_{(A-B)} = 56\Omega + 39\Omega = 95\Omega$

What is the value of resistance between A and B, if R_1 is $15k\Omega$ and R_2 is $56k\Omega$? Then, $R_{(A-B)} = (15 \times 10^3 + 56 \times 10^3)\Omega$, or $71k\Omega$.

This method may be extended to any number of resistors in series. If we have seven resistors in series with values 1Ω , 9Ω , 47Ω , 75Ω , $1k\Omega$, $22k\Omega$, $100k\Omega$, the total resistance will be the sum of all the values, or $123\,132\Omega$ ($1.23132 \times 10^4\Omega$).

Resistors in Parallel

Although it's not as simple to calculate the value of resistors in parallel, as it is for the series connection, it's still fairly easy. Let's start with two resistors connected in parallel. Look at the example in Fig. 2, and let's work out the value of resistance between points C and D.

I won't go into 'why this formula' at present, but just ask you to use the formula as presented

$$\frac{1}{R_{(C-D)}} = \frac{1}{R_3} + \frac{1}{R_4}$$

Let's put a few values into that formula then. Let's also assume $R_3 = 100\Omega$, $R_4 = 270\Omega$, and calculate the new resistance value.

$$\frac{1}{R_{(C-D)}} = \frac{1}{100} + \frac{1}{270}$$

You can (laboriously) add the fractions together in the way we did earlier in this series, or simply, convert each fraction with a calculator and add them together. The last step is to find the reciprocal of the total. 'Reciprocal?' I hear you say, 'what's a reciprocal?'

The reciprocal of a number is 1 (one) divided by that number. For example the reciprocal of 2 is $1/2$ or 0.5, and the reciprocal of 8 is $1/8$ or 0.125. In general (here's where the algebra comes in!) the reciprocal of x is $1/x$. By the same token the reciprocal of $1/x$ is x .

Use a calculator to convert the fractions into decimals:

$$\frac{1}{R_{total}} = 0.001 + 0.0037 = 0.0137$$

Lastly, invert BOTH sides of the equation:

$$R_{total} = \frac{1}{0.0137}\Omega = 72.99\Omega$$

Possibly the best way to solve problems involving several resistors connected in parallel, is to tackle them two at a time. Then add these reciprocal (already created) values together to

produce a third new value. This new (lower) value may be used again in calculating subsequent 'new' (even lower) values.

As usual, an example is always a good idea. For example, find the effective value of 680Ω , $1k\Omega$, 560Ω , $2.7k\Omega$ and 390Ω when connected in parallel. In working it out you don't have to use the same the resistor pairs as I have.

As it looks a bit complicated, we'll work through it together. If you remember: dividing a problem into smaller sections leads to conquering that problem. There are no large problems, only the inability to see the small steps!

Working Together

(i) Find the effective value of 680Ω and $1k\Omega$ in parallel (call it R_x)

$$\frac{1}{R_x} = \frac{1}{680} + \frac{1}{1000} = 0.00147 + 0.001 = 0.00247$$

(ii) Find the effective value of 560Ω and $2.7k\Omega$ in parallel (call it R_y)

$$\frac{1}{R_y} = \frac{1}{560} + \frac{1}{2700} = 0.00179 + 0.00037 = 0.00216$$

(iii) Find the effective value of the result in (i) and the result in (ii) in parallel (call it R_z)

$$\frac{1}{R_z} = \frac{1}{R_x} + \frac{1}{R_y} = 0.00247 + 0.00216 = 0.00463$$

(iv) Find the effective value of the result in (iii) and the remaining resistor, (390Ω) in parallel.

$$\frac{1}{R_{total}} = \frac{1}{R_z} + \frac{1}{390} = 0.00463 + 0.00256$$

$$R_{total} = \frac{1}{0.00719} = 139.1\Omega$$

Homework Time

Now it's time for a little homework. Don't worry, we're only going to tackle just a few problems, similar to the ones we've been dealing with this month. All you have to do is calculate the following resistor combination values. I've not used multi-choice this time, so you'll have to work them out.

Series Combinations.

Here I will use the '&' character to mean 'in series with'.

- | | |
|---|---------------------------------|
| (i) 100Ω & 220Ω | (ii) $27k\Omega$ & $56k\Omega$ |
| (iii) 330Ω & $1.5k\Omega$ | (iv) $120k\Omega$ & 560Ω |
| (v) 390Ω & 680Ω & $1.8k\Omega$ & 33Ω | |

Parallel Combinations.

For these problems I will use the '//' characters to mean, in parallel with.

- | | |
|---|---------------------------------------|
| (i) 10Ω // 10Ω | (ii) 10Ω // 33Ω |
| (iii) 150Ω // $2.7k\Omega$ | (iv) 10 // 15Ω // 27Ω |
| (v) 470Ω // $1.2k\Omega$ // 330Ω // 680Ω // $1.2k\Omega$ | |

The problems shouldn't be too difficult, if you follow what we have done this month. Read the page again if you're unsure. See you next time.

Fig. 1: These resistors are connected in series.

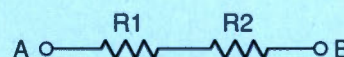
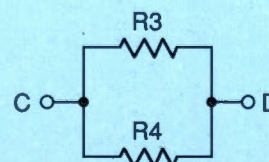


Fig. 2: These resistors are connected in parallel.



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E810F	25.00	EY86	1.75	PY80D	1.50	6B7	4.00	68S7	2.50
E8AC80	1.95	EY500A	3.00	PY801	1.50	6B8	4.00	68A	1.50
EB91	1.50	E280	1.50	QOV2-6	18.50	6B46	1.50	68BGT	4.25
EBF80	1.50	E281	1.50	QOV3-10	8.00	6B47	5.00	68A	3.00
EBF89	1.50	EY501	3.00	QOV3-10 Mult	18.00	6B55	1.50	12E1	2.50
EBL31	12.50	GZ32	4.50	QOV3-20A	25.00	6B46	2.50	12AT7	2.25
EC01	6.50	GZ34 GE	7.50	QOV6-40A Mult	40.00	6B46	2.25	12AU7	2.25
EC033	7.50	GZ37	4.50	QOV3-12	10.00	6B47	2.00	12AX7	2.25
EC035	7.50	KT61	7.50	R18	4.00	6B7A	3.00	12AX7A GE	7.00
EC038	2.25	KT66	15.00	SP41	6.00	6B7B	6.00	12B6A	2.50
EC038	2.25	KT66 GEC	35.00	SP61	4.00	6B7C	6.00	12B6A GE	6.50
EC038 Siemens	2.25	KT77 Gold Lion	35.00	U19	10.00	6B7D	4.50	12B7A GE	7.00
EC038	3.50			U25	2.50	6B7E	1.50	12C1	2.50
EC038	4.75	KT88	15.00	U26	2.50	6B7F	2.50	12H37 12G7	6.50
EC038	2.00	N78	9.00	U37	7.50	6C4	1.50	30FL12	1.50
EC038	1.50	OA2	2.70	UAB080	1.50	6C8	3.00	30P4	2.50
EC038	3.50	OC2	2.70	UBF89	1.50	6C8A	3.00	30P19	2.50
EC042	3.50	OC3	2.50	UC42	4.00	6C86GA	5.00	30P13	1.50
EC048	3.00	OC3	2.50	UC481	2.50	6CL6	3.75	30P14	1.50
EC048	1.50	PC86	2.50	UC82	2.00	6CG7 GE	5.25	3009(P)	120.00
EC048	1.50	PC88	2.50	UC83	3.00	6CH6	6.00	5728	70.00
EC048	3.00	PC82	2.50	UF89	3.00	6CWA	6.00	605	80.00
EC048	1.75	PC87	2.00	UL41	10.00	6D8	3.50	807	5.00
EF37A	3.00	PC900	2.00	UL84	2.00	6D05 GE	12.00	811A	18.50
EF39	2.75	PCF80	2.00	UY41	4.00	6D08B	9.50	812A	52.50
EF40	3.50	PCF82	1.50	UY85	2.25	6E48	3.00	813	27.50
EF41	3.50	PCF86	2.50	VR10500	2.50	6E45	1.85	885A	25.00
EF42	4.50	PCF801	2.50	VR15030	2.50	6F8	3.50	872A	20.00
EF50	2.50	PCF802	2.50	Z758	35.00	6GK6	4.00	931A	25.00
EF54	2.50	PCF805	1.70	Z803U	25.00	6H6	2.00	2059A GE	10.00
EF55	3.50	PCF808	1.70	Z803U	25.00	6H6	2.00	2059A GE	10.00
EF80	1.50	PCH200	3.00	3228	20.00	6J5	3.00	5814A	4.00
EF86	5.00	PCLB2	2.00	4C250B	6.00	6J6	3.00	5842	12.00
EF91	1.95	PCLB3	3.00	EMAC	62.00	6J7	4.00	6080	8.50
EF92	2.15	PCLB4	3.00	5W4G	6.00	6J8A GE	15.00	6146B GE	15.00
EF183	2.00	PCLB5	2.50	5W4G	6.00	6J8B GE	12.50	6550A GE	15.00
EF184	2.00	PCLB6	2.50	5W4G	4.00	6J8C GE	11.25	6683B GE	15.00
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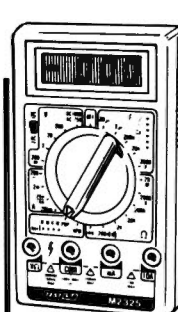
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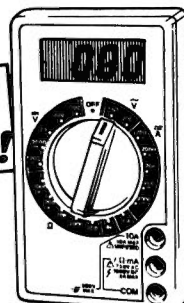
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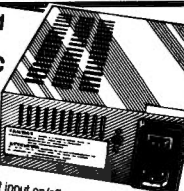
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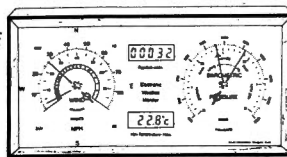
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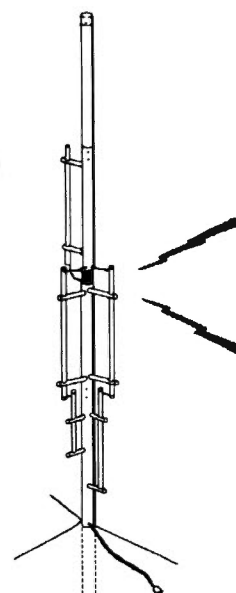
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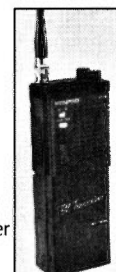
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HF Bands

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After the build-up, the ZA Albanian operations started with a roar as mentioned last time, but by the end one could find ZAs calling CQ, so well was the demand satisfied. They have been reported everywhere from 1.8MHz to 50MHz in this country. But, alas, the operating manners were probably the worst ever, on c.w. as well as phone.

Propagation

Propagation has been variable. There seems to have been something of a reconstruction process going on in the Sun at the time of writing, and I wonder what is to come once it all settles down again.

Gripes!

Now it's time to air gripes about contests! In a big contest, such as the ARRL DX or the CQ WW, some 4000 stations take part, world-wide. Such a 'biggie' will occupy the whole of the c.w. or s.s.b. sections of the bands for a weekend. The organisers argue that they can't restrict entrants. Smaller contests, on the other hand, often call for a restriction to segments of a given band. Considering that there are (to an order of magnitude) some million or so radio amateurs, of whom around half hold h.f. licences, then it seems that 4000 are holding a half-million to ransom. The question must therefore be posed: how can contest organisers NOT restrict entrants to a segment only of the bands?

It has become all too common for serious s.s.b. contest and DX operators to over-modulate quite deliberately in order to 'clear some of the QRM away!' Contest organisers can legislate against this practice in their rules, and disqualify a few offenders for the benefit of the many.

As for DXpeditions, some degree of control over split-frequency operation is needed. Perhaps there is room for the DXCC Desk to refuse to credit operations involving excessive splits. Contest and DX operators at the moment are anathema to the majority.

The 1.8MHz Band

On 1.8MHz this time, let's make a start with QRP enthusiast **Leighton Smart GW0LBI** of Trelewis, who has an FT-747 modified down to 5W; he says the 100W stuff is boring. His antenna farm has a 60m wire, end-fed for 1.8MHz (it's a super job on 7MHz too), a trap dipole for 3.5/7MHz, and monoband dipoles for 14/21/28MHz. The 1.8MHz c.w. made with F1MFI and DJ8WL, and G100TC on sideband.

'Turning to writing' sums up the position at **John G3BDQ**. John is busy with another book, but he did find time to snaffle ZA1HA who was CQing, for a new one on the band at 1817z. Others included RA1WB and RW9USA.

As for me, the past month has seen

a couple of attempts to get on the local Tuesday evening net, but not much that could honestly be described as activity!

The 3.5MHz Band

The 3.5MHz band is a little bit of the unknown, or as the old charts put it, 'Here be Dragons'. However, there is DX to be had, as some of our contributors can show. **Eric G3LPS** (Blackpool) spent about 10 minutes on the band, long enough to key with R50DPK and UD6DFA.

Mostly Europeans were worked on the key by **Angie G0HGA** (Stevenage), although G4EVS and G0NXA were hooked on s.s.b. As for the DX, there was a Gotaway in VE1AAY who was RST219 at a time when W1AW was 579.

Eric G0KRT (Welling) says this may be his last report for a while, as a house move is in prospect. However, the QRP from the Lake DTR3 plus Howes receiver got out to G0MPA, G00XT, G4KIK, GD3FXN, DK1JD and ON5AG, all two-way QRP, plus the higher-power from GW0MY and DA1JZ.

Up north now to **Don GM3JDR** (Auckengill), and c.w. with Z21HS.

Another keybasher is **Pat ON7PQ** (Kortrijk); Pat raised AA6TT, US8R, UA0Y/UZ0AM (Zone 23), ZA1A, RJ5R, ZA1ZSW, ED50PQ and 4X4DK.

Turning to Leighton GW0LBI, who managed to get his QRP over to G3IVF/QRP, G4WMI/QRP, DL3KTD/QRP, G4EMA, GM3RKO all on c.w., while a whiff of sideband sufficed for Y21CW and EI5A.

The 7MHz Band

On 7MHz it's like the song says, 'It ain't what you do it's the way that you do it!'

Working on 7MHz, Don GM3JDR stuck to his key, and found HJ8RMC, LU9FC, 9H8F, UI7T/UA4HVV, JE1IHC, SV0MW/8, Z21HS, 9L1US, UJ1K, UL8BWO, UY8U, UA9LEG, XY0RR, YC2HAX, C9RAA, 4X4KK, ZA1A, ZA1QA and JW0B.

"Laid low by a 'flu' bug" says **Ted G2HKU** (Sheppey) of his list. Still, he did raise 6W1QB, N4HF, ZA1A and ZA1QA.

A quick listen on 7MHz and **Don G3NDF** (Yeovil) entered a sideband contact with ZA1A into his log before moving on.

Pat ON7PQ likes this band, and he booked in 6W6JX, 9K2LX, 9H3JR, ZA1QA, U18QU, ZA1ZXV, JA6HW, OX3FV, ZA1A, 4K1AFM, K6NA/KL7, C02MA, 3C1EA, VK2DXI/9M2, JT1/SP5DRH, OK3CLA/5N3, YV1AD,

PJ2AM, XE3AAF and 6W1QB, all c.w.

A change of antenna helped **Angie G0HGA** to key with ZA1HA, 4X4NJ, 9H3PF, 9L1US, NA4K, W4BQF, N3AM, K5KG/2, W1GUE, K1WQM, KW1C, W3WKX, EA6/G3VW, EN3A, R3DIR, UL7MG, UA9CK and UA9CM.

The key of **Eric G3LPS** helped him to VK6NV, ZA1A, Z71AB, GU3MBS, UA0LH, UA0FZ, OK3CLA/5N3, R3DSR, VP2M/AA5AU, R50DPK, LX/PA3CQR, ZS6ANL, VK5FE, a weak DU4GX, 9H3GK, JT1/SP5DRH for a new one, ZA1QA, UL8LWO, UI9ACQ, 5B4ADA, UA0VW, ZA1HA, PY8RR, 9K2KM, UA0AF, 4J3GM, UW0AF, UW0VW, IU3GRM, UW0WB, DM0T, UF7FWW, FF0XX, 40VA (QSL via YU4IBH), 9H3JR, DL4MCF/5B4, CX4SB and VK2DXI/9M2.

Mary G0NZA says she worked a few USA stations on the band, but regards them as nothing exceptional.

The WARC Bands

On the WARC bands this month, let's start with **Don GM3JDR**, who used 10MHz c.w. to make QSOs with VS6BI, C9RAA and FW/AA7AF; 18MHz for V63WW, UA0ZC, SV/W7SW, VP2M/AA5AU, ZS9/DJ7XG/P, 4K1A, ZA1A and ZA1ZXV. Lastly, 24MHz to raise 4S7/G3REP, VK1FT, 4K1AFM, 9M2AX, ZS6AJS, VP8GAV, C06CG, YS1JBL, YN/SM00IG, U18DX, RJ4X and ZC4DG. On sideband, ZA1ZXV and 4J3GM were also worked.

Another one for the key was **Ted G2HKU**, and on 10MHz his crop included VK3BXN, W4DHz, W0LR and ZA1HA. While 18MHz came up with EA6EJ and ZA1QA.

The s.s.b. offering from **Vince 9H1IP** (M'Scala, Malta) notes 9K2ZZ, 3X0HNU, RJ4X, PY0FF, U18DX, HC8GR, VP5VEQ, YL2EG, VP9MN, VP2MR, V63AO, UF6FL, Z71IS, 5H3RA and 4J3GM. As for 18MHz, OD5Z, UL7ACI, 9M2HB, 9K2ZZ, 4S7EA, LY1BY, YV5DEH, HK4EB, UF6FL, VP8GAV, 3C1EA and VP8CFM (S. Orkneys).

On to **Don G3NDF**, who tried 18MHz and found HV3SJ, VK4CRR, and 4J3GM; plus 24MHz contacts with C06CG, ES10D, HB0/DL1MFQ, HC2AQ, HC8GR, HF0POL, J39CM, JT/SP5DRH, K6YRA, KK60B, VE6KD, VE7PER, VP2M/G0AZT, VP9MN, XX9AW, ZA1ZSW, ZB2AZ, 4J6LQ, 5N3ICEP and 5V7G.

Pat ON7PQ seems to have given the WARC bands a bit of a bashing this time! On 24MHz c.w., he noted V85KX, J73A, 4K1A, S79CW, VP9/WB2YQH, OX3FV, 4J3GM, 3X0HNU, HZ1HZ, TA2A, DK6WL/5B4, UD850DC, KP2J, JT1CD, HC5AI, FR5GL, JD1ALM, J28FO, RJ4X, ZA1QA, ZP6CW, JT1KAA, J40HS, U18DX, FY5FA, CE3ZW, JT0C0, 4U1ITU, YN/SM00IG, FY5FP, ZA1A, 5B4OG, ED50PQ, VP2M/AA5AU, JT1/SP5DRH,

3B8CF/3B7, 3D2VJ, Z24JS, 8J9SP0, S79MX, ZA1ZSW, A25GH, KL7XD, XU0JA and FK8FS. Turning to 18MHz, he noted V24TV, KP2J, 4J3GM, ZP6CW, WH6LW/KL7, ZA1QA, VK6HD, 4K1AFM, KL7CYL, T20VJ, J40HS, JT1/SP5DRH, ZB2CN, ZA1A, KP4DJ, VP2M/AA5AU, VS6UW, 4U1ITU, 5B4ADA, ZS9/DJ7XG/P, H18A, 6W6JX, FK8FS, HC5AI, LU3HAN, FW/AA7AF, S79MX, 3B8CF/3B7, 5H3RA, 5H3RA, ZA1ZSW, V51/DJ7XG, N4JQQ/C6A, KH8/W6YA, ZA1ZXV, XU0JA, W1NU/VP9, 3D2VJ, 8J9SP0, V85KX, VQ9QM, SU1HV, CE8IVH and KP4DJ. The 10MHz activity also produced the goods by way of FW/AA7AF, YV5DIA, EO50PQ, JT1/SP5DRH, ZA1A, 3D2RW/R, ZA1ZXV, 9J2HN, EA8BVP, KH8/W6YA, EA9KD, ZA1HA, YS1AG, JJ1VKL/4S7, 5H3RA, S79MX, 4X4MU, CT3M, J40HS, PZ1DV, ZK2XD, KP2A, ZA1ZXV, RJ5XV, UA0ZC, LU7EE, N4JQQ/C6A, H18A and KC4DWT.

Problems!

Possible problems for DXers, as VK9WI has been heard around, calling for QSLs via VK9NS. Jim advises DXNS that there is currently no amateur on Willis Island.

The ZL8GBS call issued for Kerma-decs operation came unstuck. I heard that the Conservation Department refused permission for operation.

With luck, Jim Smith's S2 operation will have come and gone by the time you read this; VK9NS hopes to send the documentation from Dhaka to ARRL.

It seems 9Q5EE went QRT, due to the political problems there, and he will not be returning.

The 28MHz Band

A short burst from the GW3KFE antenna on the 28MHz band one morning, netted sideband contacts with RA9WF and BY5RA, plus a c.w. contact with JA9TSI.

The key of **Angie G0HGA** accounted for ZA1HA, N5CG, KG40, N6BV/1, N1GKE, KT2I, UV3AKI, UI8GDN and RB5BM.

Mary G0NZA came from Kirkby-in-Ashfield to the Leicester Show for a chat and met everyone on the PW stand. She had a play on 28MHz s.s.b. for JY5BJ, 8R1RBF, YC1FCC and ZA1QA. Incidentally, G0NZA is now the RSGB's RLO for Notts.

Down West now, to Yeovil, where Don G3NDF notes CP6RP, J73VE, JA1SGX, JA9LJI, JH4DIT, NP2Q, UH8EA, VE4NC, XN50A, XX9AW, ZF2NT, ZA1DX, ZA1HA, ZA1QA, ZA1ZXV, 5V7JG, 707BX, 9K2LX and 9L1US. Don also mentions that XX9AW, who is a Yeovil club member, has moved his sked times to 28580kHz at 0900GMT on Sundays; if nothing is heard then try again an hour later. The QSLs are to KU9C.

Pat ON7PQ stuck as always to his

Back-Scatter

keyer, and entered 7Z1AB, ZA1A, ZA1QA, XU0JA, 9K2LX, BV2DA, BZ4RA, J37A, 4K1B, TA2DA, RA0FA, HR3/K5MK, H18A, 4K1A, ZA1DX, VP2M/AA5A, OA4BCZ, ZA1HA, HZ1HZ, FR5GL, YJ0ARW and V31RA.

A return to the fold by **Chris G4LDS**, who seems to have got around a little since he last reported about a decade ago. Chris worked ZS6AIS/P/7P8, EA6/DL6RDE, 9L1US, CX4GL, 5B4SA, SV3AQR, 5B4ES, FR5DX, all W call areas, CN8EC, VP8CDL (QSL Ian, Box 260/MPA, Stanley, Falkland Islands), LU1CF and ZA1QA.

Just a few between the 'flu' bugs and the house-painting for Ted G2HKU, by way of 4K1A, UA9AON, W5RLT, KC6ODW and ZA1HA.

A change of mode now and again suits Don GM3JDR. On the key he found BV2DJ, BY5RA, BZ4RA, BZ4SBF, 3B8FO, HL1KXS, YC3OSE, LU1AO, YN1CC, EX8V, LU2ABR, ZD8WD, LU6HDC, LU2EPN, NP21, PZ1DY, CE8FGC, RA0FB, NJ1W/DL9, ZL2AKS, VK3YU, VK2DOJ, J28FO, J40HS, UI8DX, ZA1A, ZA1HA and Z21HS. As for phone, how about P29DX, UL7LL, 5B4MF, VP8CFM, FR5ZN, CU2BS, A45YT, A22AA, ZA1QA, ZA1ZXV and 9K2LX.

Arch-QRPer **GW0LBI** worked WB2QAP/QR, K2LGJ/QR both on the key, TK0MG, V29W, 4U1ITU, CU3AK, Y06KEA, WB7RFA/VP9, 5B4ES, EA9IB, SM0MG, I0BAM all with low-power sideband, and ZA1HA with just 1W of s.s.b.

The 14/21MHz Bands

Space closes in, so we've had to cut. Ted G2HKU mentions 9H3PF, HK3RQ, KC9T, ZA1HA, ZA1QA, ZL4IJ, W4DHZ on 14MHz, while 21MHz was used for K1RM.

Now Don GM3JDR; 14MHz c.w. for UA70XWW, HC1MD/HCO, XY0RR, UA0QHU, UW0FP, 3C1EA, 4K3/UA9XLZ, 3W/4K2OT, OK3CLA/5N0, 4K1ADQ, ZL1AMN, ZA1A, ZA1HA and 4K1AFM,

while s.s.b. accounted for ZA1HA. On 21MHz, s.s.b. was the mode for ZA1ZVX, and c.w. for BZ4RA, UA0CKA, RM8MD, VK3VD, ZL1MH, LU2BRG, HL2KAJ, PY7SA, PY6BG, 4K1ADQ, HL5JAC, A25GH and ZA1HA.

Finally, GW0LBI who made it to CR6A and ZA0RS with QRP sideband on 14MHz and 8P9Z, NN3Q, W3AP, HB0/HB90AN and N3RM, all on 14MHz sideband QRP.

Deadlines

Deadlines are a bit tight this time. Please send your news to reach me at the address at the head of the column, to reach me by December 14, January 1 and February 1. Meanwhile, hope you all enjoy your Christmas and New Year!

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage

Lower Maescod, Herefordshire HR2 0HP

Solar Data for October 1991

During the last week of September and the first week of October, one of the sun's more active regions was facing the earth and a number of small flares were recorded. On October 1, a proton event, measuring 12 particle flux units, started a magnetic storm which continued for a number of days. This event gave rise to a number of small scale auroral openings reaching up to the 144MHz band. The solar flux level, at a high of 221 units on October 2, declined to 182 units by the end of the week.

During the period between October 7-20, there was a fall in the sun spot, solar flux and geomagnetic levels. On October 8 the geomagnetic A index reached 30 units, but dropped to four units by October 12, and then remained at a very quiet level between October 14-20 producing excellent propagation on the 50MHz band.

From October 21, continuing through to the end of the month, there was a major surge in solar activity as solar region 6891 rotated into view. There were 17 M type flares on October 24 and four X type flares on October 27. It is interesting to note that apart from these two days, the UK-Far East path on 50MHz remained open between October 14-26.

On October 27, the geomagnetic A index rose to a sub-storm level of 37 units, averaging 21 units for the period. Numerous auroras were recorded, events on October 28 and November 1 being particularly good and reaching up to the 430MHz band.

Auroral activity has been excellent during 1991, lending credence to the experts view that July 1989 was the sunspot maximum for solar cycle 22. Maximum auroral activity does not take place at the peak of the sunspot cycle but lags it by approximately 36-48 months.

Forecasting Conditions

Conditions on the 50MHz band were tremendous during the Autumn and this state is likely to continue throughout the winter period. The openings to the far east have now ceased, being replaced by paths to the Caribbean and North America. Look west between 1130-1430UTC if you want to work into these areas.

If conditions are enhanced it may be possible to contact areas of central and western USA, around 1530-1730UTC. Keep a look out also for the winter peak in Sporadic-E. It might even reach 144MHz! Auroral activity will probably continue, so don't forget to beam north and check the bands from mid-afternoon.

Aurora!

During the first and last week of October there were a number of auroral openings which allowed many operators to make contacts up to 2000km from the UK.

At my QTH (IO81), I managed to catch auroras on the 144MHz band on October 1-2 and October 26-30. Most of these openings were fairly weak, only allowing contacts up to 500-600km but events on the 21st, 28th and 29th were much better. Unfortunately, the change from BST to UTC meant that many UK operators lost an hour's operating at a time when the aurora usually produces the best DX. On Oc-

tober 21, I just managed to catch the end of the event, working LA9BM (JP40) and SM4KYN (JO79) around 1725UTC.

It was a similar case with the large scale aurora on October 28. This event must have been very good, as I only operated for the last 40 minutes, but still managed to work nine countries, including HB9DFG (JN37), HG1WD (JN87), HG8CE (KN06), HG0HO (KN07), OK2BFH/P (JN99), OK3EA (JN88), SP7LIH (JO91), SP9AGV (JO90) and RB5PA (KO21) at 1890km. On the following day, from 1700UTC, LA3NGA (JO49), LA6VBA (JO48), SM5BSZ (JO89) and a page full of German stations found their way into the log.

There was an even better opening on November 1, but the gale force winds and high static levels made me think it might be better to go QRT on this occasion. I did manage to sneak in one contact with UZ2FWA (KO04) Kaliningrad, before I tilted the tower over!

Ian McCabe G0FYD (ID83) worked LA3NGA and SM4KYN, on the 144MHz band, in the aurora on October 21 and heard ES2XM at 1641UTC, but couldn't work him. Ian was fortunate to be around at 1330UTC for the start of the event on October 28. His first contact, at 1338UTC, with OK2KZR (JN89) was followed by c.w. contacts with OK1HAG (JN79), DK1MDK/P (JN79), SP5EFO (KO02), SP9EWU (JO90) and strings of Germans. At 1715UTC, he heard LY2WR (KO24) but despite calling him for 20

Fig. 1: G4SJB/P operating on 70MHz from Co. Down.



minutes he couldn't attract his attention. Ian mentions that he only heard LY2WR work one UK station, G4SWX.

On October 29, he discovered an early morning aurora, between 0800-0845UTC, but could only find G6YJD on s.s.b. although the Lerwick beacon, GB3LER (144.965MHz) was 57A at the time. In the evening event, Ian contacted a number of LA stations in JO48, JO49 and JP40.

Steve Damon G8PYP (IO90) discovered the aurora on October 28 at 1600UTC and went on to work many 144MHz s.s.b. stations. They included DG1KBY (JO30), DG5DBK (JO31), DG6YGG (JO41), DB8KJ (JO30) and DL8SCQ (JN48).

A number of operators concentrated on the 50MHz band to pick up new squares and countries via the auroral openings. Terry Chaplin G1UGH (JO02) found a weak event on October 2 at 1800UTC hearing GM3WOJ (IO77). The aurora faded out with him at 1840UTC.

Ela Martyr G6HKM (JO01) had a great time during the opening on October 28. During the afternoon she worked into G, GD, GM, GW, DL, EI, ON,

OZ, PA and SM, gaining two new squares, EI8EF (I054) and SM7NNJ (J086). Ela also found time to QSY to the 144MHz band, to make 13 s.s.b. contacts including DG8DAE (J041), EI20NB (I063) and EI4AQB (I053).

Meteor Scatter

Gordon Smith GW6TEO (I071) is keen on meteor-scatter and is now active on s.s.b. with an Icom IC-271E, a pair of 4CX-250B's and a 17-element Yagi. He reports that his first ever 144MHz m.s. contact was with IK0BZY (JN61), completing the QSO in 25 minutes.

Dave Hilton-Jones G4YTL (I091) made good use of the Perseids shower, picking up four new squares, ES0SM (K008), LA8KV (JP52), OY/G4DHF (IP61) and UV1AS (K059), at a distance of 2143km.

Graham Peyman G0KON (I080) is another operator who has cracked the 2000km barrier. On August 12, he completed with OH2BYJ (KP20) to give him his best meteor scatter DX of 2001km.

Jonathan Eastmont GW4LXO has been active on m.s. for a number of years and has noticed a great deterioration in the s.s.b. random operating procedures used by many stations. He comments that operators never seem to give the callsign of the station they are working and frequently they receive 'roger' reports from their QSO partner.

There are two obvious errors here. Firstly, you **MUST** always transmit the callsign of the station you are working as well as your own and secondly, a roger report cannot be sent unless **BOTH** callsigns and reports have been received.

Very simply, if you do not transmit your own callsign, then the contact does not fulfil the basic requirements for a contact and the QSO is not valid. Unfortunately, this bad operating practice is not just restricted to meteor scatter working, but has spread onto many of the amateur bands. How many stations have you heard on the 50MHz band, 'working' a DX station, but not sending his callsign? For a valid QSO you **MUST** send both callsigns. It is not optional!

During the Perseids meter shower, GW4LXO (I081) worked EA3KU, HB9FAP, I1KTC, I2FAK, IN3TWX, IK6MMJ, OY/G4PIQ, SM7FWZ, YU2CCY and ZB0W, bringing his total of DXCC countries up to 49.

John Hoban G0EVT (I093) didn't think much of the Perseids shower. He reports that there was plenty of activity on the 144MHz random frequency but the bursts were generally of quite short duration, although strong. When a long burst occurred, it caused pandemonium on the frequency. John wonders how many stations were worked properly, when most operators were not giving both callsigns. He was sure



Fig. 2: PA3FOC and PA3BZL. Photo by G4VXE.

many operators thought they were working a DX station who, in reality, was working someone else.

Coincidentally, John suggests that I make a comment in the column, on the correct procedures. I'm only too happy to oblige! If you want to make valid m.s. QSOs and are unsure of the up-to-date way of doing it, send me an A4 s.a.e. and I'll gladly send you my 10-page m.s. information pack.

To participate in the Perseids, G0EVT bayed a pair of 14-element Yagis, 4.13m apart, but was disappointed with the results. Each Yagi was set up individually for a low v.s.w.r. and then combined together with a MET power divider and Westflex-103 feeder to give a resultant v.s.w.r. of 1.25:1 at 144.250MHz.

The horizontal beamwidth was narrower, but the antenna system didn't seem to be any better than a single Yagi. John wondered if I had any thoughts on this matter? My first reaction was to blame it on the propagation mode, perhaps suggesting that by cutting down on the antenna beamwidth, it was effectively letting the antenna system 'see' less volume of sky and therefore less meteor trails. In fact, this theory can be very true but I suggest that in this case, John was actually looking for something that is very difficult to quantify.

Measuring the performance of an antenna system is very subjective, especially if you don't own a professional antenna range. In practical terms, combining two Yagis together will give you no more than 2.5dB additional gain, maybe less than 2dB if you can't solder properly! I guess it would be very difficult to differentiate between two systems, even if you had both up at the same time. It's even worse if you try to compare them weeks apart! Doubling up on your antenna

system can be worthwhile, but don't expect to see a tremendous change in performance.

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The Ursids meteor shower occurs between December 16-23, with maximum activity occurring on Sunday 22nd. The best direction is on the east-west path, although other beam headings during the 24 hours can be quite successful.

The Quadrantids meteor shower will be encountered between January 2-6, peaking sharply on Saturday 4th. Between 0100-0400UTC beam south-east or north-west, 0400 to 0600UTC beam north or south, 0700 to 1000UTC beam east or west, 1200 to 1700UTC beam north-east or south-west. The shower radiant is low between the hours of 1500-0000UTC and is therefore not very usable for meteor scatter. I have always found this shower to be particularly good to Scandinavia in mid-afternoon.

Moonbounce

The first leg of the ARRL e.m.e. moonbounce contest, held on October 26-27, was marred by a 500° Kelvin sky noise temperature, an aurora and drizzle which caused power line hash. Not very conducive for weak signal operation! Single Yagi stations suffered considerably, although a number of stations reported contacts. Faraday rotation, that is the twisting of a signal's polarisation, was very noticeable and stations would become audible for about five minutes or so, and then disappear for up to 20 minutes before reappearing again. Stations with four Yagis or more fared a little better of course, but many reported that signals were very weak, especially at moon set.

Using a single 4218 Cushcraft Boomer, I heard a number of 144MHz stations, at moon rise and moon set, including DL8DAT, F6EYM, SM5FRH, N5BLZ, W5UN and KB8RQ. I only managed to work one station, W5UN, at 0834UTC on October 26, when the moon

was at 18° above the horizon.

John Regnault G4SWX (J002), with the advantage of four Yagis and elevation control, worked 45 stations on the 144MHz band including HA2RG, LZ2US, N1BUG, K2GAL, K13W, N5BLZ, W5UN, WA1JXN/7, K7CA, W7FN, KB8RQ, W0HP and VK3AMZ.

The 50MHz Band

As predicted, the 50MHz band was in tremendous shape during October with openings to Africa occurring on virtually a daily basis. Most of the regulars appeared in many UK log books, producing an almost definitive list of active African 50MHz countries; A2, CN, TR, TU, Z2, ZS, ZS9, V51, 5V, 7Q, 9J and 9L.

The month also saw some of the best propagation to the far east to occur this solar cycle, with continuous daily openings between October 14-26. During this period many UK operators worked or heard BV2DP, KG6UH/DU, JAs, KG6DX, VK2, VK3, VK4, VK6, VK8, VS6WV, VS6XMQ, XX9JN and YC2ASB, with October 19 being regarded by many as the best day since records began!

This good propagation continued into November, with an excellent opening to South America occurring on November 2. Stations worked from the UK in this opening included C02KK, CX8BE, CX8BHI, HC1BI, HC5K, KP2A, KP4EIT, KP4EOR, many LUs, PJ2KI, PJ4/WA3LR0, many PYs, TI2HL, YV4AB, YV4DDK and 9Y4VU. Some stations also reported hearing K1TOL, WA4LAF and VE1YX via back-scatter. It really is going to be a very good F2 winter season!

Geoff Brown GJ4ICD (IN89) doesn't miss anything and October was no exception. In addition to working everything that was contacted in the UK (!) Geoff also found LU4EJ (GF11) on the 7th, LU2DEK, PY0FF and PZ1EL on the 9th and KG6DX on the 13th. On October 14, he worked VK2FLR (QF560D), a new UK distance record of 17239km. And so it continued, KG6UH/DU and KG6DX on the 16th, XX9JN and YC2ASB, for square 482, on the 19th.

Ela G6HKM, made her first QSOs with VK this season by working VK6PA (OG89) on October 14 and VK8ZLX on the 17th. On the 19th she worked VK4ALM (QG56), VK4FP, VK4FNQ and VK4GUN, all in QH30, and followed that up by working VS6XMQ (OL72) for a new country and square. She also heard VS6WV but didn't join in the pile up.

It's a great pleasure to receive a report, via packet radio, from **Steve VS6XMQ**, the Honorary Secretary of HARTS, the Hong Kong National Society. Not only is Steve a well-known 50MHz DXer, but he is also a devoted *PW* reader and claims to be one of the last of the breed of home-brewers in Hong Kong. He mentions that he is presently building the *PW* 'Otter'

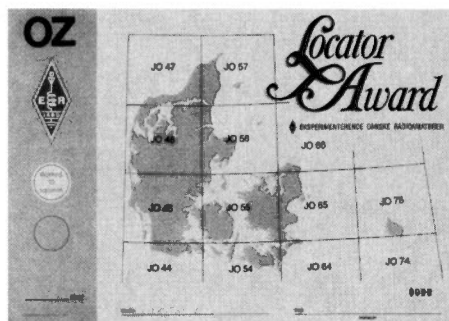
Annual c.w. ladder

Station	Band (MHz)				Points
	50	70	144	430	
G4ASR	48	49	335	—	432
G4OUT		40	142		182
G0FYD	10		37		47
G0EVT	17		11		28
GW4VFX			11	—	11
GM4CXP	1	6			7

Number of different stations worked since 1 January 1991

Back-Scatter

Fig. 3: OS Locator Award.



50MHz receiver, and the G4WIM 50MHz multi-mode transceiver. Steve sent in a long list of DX that he worked in the summer of 1991. It is interesting to note that the UK are now, or will soon be getting, propagation to the same areas. Countries or stations that have not yet been worked from the UK include BV2DQ, VU2AID, XU1U and XX9TDM. Keep a look out for them during February and March 1992.

The 70MHz Band

John Bruce G14SJB was very active on the 70MHz band during 1991, participating in all RSGB 70MHz cumulatives, the Trophy contest, v.h.f. field day and WAB contests. The photograph Fig. 1 shows G14SJB/P operating from his usual location, Carrowreagh Hill, Co. Down (IO74CO).

During June, he made a trip to Pigeon Top, Co. Tyrone but the expedition was literally a wash out. Torrential rain and gale force winds coupled with very poor propagation meant that only G1SWH and G18AYZ went down in the log book. John intends going back to Co. Tyrone, and also to Co. Fermanagh during 1992. On the home front, all the antennas have recently been taken down, in preparation of a move to a better v.h.f. QTH.

Ian Booth G7HRP (IO83), located in Manchester, is now QRV on the band and reports that local stations, G1HBE, G1ITS and G8HDS are also operational. They all monitor 70.450MHz, mainly during the evenings and regularly hold a net on 70.400MHz.

On October 20, I participated in the 70MHz c.w. contest but found very little activity. Despite trying very hard, I only managed to work 17 stations, my best DX being with G3FIJ (JO01) at 262km.

The 144MHz Band

Except for the auroral activity which occurred at the beginning and end of October, there was very little else to report, apart from a late night tropo opening to Spain on October 2. In this event, both G6HKM and G8PYP worked EA1CJT (IN63) and EA1TA (IN53).

The 430MHz And Microwave Bands

Tropospheric conditions were not very good during October, although G6HKM did manage to work HB9/F1FH/P (JN36) on the 430MHz band during the contest on the 6th. Ela reports that activity during the first 1296MHz cumulative on October 8 was poorly supported with only nine contacts being made, but the second session on the 24th was much better with 20 QSOs going in the log. However, it was situation normal for the 1296MHz fixed station contest on October 27 when only 13 stations were worked.

John G0EVT has found very little in

the way of DX on the 430MHz band recently. He did, however, manage to make a few s.s.b. QSOs into Holland, on October 5-6, during the IARU u.h.f. contest.

DXpedition Update

Reg Woolley GW8VHI (DA1RG) has provided a DXpedition update. He will be active from IO71 and IO72 between January 2-4. He will be using an FT225RD, a pair of 4CX-250Bs and a 14-element Yagi and will primarily be active via s.s.b. meteor scatter. Skeds can be made via his DA1RG address, 431 MU, Flugplatz Elmpt, D-4055 Neiderkruchten 1, Germany.

During August 1991, the joint Swedish-Estonian expedition group **ES0SM** operated from Saaremaa Island (KO08XL), in the Baltic Sea. The results were extremely good with 525 QSOs in 111 locators and 26 DXCC countries being made on the 50MHz band. On 144MHz, 508 contacts, 182 via aurora and 144 via c.w. meteor scatter, were made in 161 locators and 26 countries. The best DX during the aurora was G140TC at a distance of 1767km. On the 430MHz band, a total of 50 QSOs were made in 23 locators and eight countries.

The 144MHz expedition by **PA3BZL** and **PA3FOC** to Ischia Island (IC8), as reported in the October issue of *PW*, unfortunately had to go QRT after only one day's operation because of serious TVI problems at the hotel where they were staying. As Tom SM6AFH comments in the *Two Meter News Sheet*, "What we can learn from this is that it is better to do it the hard way with a tent, generator, mosquitoes, at a remote spot." Fig. 2 shows Rene PA3FOC and Evert PA3BZL, at the Weinheim v.h.f. meeting, catching up on the latest v.h.f. news!

OZ Locator Award

The OZ locator award, shown in Fig. 3, is available to all licensed amateurs for v.h.f., u.h.f. or s.h.f. contacts made with OZ stations after 1 January 1985. The requirement is to work at least 10 of the 13 locator squares in Denmark, a sticker being awarded for the last three squares.

The award is available for the following categories - phone, c.w., e.m.e., m.s., satellite + band. For example, 144MHz c.w. operation. Contacts made via active repeaters, cross-band or cross-mode do not count.

Applications for this award must include QSL cards, together with a list of the different contacts. Operators who have obtained the basic award, should, if they apply for the last three squares sticker, only forward QSLs and lists for these. The cost of the award is US\$3 or 10 IRCs and it can be obtained from EDR VHF Contest Manager, Georg Landbo OZ1FMB, Fasanvej 7, DK-7190 Billund, Denmark.

VHF Contest!

The RSGB Fixed station v.h.f. contests on the 70, 144 and 430MHz bands are being held between 1400-1600UTC on December 28, 29, 30 and 31. The contest exchange consists of RST, serial number, locator and county. The serial number starts at 001 for each band and continues sequentially every day. So, if you work 60 stations on day 1, you continue on day two with serial number 061.

To stimulate DX activity on the 144MHz band, the German VHF-DX Group, has organised an activity contest lasting one calendar year, commencing January 1 1992. For every contact over 500km, one point may be claimed. Repeat contacts with DX sta-

tions are not allowed.

The total score is the number of different DX contacts multiplied by the number of locator squares worked. You may count any locator squares worked in the year irrespective of distance. A full set of rules including a locator map can be obtained by sending me an s.a.e.

The Nordic activity contest is held every month and it is open to all amateurs outside of Denmark, Finland, Norway and Sweden. All operation must be in accordance with IARU Region 1 band plans and logs must contain contacts with OZ, OH, LA and SM, from at least two different locator squares. No contacts via active repeaters are allowed. Contest exchange is RST and locator, e.g. 591081MX. The band sections are held on the following days, 144MHz on the first Tuesday of each month, 430MHz on the second Tuesday, Microwaves on the third Tuesday and 50MHz on the fourth Tuesday of the month. All sections will run from 1800-2200UTC during the winter and 1700-2100UTC during the summer. Monthly and yearly results are available, the yearly winner from each European country being awarded a contest Diploma. A full set of rules can be obtained from myself on receipt of an s.a.e.

Dates for the first of the Scandinavian activity contests in 1992 are as follows: 144MHz activity on January 7, 430MHz on January 14, Microwaves on January 21 and 50MHz activity on January 28.

Deadlines

I must say thank you to everyone who has written to me during 1991, I've thoroughly enjoyed reading your letters. If you haven't written in before, why don't you give it a try? It really is quite painless!

May you all have a Happy Christmas and a DX filled New Year!

Please send your letters to reach me by the end of the month. I always write up the column in the first week of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM and I can also be contacted at my DX cluster GB7DXC.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. They will all be returned to you.

144MHz QRB Table

Top	distances (km)
Tropo	3160 GM4YXI
Aurora	2143 G4YTL
Sp-E	3080 G0EVT
Meteor	3100 GW4CQT

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

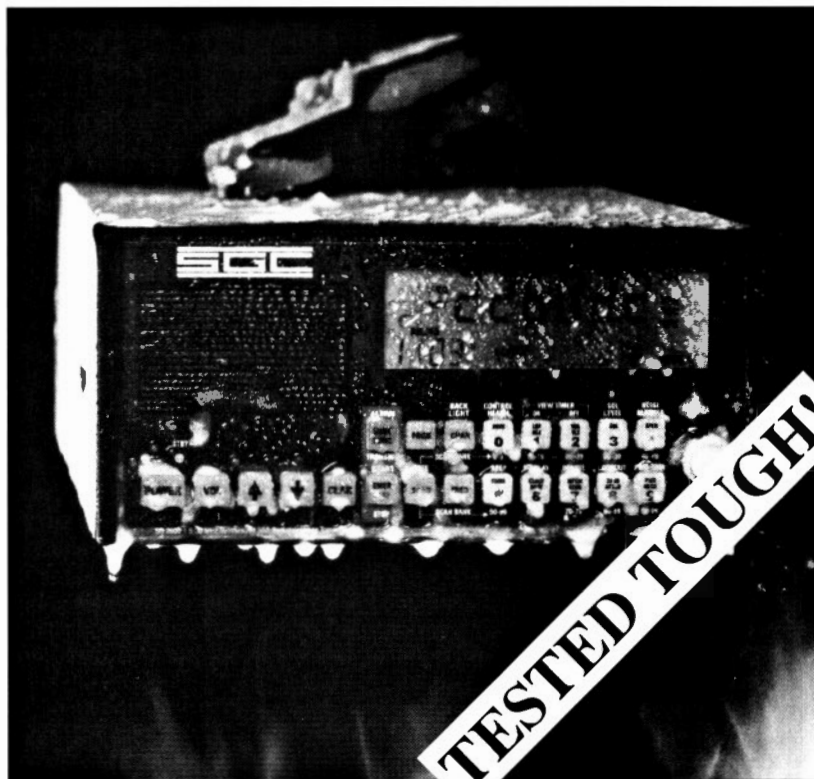
Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G6HKM	61	51			74	23	40	11	33	7	300
G4FCD	25	21			82	13	55	13	33	5	257
G0NFH	44	25	30	7	61	17	43	11	13	2	253
G8ESB	7	6	20	5	85	14	45	8	14	5	209
G8ASR	1	52	50	9	55	28					195
G4LDR	24	19	10	2	51	12	35	5			158
G0FYD	12	38			72	29					151
G8PYP	16	38	1	1	44	20	19	5			144
G0EVT	13	29			37	18	14	6			117
GW7EVG					47	8					55
G1THG	8	11			23	9					51
G7CLY					38	10					48
GM4CXP	2	1	2	2	22	3					32

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Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

This time I have a reaction to an item I included in Broadcast Round-up concerning the few Esperanto transmissions which remain on the short wave bands. **David Harding G0DQI** wrote from Deal in Kent: "Mirespondas al via demando. Ne estas auskultataj statistikoj disponeblaj, sed dum tre nemultaj Anglujanoj auskultas Esperanton (plue, tre nemultaj auskultas mallongajn ondojn tute ne), estas ankoraŭ bona nombro trans la mondo kiu auskultas Esperanton kiel speco de 'duona-voja domo' al aliaj Europaj lingvoj."

Luckily David offers a translation (for those of you who need one): "So to answer your question. There are no listening figures available, but whilst very few English tune into Esperanto (indeed, very few tune into short wave at all!), there are still a fair number across the world who listen to Esperanto as a sort of 'half-way house' to other Western European languages. They can get a fairly good idea of what is being said as the broadcasts are spoken slowly and clearly. Once the ear is tuned into Esperanto, they can try Spanish or Italian which are similar, though broadcast about three times faster."

"As a personal point of interest, whilst I can hardly claim to speak Esperanto with any skill, I have used it in h.f. contacts with Hungarians and Poles. I also exchange messages in Esperanto on Packet Radio with a small group of enthusiasts in France, Belgium, Holland, Germany and Denmark. I've even used it with a local Lithuanian lady on CBI!"

So it seems that at least a small number of English speakers are familiar with Esperanto and listen to those transmissions from Beijing and the Vatican. I might be tempted to give it a try myself.

World Developments

There are a number of developments to report in the world of international radio listening. The BBC World Service continues to increase its rebroadcasting in Eastern Europe, with Hungarian Radio carrying BBC Hungarian on its main national network daily. In Finland, the national broadcaster YLE is now carrying BBC World Service in English as well as the Voice of America, also in English and Deutsche Welle in German on f.m. to the Helsinki area. The BBC World Service will be launching a Ukrainian service early in 1992, and has already started to recruit staff for the new section at Bush House.

Radio Moscow's English World Service has started carrying *Vasily's Weekend* once again. A recent interview with Vasily Strelnikov on Radio Netherlands' Media Network programme declassified some of the mysteries of Radio Moscow, and it provided an insight into the background of one of the station's most enigmatic presenters. Vasily lived most of his childhood in the United States where his father was posted. He was attracted to the wide variety of radio available on the Eastern Seaboard and decided it would be good to have similar sounding programmes in the Soviet Union. Today he's brought something like American radio to Radio Moscow and Vasily is also involved with one of the new commercial stations which operates in Moscow. Vasily's programme can be heard at a number of times during the weekend programming of Radio Moscow.

European Stations All times GMT (=UTC)

Albania's external service, Radio Tirana, has changed its schedule and cut back on some of its language services. Currently English is heard at:

0230 on 9.76 and 11.825MHz
0330 on 9.76 and 11.825MHz
1630 on 9.73 and 11.825MHz
1830 on 1.395, 7.12 and 9.48MHz
2230 on 1.395, 7.115 and 9.725MHz

Much news has arrived from **Roy Merrill** this month, including his logging of Estonian Radio Tallin at 2030 on 5.925MHz but the parallel outlet of 9.56MHz occupied by a strong carrier with Asian and Far Eastern music. Latvian Radio in Riga was also heard at 2030 on 5.935MHz with extremely good signals rating SIO555.

The BRT Brussels service has the English *Radio World* programme on Saturdays at 1000-1030 on 21.815, 13.675 and 9.855MHz. The evening programmes at 1900 and 2200 are heard on 15.515, 9.905 and 5.91MHz.

Radio Sofia, Bulgaria transmits in English:

0300-0515 on 17.825, 15.16 and 11.72MHz
1730-1900 on 17.825, 17.78, 15.33, 11.765, 11.72 and 9.70MHz
1945-2030 on 17.825, 17.78 and 11.765MHz
2145-2400 on 17.825, 15.37, 15.31, 15.11, 11.66 and 9.70MHz

Radio Finland's European schedule is now:

0730 on 11.755, 9.56, 6.12MHz and 963kHz
1505 on 11.755 and 6.12MHz
1930 on 11.755, 9.73, 6.12MHz and 963kHz
2230 on 9.73, 6.12MHz and 963kHz

Radio Norway's weekend English broadcasts are now broadcast:

0100, 0200 and 0300 on 9.605MHz
0300 and 0400 on 9.645MHz
1200 on 25.73 and 21.695MHz
1500 on 11.87MHz
1600 on 21.73 and 15.23MHz
1700 on 9.655MHz
1900 on 17.73 and 15.72MHz
2100 on 9.59MHz
2300 on 11.925MHz
2400 on 9.645MHz

The RDP Lisbon service now has English:

to Europe at 2000-2030 on 11.74MHz
to Middle East at 1600 on 21.515MHz
to Africa at 2100 on 17.74MHz

English from Radio Sweden is now down to three broadcasts in the evening for Europeans. These are at:

1930-2030 on 15.27, 9.655, 6.065 and 1.179MHz
2130-2200 on 6.065 and 1.179MHz
2330-2400 on 1.179MHz

Radio Kiev has English to Europe at 2200 on 5.96 in parallel with 9.82 and 11.79. The station has English once again at 0130 on 9.785 (somewhat late for its European beam) and to North America at 0000 on 17.69, 17.665, 15.18, 12.005, 11.79 and 11.675MHz.

Radio Yugoslavia is heard at 1930 on 15.14 and new 6.10MHz which rates up to SIO543. The station id's with "...you are listening to the Federal short wave radio station...". English is heard again at 2200 with 9.505 and 6.10MHz.

Meanwhile Croatian Radio has been heard from before 1000 on an initially noisy 9.83MHz with a weaker parallel 7.24MHz. This peaks at around SIO533 in the early afternoon, but 7.24 is eventually blocked by Moscow. The identification is "Shvratski Radio Studio Zagreb" and English is apparently heard at 1200 and 2100 on 1.134MHz.

Francis Rose G2DRT has sent the latest schedule from Vatican Radio. English is heard in Europe:

0600 on 7.25, 6.245 and 1.53MHz

1700 on 7.25, 6.245 and 1.53MHz (with French)
2050 on 7.25, 5.935 and 1.53MHz

Radio Vatican now transmits the recitation of Vespers at 5pm (1600GMT) daily which can be heard on 7.35, 6.245 and 1.53MHz.

African And Middle Eastern Stations

The current schedule from the Voice of Israel lists English:

0500-0515 on 11.588MHz
1100-1130 on 17.545MHz
1430-1458 on 17.59, 15.64, 11.605 and 11.587MHz (not Fri, Sat or Holy Days)
1800-1815 on 17.575, 15.64, 11.675 and 11.587MHz
2000-2030 on 17.575, 11.675, 11.605, 11.587, 9.435 and 7.465MHz
2230-2300 on 17.575, 11.675, 11.605, 11.585, 9.435 and 7.465MHz

The Voice of Ethiopia on 9.56 at 1500 is unheard at present, probably due to propagation conditions. The parallel of 7.165 has RFE/RL on channel. However, the Amharic service can be heard at 0329 sign-on on 7.11MHz, starting with SIO233 but fading very quickly.

Radio Nigeria, Ibadan, signs-on at 0430 on 6.05MHz with co-channel QRM from HCJB in Spanish. Identification of "Radio Nigeria, the Voice of the Nation" with news at 0500 and signals up to SIO534. Slow deterioration to fade-out around 0615.

Radio Moundou in Chad is heard signing on at 0457 on 5.2864MHz. A three note interval signal precedes a short brass band interlude with identification in French at 0501.

Asia And The Pacific

Radio Australia has moved from 13.745 to 13.755MHz in the evening period, but is affected by Kol Israel's Hebrew service on 13.753 which creates an annoying heterodyne overshadowing Australia after 1900.

Radio New Zealand International has dropped 13.785MHz and returned to 15.12MHz for its morning transmissions. Roy Merrill has heard the station at 1755 sign-on in heavy clutter with FEBA Radio still co-channel until 1830. The SLBC transmission from Colombo, Sri Lanka blocks the channel between 2000 and 2130. The evening New Zealand transmission on 17.77MHz is variable to SIO434 but usually rates a watery SIO333 at best, up to close at 0730 from fade-in around 0500. The 9.70MHz transmission is also variable, sometimes reaching SIO333 by 1100 when strong adjacent channel signals on 9.695 and 9.705 tend to block the channel until at least 1130.

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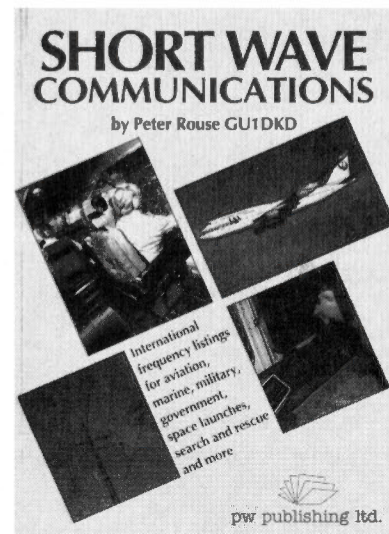
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Peter Rouse GU1DKD
PW Publishing Ltd.
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187 pages, price £8.95

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Newly published, this book, as its name suggests covers a very wide area and as such provides an ideal introduction to the hobby of radio communication. Logically laid out chapters take the reader through basic radio propagation, how to work your radio and what the controls do. One chapter deals specifically with antennas, and another with band plans. There are many pages of useful information of where and when to listen on the bands, so you can successfully receive the service or transmissions that interest you. Using simple, understandable language throughout, the author has managed to make this book a good basic, very readable introduction to a complex subject. Newcomers to the hobby will be delighted to find a copy in their stocking.



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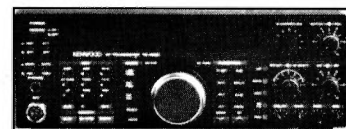
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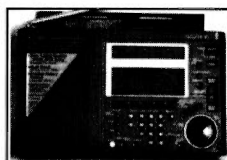
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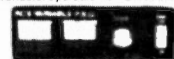
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COMPACT COMMS

IC-735 FULL FEATURED TRANSCEIVER



As predicted the Icom IC-735 has rapidly gained the reputation it deserves. This compact transceiver is ideal for mobile, portable or base station operation. It has a general coverage receiver from 0.1Mhz to 30Mhz with superb sensitivity in all modes; SSB, CW, AM and FM.

Clear Reception

Spectacular specifications are also achieved on RF Intercept, Dynamic Range, Reciprocal mixing and I.F. Blocking. The IC-735 that will provide clear reception no matter what the HF conditions, even under the worst pile-ups.

PBT and Notch control

The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and a built-in passband tuning system that allows continuous width adjustment of the IF passband. In addition, a sharp IF notch filter provides clear reception even in the presence of a strong interfering signal.

Scanning Functions

Scanning functions include programme scan, memory scan and frequency scan. The HM12 scanning microphone is supplied. RF output is approximately 100 watts and can be continuously adjusted down to 10 watts. The twin VFO's and 12 memories can store both mode and frequency.

LCD Readout

The IC-735 is one of the first HF transceivers to use a liquid crystal display with green illuminating back-light, which is highly visible even in sunlight. Controls that require rare adjustment are situated behind the front cover but are immediately accessible.

Convenient Miscellaneous Functions

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- PBT and NOTch control
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