PRACTICAL WIRELESS...THE RADIO MAGAZINE

PW

FREE
INSIDE THIS ISSUE
144MHz REPEATER DATACARD

REVIEWED THIS MONTH
Icom IC-970E VHF & UHF Transceiver

BUILD
The Meon 70MHz Transverter & The PW Speedbrush Morse Practice Key

WIN...WIN...WIN...
A Smartuner In This Month's Competition

REVIEW
Lake Electronics DTR-7 QRP 7MHz CW Transceiver Kit

PLUS
RAE Maths, The Oscilloscope In Your Workshop, CB High & Low

AND LOTS MORE!

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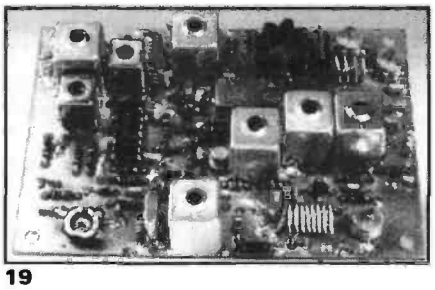
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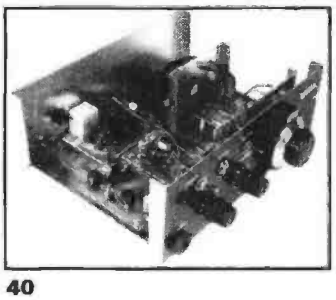
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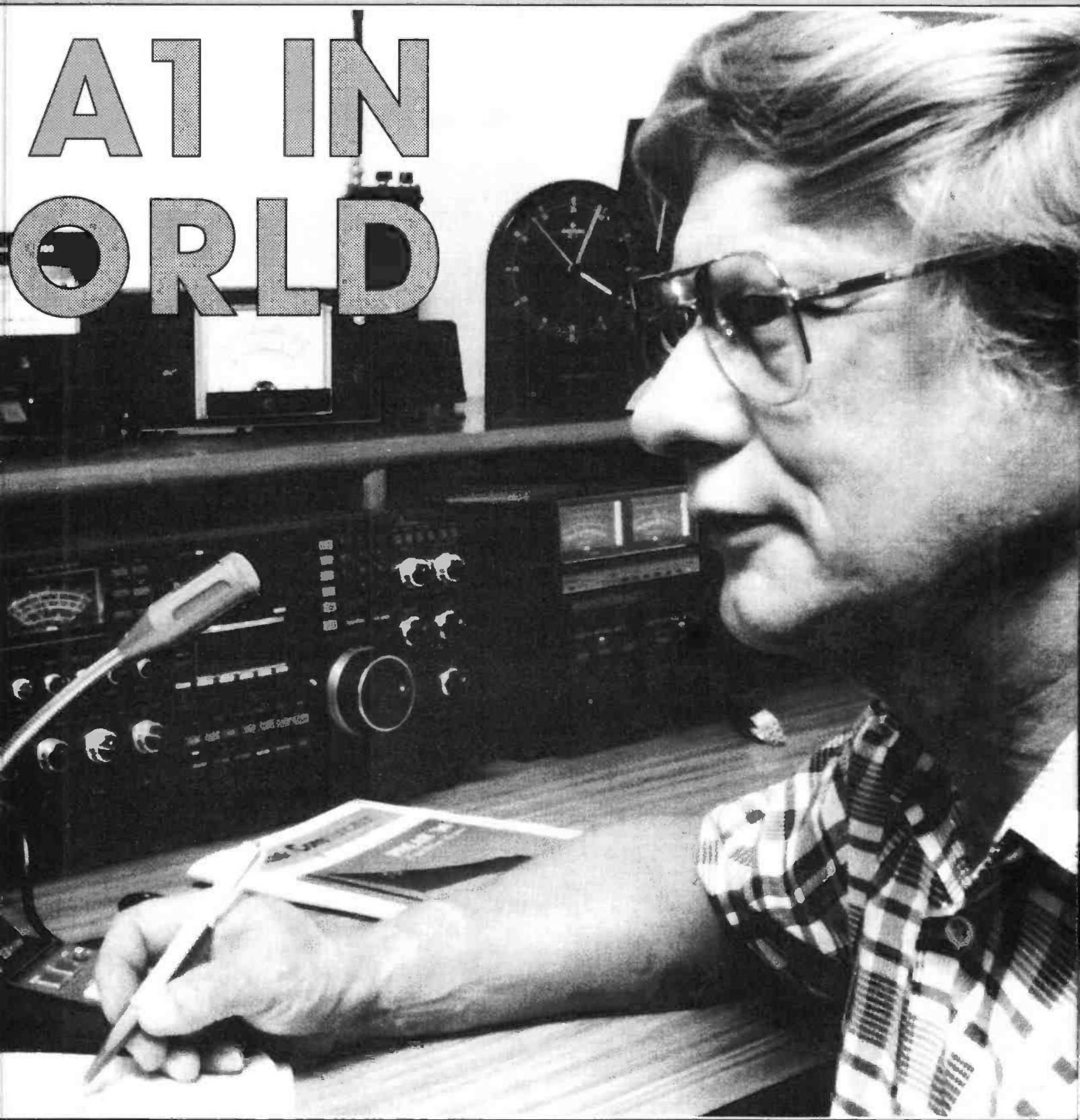

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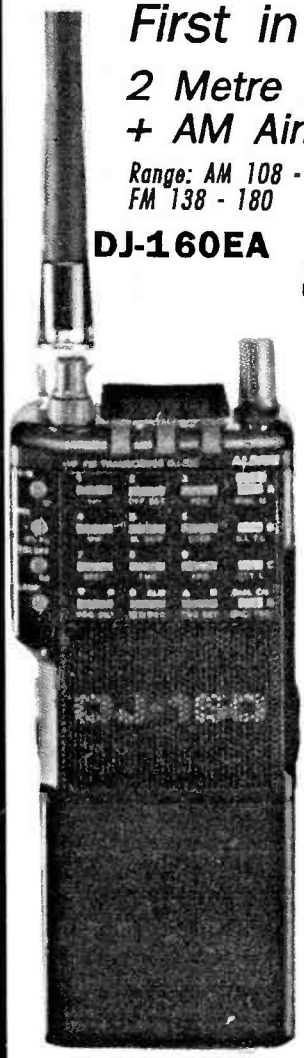

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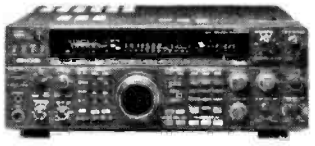

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Keylines

We meet many readers during shows, rallies and other events. Many readers take the opportunity to come and chat, buy books, bend the editor's ear and suggest ideas for *PW*. However, it's not often we are privileged to meet a reader from abroad who's taken the trouble to find our corner of Dorset and come into the office!

In late February, Doctor Burkhard Freund Y26IG from Magdeburg in what was East Germany, while on an educational visit to the UK, came and met some members of the editorial team. Burkhard's English (he's a specialist English teacher and translator) placed our German at the bottom of the class, but despite that he put us at our ease and we enjoyed the meeting and became good friends.

Rob Mannion G3XFD

Second Meeting

In fact we were able to meet Burkhard twice in two days as the local newspaper wanted to photograph him here in the office. He was able to see us at our busiest, so much so that we were only able to round up part of the team - and one of them (Rob Mackie) was behind the camera!

Pictured from left to right and standing behind Burkhard are Donna 'Toad' Vincent (Editorial Assistant, secretarial help and 'Bargain Basement'), Sharon George (Production, 'Newsdesk '91' and 'Backscatter'), G3XFD, and 'Tex' Swann G1TEX, our technical projects sub-editor. Rob Mackie, our photographer, was behind the camera and Steve Hunt our art editor was, as usual, extremely busy designing the next issue of *PW*.

We know that the magazine reaches around the world and we are always delighted to hear from distant readers. I wonder who can claim to be our most remote reader? I've no doubt we'll hear eventually!

To finish off this month, I'm sorry to say that I forgot to thank the Flight Refuelling Ltd's Amateur Radio Club for last month's cover photographs. The club kindly allowed us to feature a (small) part of their impressive antenna farm at Merley near Wimborne. Unfortunately the photo-credit was left out so I owe a belated acknowledgement to them. Thankyou!

73s DE Rob Mannion G3XFD.

Receiving You...

From The Wireless Institute of Australia

Dear Sir

With reference to the news item in the March issue of *PW* regarding the operation of the VK3 QSL Bureau.

We are dismayed that you would publish such material without first verifying the authenticity.

The information published is completely untrue and we believe libellous.

A great disservice has been done to the WIA Victorian Division, Amateur Radio and me personally.

Mr Terry Robinson has been circulating defamatory material of this nature to a number of publishers, however they have at least had the temerity to seek verification.

Legal action was commenced against Mr Robinson late last year and he was warned if he did not desist from his mischievous actions, the Wireless Institute of Australia Victorian Division would seek damages in a court of law.

The publication of this material has severely damaged the reputation of the 'worlds oldest radio society' and my personal reputation on an international scale.

The following is an official statement issued by the Council of the Wireless Institute of Australia on 21 November 1991.

"All amateurs are assured that the WIA Victorian Division Inwards QSL Bureau is operating efficiently within the guidelines of the I.A.R.U.

The WIA Victorian Division Inwards Bureau operation is fully computerised and cards are handled and distributed by paid staff.

Cards for both WIA members and non members are accepted.

Cards for members are processed and distributed as a free membership service, and cards for non members are made available for collection without charge or they may be distributed in the same manner as member's cards for a nominal charge".

The address for all Inwards QSL cards to the VK3 area is:

VK3 Inwards QSL Bureau
Box 757 G
GPO Melbourne 3001

We look forward to any explanation you may care to offer.

Barry Wilton VK3XV
Secretary - Manager
Wireless Institute of Australia

Editor's comment: As requested by the Wireless Institute of Australia I've reproduced their letter in full. I apologise unreservedly for printing what turned out to be false information. The information was published in good faith and attempts were made to contact Mr Wilton direct for confirmation of the facts. In future *PW* won't publish any material referring to the WIA or its activities unless we have specific permission to publish that information from the WIA.

Receiving You...

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.
Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

Dear Sir

I much enjoy reading *PW* magazine. Thank you for the excellent articles. Recently I built the *PW* 'Marland'. This nice transmitter now works faultlessly since I have eliminated a parasitic oscillation (microphone amplifier TR7-BG109, one capacitor from base to collector). Now I have got very complementary reports when I use it on the air.

Now I am waiting for the companion receiver (it should be based on discrete devices please).

Other home-brew *PW* projects I have built are: *PW* 'Badger,' the *PW* 'Portland', and speech processor (works very well) and now the *PW* 'Empire' valved transceiver from the 1000th issue of your magazine. Thank you, everyone at *PW*.

Johann Hans 0E7UT
Kufstein
Austria

Editor's reply: Thank you Johann! We're very pleased to hear that *PW* projects are being built in the Austrian Tyrol. George Dobbs G3RJV is working on the receiver side of the 'Marland', and we hope to publish it in the near future. George intends to try and equally balance discrete and integrated components in the new receiver.

Editor's note: The following extracts are from some of the mass of letters received in the *PW* office, after the publication of William Mitchell EI5GO's letter in the March issue. We must point out that we have not received any letters in direct support of Mr Mitchell's opinion.

★★★★★STAR LETTER★★★★★

Dear Sir

I must take Rob Mannion to task over his recent remarks about amateur radio and it's 'old man's image'!

Let's face it Rob, old age is relative - but it's many of the old men amongst our ranks who have the real 'know how' - and, dare I suggest, part of your job as Editor of a much respected magazine is to tap this know-how for the benefit of others.

I read recently of a man of 81 who had passed the RAE and got his A licence. I also know a man of 81 who turns out a worthwhile constructional project each month - and goes 'old-time dancing five times a week. As I said Rob, old age is relative!

Conversely I don't believe that a whole boat-load of those 'Enid Blyton' characters featured within the pages of *Radcom* during the past year - complete with their bulbs and batteries - are going to make the slightest dent in the amateur radio world, despite the incomplete RSGB video.

What we do need is an influx of people, male or female, young or old, who have their own personal curiosity, interest and motivation about all things radio. After years in the doldrums *Practical Wireless* has taken off and is doing its utmost to attract such people. Now we need a *Radio Communication* magazine that communicates.

It's a high-tech' world we're living in Rob, so you set the pace for your readers and we'll try to keep up with you - young or old!

H. N. Kirk G3JDK
Rotherham
Yorkshire

G3XFD's comment: Well, what can I say Mr Kirk? Perhaps I ought to be pleased to be approaching the point where I can honestly claim to be an old man. The *PW* team will certainly try to set the pace for you and I'll find out what my own bunch of Enid Blyton characters (at a school radio club I help run) think of your comments. In the meantime, we'd like to hear what younger readers think of Mr Kirk's opinion.

Dear Sir

The letter from William Mitchell EI5GO is almost totally lacking in logic.

What hard evidence is there to support the contention that the repeater abuses are limited to the less intelligent, or even to the licenced? After all, anybody could buy or steal a rig, and can make a nuisance of him or herself on a repeater. But that does not automatically mean that the recent B licensees are automatically the culprits.

It is equally illogical to suggest that the Novice Licence is going to cause the same problems, before the first Novice Licence is issued.

I recently heard a QSO on 14MHz being interrupted by another station deliberately trying to spoil it, yet no UK Novice Licence has yet been issued.

Unfortunately, there will always be wallies but it is unfair to lay the blame on particular segments of the hobby.

C. J. Charles G0LWA
Cheadle
Stoke-on-Trent

Dear Sir

I would suggest to Mr Mitchell that rather than upsetting newcomers to our hobby that he uses his communication skills, written and practical to assist those of us who wish to become good ambassadors of our hobby. I for one would welcome his assistance in passing this so-called ridiculously easy RAE exam!

As yet, I am only half way through my course for the RAE and find it quite hard at times. Mr Mitchell's letter has given me a new lease of life, I will pass the RAE and I won't become a wally!

J. Briggs
23 Base Wksp
BFPO 20

Dear Sir

I found that many of the comments made by EI5GO extremely offensive. He refers to a "mass of zero IQs coming onto the airways", and assumes that anyone using a 'hand-held' transceiver with a 'rubber duck' antenna is an idiot! For some operators - that's the only rig they can afford.

Mr Mitchell also seems to require that repeaters should be closed down because they are abused. If someone is shot and killed, who or what is charged? It's not the gun, but the person pulling the trigger who's guilty.

To many amateurs, the local repeater may be the only centre of activity. I'm a fairly new amateur as you will see by my callsign, and horror upon horror, I came into amateur radio via, dare I say it, CB!

Dick Pascoe G0BPS
Folkestone
Kent

Dear Sir

I feel that Mr Barker G3WAL and Mr Mitchell E15GO, are totally unjustified in suggesting that the repeater network should be closed down.

Removing this excellent service from amateur radio would be playing into the hands of the idiots whose sole aim is the withdrawal of the repeater network.

I needn't remind anybody of the terrible effects of the snow in December, when the repeater network provided a vital service to the housebound, and also to others who were caught out in awful road conditions.

I feel it would be a great tragedy if this vital service was removed, and I think G3XFD's funding programme (The CARRIES proposal) is a very good idea to boost repeater funding.

Paul Robertson G7JCG
Redditch
Worcestershire

Receiving You...

Dear Sir

As a short wave listener studying for the RAE, I'm aiming to start with a B licence, with a view of one day obtaining an A licence, I was upset to read Mr Mitchell's comments.

I think that his views are elitism at their worst. Comments like EI5GO's reinforce the 'fuddy-duddy', 'old fogey' image amateur radio is trying to get rid of.

Please Mr Mitchell, don't judge every operator by the 'wally' element you've heard, as there are a lot of good guys and girls out there!

E. R. Hagon
Salisbury
Wiltshire

Dear Sir

Thanks for a most interesting piece on repeaters in the February issue of *PW*. I fully endorse the CARRIES idea suggested in 'Keylines', which I think is excellent. I live near GB3CF, but being on a good v.h.f. site, occasionally use several other repeaters. Your suggestion for a general fund will give me a way of supporting the other repeaters without breaking the bank!

As a relative newcomer I know that there is some antipathy towards the RSGB (of which I am a member) but feel strongly that anything of the CARRIES type should come under the wing of the RSGB. The hobby must have a strong unified voice. I know from my business life that a diversity of special interest groups does not have the same 'muscle' or credibility as one major body.

John Heath G7HIA
Kirkby Mallory
Leicestershire

Dear Sir

The RAE and type of licence held are totally irrelevant to radio and repeater abuse. You don't need a licence to lock up a repeater and/or use obscene language on the air.

All you need is a rig. Whether it's hand-held, home-built or commercial multi-mode equipment doesn't matter. It's the person using it who counts! If this person is an idiot with no respect for others, we have a problem, and as I've said, there's no licence or RAE needed although I realise many abusers may be licenced.

By saying the c.w. test filters out the pollution, E15GO implies class B licencees are the source of this abuse and this is very unfair. I also ask that he give novice operators a chance. Don't forget that we are ' innocent until proven guilty'!

One method to lessen the problem would be selective or restricted access to repeaters. The access tone would be given to repeater group members only, and perhaps changed every three or four months.

There's no complete solution, but let's sit down and put things in perspective, there are far worse troubles and evils in life!

Garry Ward G7ITR
Woolford
Bury

Dear Sir

May I say that in my opinion, 'Bargain Basement' is a great idea. I am certain that it will be well received and should result in an increased readership. I wish *PW* every success.

B. D. Tipper G3WWL
Sutton Coldfield
West Midlands

Editor's reply: Glad you like the idea Mr Tipper. Keep those adverts coming readers!

Dear Sir

William Mitchell E15GO is under the wrong impression, if he thinks that anyone who uses a hand-held rig is a simpleton.

I passed the RAE in 1988 after a year of hard study, I had no previous radio or electrical experience when I decided to 'have a go'. It was sheer determination to succeed which finally got me through, with a similar attitude from a very hardworking tutor, (thank you Russ G4NUG).

I waited two years before being able to afford any equipment - a hand-held transceiver with a 'rubber duck' antenna. At home I can't have external antennas or base stations and this was the only way I could get on the air.

I consider myself a sensible user. My local repeater is often the only means I have to cover any distance.

I don't believe that I'm the only person who makes sensible use of my radio equipment. Perhaps Mr. Mitchell should think carefully before tarring all hand-held transceiver users with the same brush.

Michael Clift G7FDL
Aylesbury
Bucks

Dear Sir

I was shocked to read such a negative attitude from EI5GO regarding 144MHz. Anybody like myself preparing for the RAE in May, will probably take his comments on the "ridiculously simple RAE" and the other equally misguided opinions, as a direct insult.

So what if a new licensee introduces himself to the hobby on one of the many available hand-helds? Just because he has a rubber duck equipped rig - does that really make him a wally?

Repeater clubs and users should police their repeaters and co-operate with the AROS, providing evidence, names and locations (as mentioned in the March *PW* 'Newsdesk '91', to try and stamp abuse out. The many dedicated people who run, build and maintain repeaters are doing a great job. They deserve some positive credit instead of listening to people winge about something that is not their fault.

Ian Bull
Peacehaven
East Sussex

Dear Sir

As a recently licenced amateur, I was greatly incensed by EI5GO's letter. I obtained two distinctions in the RAE (I'm very proud of that achievement), have ten GCSEs to my name and expect to pass four A-levels this summer and yet he considers me to have an IQ of zero!

Please don't shut abused repeaters. They provide an excellent service to the many mobile stations who use them. The answer to repeater abuse is swift action and stiffer penalties on the abusers, not the repeaters and their genuine users.

Mr Mitchell has made a grave mistake in voicing his pitiful opinions and has offended a great many people. Is this the true spirit of amateur radio? I sincerely hope not.

David Murray G7HME
Aughton

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 the past years are available at £1.65 each including post and packing.
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Send all orders to the Post Sales Department.

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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.
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Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics who advertise in the magazine.
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Wireless Line
This is an information service for the radio enthusiast, updated each Friday. Calls cost 44p per minute peak time and 33p per minute off-peak. The number to ring is: (0898) 654632.

Receiving You...

Dear Sir

I am not a licensed amateur, but I do intend to take the RAE when I have finished my college course. I'm 21 years old and have been interested in radio for the past 12 years.

Only the snobby attitude, which some amateurs like Mr Mitchell hold, has kept me back from the RAE, although I realise that not everyone has opinions like Mr Mitchell's.

I've been a short wave listener for many years and I fear that unless you're able to build a working transceiver you're not welcome on the amateur bands. I'm not technically gifted - so this attitude worries me.

I agree wholeheartedly with Mr Mitchell's opinion that these wallies should not be allowed to get on the air. However, from his wording I feel that I fit into his wallie category. I find this extremely insulting as I'm fluent in three languages and I'm studying for two degrees in arts-based subjects and will eventually have 'Reverend' in front of my name.

Surely he doesn't really believe that by making the RAE more difficult, and incorporating a 'Technical Excellence' test, that his so-called 'zero IQs' will be kept off the air? As the well known proverb says: 'Where there's a will, there's a way'.

Hugh Anthony Quinn
Co. Kildare
Republic of Ireland

Dear Sir

I found the late Mr Muldoon's article on PME in the March issue most interesting. As he rightly said the loop impedance will be unlikely to exceed 0.35Ω and compression fittings must be used on all joints. This is all very well if the work is properly carried out.

My house was built some 15 years ago and has two phases incoming, one for the central heating system and the other for normal domestic purposes. About three or four years ago I was experiencing very bad regulation on the domestic system which supplied the radio shack. In the course of investigation it was noticed that when the one system was loaded the voltage on the other was increased and vice-versa. After some thought it was realised that the fault probably resided in the neutral connection and the power company was informed.

When the linesman came out to investigate, it was found that the fault was due to dis-similar metals in the compression sleeves at the feed point to the house. I can't remember now whether it was copper fittings on aluminium conductors, or the other way round, but protective grease on the fittings, on all the conductors, has dried out and serious corrosion has taken place.

The moral is to fit a voltmeter in the shack to constantly monitor the supply voltage and report any bad regulation problems to the supply authority.

S. F. Brown G4LU
Oswestry
Shropshire

Competition Corner

You could win an SGC Smartuner, worth £395, for your shack. There's been a lot of interest in this useful antenna tuner system. If you win the SGC Smartuner, kindly donated by the manufacturers, you could use it for portable, mobile and main station operation. Just think - no more antenna tuning! All you have to do is transmit, the Smartuner does the rest for you!

How To Win Your Smartuner

If you read the review on this clever automatic antenna tuner in March issue of *PW* - you'll have no trouble in answering the six simple questions on what it can do and how it does it! All you have to do is answer the six questions below, and complete the following Limerick tie-breaker before sending in your entry (with the corner flash from this page if you send a photocopy).

1: In what country is the SGC Smartuner made?
2: How does the Smartuner tuning system work?
3: What type of antenna is the Smartuner specifically designed for?
4: What is the power input range of the Smartuner?
5: What is the Smartuner's power consumption?
6: What is the Smartuner's recurrent memory re-set time?

Tie-Breaker Limerick

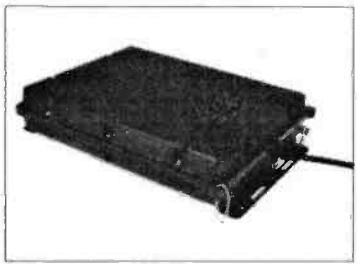
There was a reader from Poole,
who certainly wasn't a fool,
to make his signal a boomer,
and win an Smartuner,

.....

PW MAY '91 COMPETITION ENTRY COUPON

Complete the final line of the Limerick and send your entry with the six questions answered (and the corner flash if you send a photocopy of this page) to: *PW* Smartuner Competition (May 91) by 9 May 1991. The winner will be announced in the August issue of *PW*. The four runners-up will be able to choose vouchers for the *PW* Book Service or one year subsriptions. Get smart readers - have a go!

PRIZES...PRIZES...PRIZES



Runners-up can choose either a one year *PW* subscription or £20 in vouchers for the book service.

Name .....

Address .....
.....
.....
.....
.....
Postcode .....

☐ Subscription
☐ Vouchers (please specify)

Newsdesk '91

RAIBC Appeal

The Radio Amateur Invalid & Blind Club have been collecting all the various types of vouchers and stamps given out when you buy petrol. These are used either directly or indirectly by the club committee to purchase radio equipment for their blind and disabled members. They also compile audio cassette home study courses to enable their blind and severely handicapped members to study at home for a City and Guilds exam. To date they have been able to purchase over £12 000 worth of equipment by this method.

Although they are a registered charity, they don't ask the public for money. They feel that it's easier to get donations of vouchers and stamps that people wouldn't miss or might throw away without exchanging them for the goods offered in the catalogues.

The Shell organisation decided to end their current promotion on 10 March 1991. This leaves the RAIBC with a shortfall of Shell stamps of around 25 000 to enable them to complete their current project. The Shell stamps can still be surrendered by the RAIBC until 31 May 1991.

The RAIBC can also make use of all odd vouchers and stamps which include BP, ESSO, Texaco, Maxol, Privilege, Green Shield and even Air Miles.

They've received used postage stamps in their mail and although they don't make use of these themselves, they pass them on to help to buy Guide Dogs for the blind.

Should anyone wish to send tokens, they can do so free of charge, to **RAIBC (NI), Freepost, BE 1796, Belfast BT12 5BR**. Used postage stamps can be sent direct to **Archie, PO Box 87, Belfast BT12 5PU**.

RAIBC would also like to thank all of the garage owners and members who have already supported their appeal.

HMS Fearless

The town of Scarborough has adopted the warship HMS *Fearless* and to celebrate the first visit to the resort of this newly commissioned veteran of the Falklands War, the Scarborough Special Events Group will be on the air as GB0RN from May 9 to 13th, whilst the warship is at anchor in the bay.

Operation will be around 3.725 and 7.055MHz in the h.f. bands plus 144MHz s.s.b. and f.m. in addition to activity on the RNARS nets.

Special QSL cards will be available to commemorate the occasion and further details can be obtained from:
Roy Clayton G4SSH
9 Green Island
Irton
Scarborough
North Yorkshire
YO12 4RN.

Car Boot Sale

On 26 May 1991, Northampton Radio Club have a Car Boot Sale at the rear of the 'Red Lion' public house, on the A45 400 yards from junction 16 of the M1 (Northampton turn).

There will be parking for over 500 cars, entrance fee will be 50p per car, or 25p per peron. If you are selling, the fee will be £6.50 in advance, or £9 on the day.

There will be a licensed bar open from 12 p.m., food all day long and a Bring & Buy sale. Many radio/computer/electronic stalls to see.

Any bookings to **Paul G0HWC on (0327) 41267 evenings.**

Special Event Station

The weekend of May 11/12 May 1991 will see the 10th Anniversary of the Southern Electric Museum which is located in the Old Power Station, Bargates, Christchurch, in Dorset.

The Museum, which is dedicated to the supply and use of electrical energy and equipment through the ages, is a unique collection and will be open to visitors from 11am to 4.30pm on both days.

The members and reps. of the Bournemouth & District RAIBC Group will be operating the Special Event callsign GB2SEM from the museum and a unique colour QSL card will be available for all reports and QSOs via the RSGB QSL Bureau, or direct (with an s.a.e. please) to G6DUN who is QTHR.

The station will be active on 3.5 and 7MHz in the mornings and on 14, 21 and 28MHz in the afternoons. Contacts and talk-in will also be available on 144MHz f.m.

Bruel & Kjaer

A 24-page full colour booklet from Bruel & Kjaer reviews the basic requirements for quality, speed and cost-effectiveness of electronic measurements, in particular with respect to signal sources.

Advances in frequency synthesis and analogue circuit design have made it possible to achieve a high degree of accuracy and efficiency in signal generators, enhancing the overall quality of measurements. At the same time, Bruel & Kjaer has placed considerable emphasis on interface design, human engineering and reliability, to maximise test system up-time.

The booklet considers the role of the signal generator in applications as diverse as design and test of digital audio devices; high-resolution A-D converters; scientific, industrial and medical instruments; telecommunications and navigational equipment; and a variety of dynamic measurements in the low-frequency electronics, sound and vibration areas.

For each application, combinations of excitation, measurement and data presentation equipment are detailed.

For further information, contact:
Les Minikin
Bruel & Kjaer (UK) Ltd
92 Uxbridge Road
Harrow HA3 6BZ.
Tel: 081-954 2366.

International Marconi Day 1991

The Cornwall Amateur Radio Club would like to remind radio amateurs and s.w.l.s intending to take part in the IMD on Saturday 27 April, that the occasion is a one-day event starting at 00.00z and finishing at 23.59z. The official award is for full two-way working only and not for full two-day working as stated in the April issue of *PW*.

Thanks!

The committee of the Lancastrian Rally would like to thank all those who turned up at their rally on January 27 and made it a very successful day. They hope you will all come again next year on Sunday 26 January 1992, same time, same place.

Training College Open Day

Saturday 13 April 1991 is Open Day at The Salvation Army's William Booth Memorial Training College, where for over 60 years Salvation Army Officers have been trained for their life time in the ministry.

To celebrate this special day, WACRAL (World Association of Christian Radio Amateurs and Listeners) and The Royal Air Force have organised this Special Event Station using the callsign GB4SA.
The Salvation Army Training College
Denmark Hill, London SE5 8BQ.

New Catalogue

LMI UK, the Nuneaton-based distributor of electronic components, have published a new short form catalogue covering their versatile range of new and established LMI products. Included are p.c.b. terminal blocks, connectors, quick connect tab terminals and electronic modules.

The module range and high density screw terminals able to mate with DIN 41612 type D, E and F are recent introductions.

These high quality products are all manufactured from UL94VO approved polycarbonate material, and they have many uses within the electronic/electrical, control, instrumentation, engineering and manufacturing industries.

For further information, please contact **Paul Haynes on (0203) 642429**.

Newsdesk '91

Club News

North Ferriby United ARS meet at the North Ferriby United Football Club Social Room, Church Road, North Ferriby, 8pm. April 12 and May 3 are Nights on the Air, April 19 is The Trio TS-850 with Peter G3ZRS and the 26th is a Surplus Equipment Sale. Details from **Frank Lee G3YCC on (0482) 650410.**

Cheshunt & District ARC meet Wednesdays, 8pm in the Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. April 24 is a Natter Night. Details from **Roger Frisby G4OAA on (0992) 464795.**

Stourbridge & District ARS meet 1st & 3rd Mondays at the Robin Woods Community Centre, Scotts Road, Stourbridge. April 22 is a talk given by a Trading Standards Officer. Further details from **Dennis Body G0HTJ, 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.**

Loughton & District ARS meet in Room 14 is Loughton Hall, Rectory Lane, at 7.45pm. April 19 is 'What is PEP?' More details from **Mike Pilsbury G4KCK on 081-504 4581.**

Fylde ARS meet 2nd & 4th Thursdays, 7.45pm at the South Shore Lawn Tennis Club, Midgeland Road, Blackpool. April 11 is a talk by Steve Williamson G3WGU on his own choice of subject, the 25th is a talk by C. J. McMahon G6FCI with a 'Packet Radio Demo' and May 9 is a Club Equipment Sale. Details from **Eric Fielding G4IHF, 6 Thornton Avenue, Lytham St. Annes, Lancashire FY8 3RL.**

Sutton & Cheam RS meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Natter Nights are 1st Mondays in the Downs Bar. April 13 is their Annual Dinner at the Stoneleigh Inn, Stoneleigh, the 18th is a Junk Sale and the 20th is a Visit to the National Remote Sensing Centre, Farnborough. Further details from **John Puttock G0BWV at 53 Alexandra Avenue, Sutton.**

Wimbledon & District ARS meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon, London SW19. April 12 is a General Activity evening and the 26th is 'Keys and Keyers' by Tom Mansfield G3ESH. Any enquiries to **Chris Frost G0KEB on 081-397 0427.**

North Bristol ARC meet at S.H.E., 7 Braemar Close, Northville, Bristol. April 19 is a Home-brew Contest. Further details from **Chris Budd G0LOJ on (0454) 616267.**

Bury St. Edmunds ARS have a change of venue for 1991, they now meet at the West Suffolk College, (Room EO-40), Out Risbygate, Bury St. Edmunds, on the 3rd Tuesday of each month, at 7.30pm. Further details about the club from **Ian Capon G0KRL on (0359) 70527.**

Three Counties RC meet every other Wednesday, 7.30pm at the Railway Hotel, Liphook, Hampshire. April 24 is their AGM and May 8 is High Tech. Industrial Locations in the Three Counties by R. E. J. Seymour. For further details contact **Dave G4VKC, 39 The Maltings, Liphook, Hants GU30 7DG.**

Preston ARS meet Thursdays, at The Lonsdale Sports & Social Club, Fulwood Hall Lane, Fulwood, Preston. April 18 is an illustrated talk by Mr Andrews on 'The Abbey Walk' and May 2 is a Slide and Demonstration evening 'Bolton Mountain Rescue Team'. Details from **Eric Eastwood G1WCQ, 56 The Mede, Freckleton, Preston, Lancs PR4 1JB. Tel: (0772) 686708.**

Derby & District ARS meet Wednesdays, 7.30pm at 119 Green Lane, Derby. April 17 is The Packet Network and How it Works - an illustrated talk by Richard Hillier G4NAD, April 24 is a Video Show - including the RSGB Project Year Video, May 1 is May Day Junk Sale and the 8th is PACSATS - illustrated talk by Jonathan G4KLX. Further information about the Society is available from **Richard Buckby G3VGW, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.**

Horsham ARC meet at the Guide Hall, Denne Road, Horsham, West Sussex. They have a Home-Brew evening on May 2. For further details, contact **Peter Stephens G8SUI, at 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: 073784 2150.**

Bromsgrove ARS meet 2nd & 4th Tuesdays, 8pm at Lickey End Working Mens Club, 17 Alcester Road, Lickey End, Bromsgrove, Worcs (adjacent to junction 1, M42). Further details from **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.**

Clacton RC meet 1st & 3rd Wednesdays, 7.30pm at Eldorado Club, The Broadway, Jaywick, Clacton-on-Sea, Essex. They have a talk entitled Reminiscences of a Radio Amateur on April 17. Details from **Pete Neave G4DAN, 59 Harwich Road, Mistley, Manningtree, Essex CO11 1NB.**

Australian QSL Bureau Alive And Well

The information published in the March issue of *PW*, regarding the incoming VK3 (Victoria) QSL bureau, has turned out to be incorrect. The Wireless Institute of Australia has confirmed that the bureau is in operation and has not been suspended in any way. Further details on the background to the incorrect report are published in 'Receiving You'.

Railway Gala Day

The narrow-gauge Romney Hythe and Dymchurch Railway in Kent has a Steam and Diesel Gala Day on May 19. It's hoped to have GB4RHR on air for this event - listen out for the whistles on the bands!

Details from:
Ian Bamford
8 Lower Road, Kenley, Surrey CR8 5NB.

Young Amateur of the Year Award 1991

The Radio communications Agency (RA) are continuing their sponsorship of the Young Amateur of the Year Award in 1991, which is presented for the most outstanding achievement by a young amateur radio enthusiast.

The 1991 award is open to anyone who is under 18 and is keen on construction, or interested in using radio and gaining operational skills, or using radio for a community service such as helping the disabled or in emergency communication networks or is actively encouraging interest in amateur radio, or is involved in amateur radio in any way, for example involvement in school projects.

The prize, for the most outstanding achievement between 1 August 1991 and 31 July 1991, will be awarded by the Radiocommunications Agency and presented at the Radio Society of Great Britain's (RSGB) HF Convention in September.

On top of the £250 cash prize awarded to the winner by the RA, each entrant will be presented with a copy of the RSGB's amateur radio log book. The winner and runners up will also have an opportunity to visit the RA's Radio Monitoring Station at Baldock in Hertfordshire. Continued support from the radiocommunications industry has resulted in special additional prizes for the winner and runner up.

Last year's winner was 17-year old David Martin from Glasgow. As well as being co-founder and treasurer of YAGIS (Young Amateur's Group in Scotland), David had run a special event station for the Scout's 'Jamboree on the Air'. He was also a member of the Radio Amateur Emergency Network (RAYNET). David received a £250 prize, a certificate and several other prizes at the RSGB's HF Convention, held in Daventry. The runner up was 17-year old Simon Glanville from Coventry. Simon also received several prizes donated by the radiocommunication industry. Both David and Simon will be visiting the Radio Monitoring Station at Baldock as part of their prize.

The closing date for applications is 31 July 1991. The Award is open to any resident of the UK, the Channel Islands, or the Isle of Man, who has not reached his or her 18th birthday by the closing date. Candidates need not be holders of the Amateur Radio Licence.

Applications or nominations for the Award must be send to:
The Secretary
Radio Society of Great Britain
Lambda House
Cranborne Road
Potters Bar
Hertfordshire
EN6 3JE.
Tel: (0707) 59015.

Newsdesk '91

All Formats Computer Fair Comes To Birmingham

The Fair is of interest to anyone who uses a computer, especially when it comes to saving money. However, every Fair until now has been held at the New Horticultural Hall in London. Now, the first regional Fair is coming to the National Motorcycle Museum in Birmingham, on Sunday April 21, 10am to 4pm. Situated next to junction 6 of the M42, this is in the centre of the Midlands motorway network.

Bargains range from games and consoles to business systems. All formats of computer are catered for and there is a wide representation from user groups, specialist magazines and public domain libraries. The low cost of exhibiting produces many varied and interesting stands.

Further information from **John Riding on (0225) 868100.**

New Communications Centre

On Wednesday January 16, Mr Patrick McLoughlin MP, Parliamentary Under Secretary of State for Transport, opened a new communications centre near Heathrow to serve the licenced radio amateur, committed short wave listener and airband enthusiast.

Owned and run by Lowe Electronics Ltd., the largest distributor and retailer in the country of amateur radio equipment and specialist airband radios, the company has felt for some time that there is a need for a communications centre West of London to serve these specialised radio fields.

The new centre is at 6 Cherwell Close, Langley, Slough, Berks SL3 8XB. Tel: (0753) 45255. It is located just 15m from the main A4, and only 180m from junction 5 of the M4.

Mr McLoughlin made the first entry in the centre's Visitors' Book acompanied by the Lowe Electronics directors John Wilson G3PCY, Richard McLachlan G3OQT, Roger Geeson G3NJX and Ian Sneap G3ZYC.

If you require any further information, please contact:
Mr Richard McLachlan
Lowe Electronics Ltd.,
Chesterfield Road
Matlock
Derbyshire
DE4 5LE.
Tel: (0629) 580800.

Summer RAE Course

B & C Electronics are proud to announce that the 1991 Summer RAE Course begins on June 6, at a cost of £63.60.

The course fee includes tuition, books, folder, paper, calculator and refreshments at break time, but does not include the examination fee.

The course is run by Chris G8YPE who has eight years of experience in tutoring people through City & Guilds 765.

They offer free tuition until you pass, providing that the student takes every available examination.

For further details about the course, please contact **B & C on 021-475 2426.**

VHF News

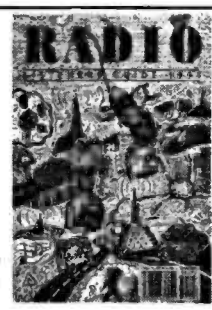
As from Friday April 5, the Radiocommunications Agency have announced that radio amateurs in the UK can operate mobile on 50MHz and vertical polarisation. The permitted power level of 14dBW remains in force.

British Rail ARS

During the weekend of May 17-20, to celebrate 25 years of the British Rail ARS, the society are running a Special Event Station from The Sidings Hotel & Restaurant, Shipton, by Beningborough, Near. York.

They hope to be active on 3.5, 7, 14MHz and 144MHz. The callsign to look out for is GB2RA. Further details from:
G. Sims G4GNQ,
85 Surrey Street,
Glossop,
Derbyshire SK13 9AJ.

Radio Listeners Guide 1991



The the third edition of the essential book for all radio listeners , the *Radio Listeners Guide* has been published. Simple to use maps and charts, show the frequencies for all the radio stations in the UK.

When travelling or at home, the guide gives you all the frequencies you'll ever need. Tune to your favourite radio stations when travelling, or listen to one of the hundreds of stations you never knew existed. Hear local news, travel information and weather forecasts. In addition, the guide has features by the BBC and the Radio Authority explaining what's new in national broadcasting.

Not only does the guide give you all the national, local and community stations in the UK, it also lists foreign stations that can be received in the UK.

The *Radio Listeners Guide* costs £2.95 plus 30p postage and is available from the publishers at the following address:
The Radio Listeners Guide
Freepost
PDQ Publishing
PO Box 41
Didcot, Oxon OX11 8BR.

New ITC Magazine

The Independent Television Commission's new quarterly magazine, *Spectrum*, successor to the IBA's journal *Airwaves*, was launched on March 7. Addressed both to broadcasters and to observers of the industry, its primary concern will be to air comment and debate on broadcasting policy and practice from a variety of viewpoints.

Features in the launch issue include a critical look at music on television by musician and journalist David Toop, a challenge to British film talent from ex-BSB Movie Channel Managing Director Andy Birchall, views on prospects for independents based in the region and a perspective on Soviet media policies from Ukranian broadcaster Alexei Sologubenko. Frank Willis, ITC Director of Advertising and Sponsorship, and Rachel Viney, ITC Religious Broadcasting Officer, discuss regulation in their specialist fields and Dr. Camel McLaughlin, ITC Senior Research Officer, reports on the latest annual Attitudes to Television survey.

Peter Brownbridge

Peter Brownbridge, the ebullient proprietor of Johnsons Shortwave Radio in Worcester, died at home on Saturday March 9 after a long illness.

Peter was one of those rare individuals who put his customers first. He would rather give them sound advice, even if it meant making less profit from the deal. Being partial to a long chat, he would always drop in at the *PW* Editorial Offices when he was taking his annual holidays in Weymouth!

The business will be carried on, for the time being, by Anita, helped by Lara the dog.

Condolences to Peter's family from the staff at *Practical Wireless*.

Newsdesk '91

Neighbourhood Watch

New from Maplin Electronics is a complete single zone home burglar alarm kit. The DIY Neighbourhood Watch Security Alarm is simple to install, simple to use and is exceptional value for money. The unit will also ensure that any unwanted visitors will get a far from friendly reception

At the heart of the system is an on/off key operated microcomputer-based unit providing a fault indicator light. This will alert the household or office if any of the detectors fitted are activated. There's a time delay of 20 seconds to exit and 15 seconds to enter before the alarm is triggered. The system will continuously monitor the tamper and personal attack circuits. There is an automatic bell cut-off after 20 minutes when the system resets itself.

The kit comprises: one microchip control unit, bell box and siren, four pairs of magnetic contacts, one personal attack button, one large pressure mat, one stair pressure mat, anti-tamper microswitch, 50m of four-core security cable, cable clips and fixings, easy-to-follow instruction booklet and siren housing label.

The power for the system is by 12V battery (not supplied) which is housed in the bell box. The battery should provide many years of service, unless the siren is sounded for long periods.

Maplin supply a vast range of detection devices which can be fitted to the system including passive infra-red detectors.

Price £54.95 (to include VAT). Order reference number is: XM97F DIY Alarm Kit. **Maplin Electronics Tel: (0702) 552911.**

Radio Diary

*** Practical Wireless & Short Wave Magazine in attendance**

***April 14**: Trafford ARC will be holding their Great Northern Rally at G-MEX, City Centre, Manchester. Doors open 10.30am, rally closes 5pm. **Graham Oldfield 061-748 9804.**

April 21: Bury RS will be holding their Hamfeast '91 rally at the Castle Leisure Centre, Bolton Street, Bury. **Lawrence Jones G4KLT. Tel: 061-762 9308. PLEASE NOTE THE CHANGE OF DATE.**

April 21: Swansea ARS will be holding their 10th rally at the Swansea Leisure Centre, which is located on the A4067 Swansea-Mumbles coast road. Usual facilities will include trade stands, Bring & Buy, bookstall, h.f./v.h.f. demo station, full catering and licensed bar. Open 10.30am to 5pm. S22, talk-in by GB2SWR. **Roger Williams GW4HSH on (0792) 404422.**

***April 27/28**: The RSGB will be holding their National Amateur Radio Show at the National Exhibition Centre, Birmingham.

May 5: The 8th Anglo-Scottish rally will be held at Tait Hall, Kelso. Doors open 11am. All the usual attractions on this holiday weekend. Details from the rally co-ordinator **GM4UIB. Tel: (0573) 24654.**

May 6: Dartmoor RC have their rally at St. Annes Church Hall, Yelverton (A386), Devon. Doors open 10.30am. Trade stands, Bring & Buy, refreshments, parking. Talk-in on S22. **Dave G1YPD. Tel: (0752) 703101.**

May 12: Yeovil ARC have their 7th QRP Convention at the Preston Centre, Monks Dale, Yeovil. Doors open at 9am, admission is £1.50 which includes programme. All the usual traders, plenty of food and refreshments available. There will be four lectures during the day. **David Bailey at 7 Thatcham Close, Yeovil BA21 3BS.**

May 12: Royal Naval ARS have their rally at HMS Plymouth, Plantation Quay, Goven Road, Glasgow. Doors open 10.30am, admission £2 adults and £1 children + OAPs. There will be traders, Bring & Buy, displays, lectures, talk-in on S22. Admission allows you to wander around the ship until 9pm. Good family day out. Further deteils from **John Dundaf GM0OPS on 041-959 3385 (answer machine 24hrs).**

May 18: The Swindon Radio Rally is to be held at the Oasis Leisure Centre, North Star Avenue, Swindon, leave M4 at Junction 16. Doors open at 10.30am, trade stands, grand Bring & Buy, Repeater Group, etc, ample free parking. Talk-in by RAYNET on S22 from 0500hrs. For details contact **Jim G7GEA on (0793) 611859 or John on (0793) 619014.**

May 19: Mid-Ulster ARC have their annual 'Parkanaur' rally at the Silvarwood Hotel, Lurgan, Co. Armagh. The rally will be open to the public from 12 noon. There will be the usual trade stands, Bring & Buy, bookstall, QSL bureau, etc. Talk-in on S22, 145.550. The proceeds of this rally will go to the Stanley Eakins Memorial Fund at Parkanaur, nr Dungannon. **Jim Lappin GI1YGS. Tel: (0762) 851179.**

May 26: The Maidstone YMCA ARS are holding their bienniel rally at the YMCA Sportscentre, Maidstone. As usual the rally will feature Trade and Special Interest Groups stends, refreshments and ample free parking. **Alan Judge G0NCW. Tel: Maidstone 750709.**

May 26: Plymouth Radio and Electronics Fair is being held at Plymstock School, Church Road, Plymstock, Plymouth, Devon. Doors open at 11am. Attractions include large Bring & Buy, RSGB bookstall, many trade stalls, RSGB Morse testing and refreshments. Talk-in on S22. **Jan Fisher G0IVZ. Tel: (0752) 340946.**

May 26: The 15th Annual East Suffolk Wireless Revival 1991 is being held at the Maidenhall Sports Centre, Ipswich, Suffolk. Attractions this year include Bring & Buy, car boot sale, radio society book stall, c.w. pile-up competition, vintage radio display, plus non-radio stalls, children's play area and model flying display. Refreshments available, admission is £1, ample car parking. Talk-in on S22. **Iain Moffat G1WCK, 30 Daimler Road, Ipswich, Suffolk IP1 5PQ.**

June 2: The Northampton Radio Club are holding their car boot sale at the rear of the Red Lyon public house, which is on the A45, 400m from Junction 16 for the M1. There will be parking for over 500 cars. The entrance fee with be 50p per car or 25p per person. If you are selling, the fee is £6.50 in advance or £9 on the day. There will be a licensed bar open from 12 noon, there's food all day long as well as a Bring & Buy stand. Any bookings to **Paul G0HWC. Tel: (0327) 41267.**

***June 9**: The RNARS Rally will be held at HMS Mercury, near Petersfield. Gates open between 1000 and 1700. In addition to the dozens of Trade stands and the RNARS tent, there will be a Bring and Buy, a flea market offering tables for hire by the hour, a car boot sale, a large arts & crafts exhibition, radio-controlled power boats, cars and trains to mention but a few of the attractions. **Cliff Harper. Tel: (0703) 557469.**

***June 9**: Elvaston Castle Radio Rally will be held at Elvaston Castle Country Park, Derby. **Peter Neal (0332) 700265.**

June 9: The Norfolk RAYNET rally and car boot sale will be held at Barford, Norfolk. Car boots pitches £5, trade stands, refreshments, etc. Talk-in on S22 by G4GLI. **Pat Bates G0IYD. Tel: (0692) 404593** evenings only.

June 9: The Southend Rally will be held in the Rocheway Centre, Rochford, Essex. Car Boot pitches will be available, either pre-booked or on the day on a first-come-first-served basis. **Stephen Blinkhorn G1XGP. Tel: (0702) 712595 evenings.**

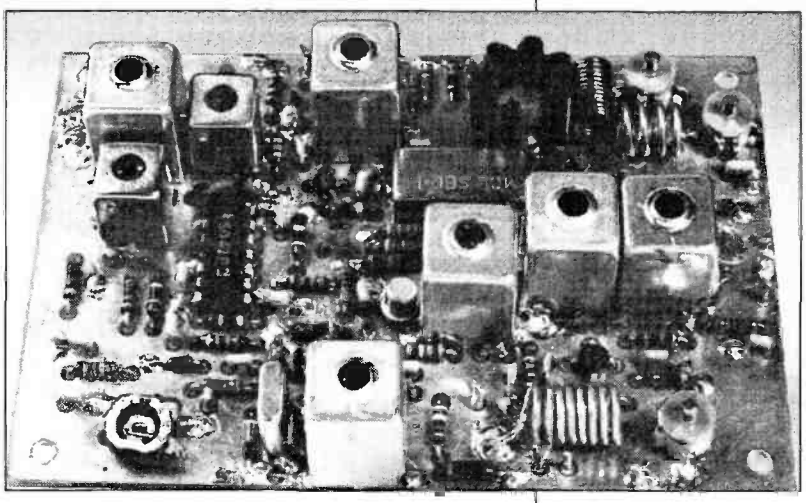
June 9: Mid-Lanerk ARS are holding their annual Open Day at Newarthill C. E. Centre, High Street, Newarthill. There will be the usual traders plus some new ones, a Bring & Buy stall, catering facilities, raffle prizes and a lucky catalogue number. Talk-in on S22. They have applied to hold Morse tests as usual, applications must be made in good time to the relevant department at RSGB HQ. Doors open 11am. Admission/Catalogue is £1. **David Williams GM1SSA, 32/34 Carfin Street, New Stevenson, Motherwell, Scotland ML1 4JL. Tel: (0698) 732403.**

June 16: Denby Dale & District ARS have their Rally at Salendine Nook High School, Huddersfield. Open 11am until 4pm. Same venue as last year. **J. D. Chappell at 221 Huddersfield Road, Shelley, Huddersfield HO8 8LJ.**

Meon-4

A 144-70MHz Transverter

Construction



Andrew Talbot G4JNT wasn't put-off by the statement: 'it is almost impossible to use a 144MHz i.f. to drive a 70MHz transverter'. With carefully calculated design changes, he modified the well established PW *Meon to work equally well on 70MHz.*

When I became interested in 70MHz, I looked at various options to get onto the band. For cost, this meant using a 144MHz transceiver driving a transverter. No commercial equipment was available that could be driven from 144MHz. A survey of available literature showed few published designs, although there were some available with a 28MHz i.f.

The Early Meon

In particular, the 'Meon' transverter(§) looked promising, if it could be adapted for the new drive frequency. This project allowed transmission and reception in the 50MHz band, with a 144MHz transceiver. An investigation into the potential design of equipment, immediately highlighted why few designs were available. This was mainly due to local oscillator (l.o.) breakthrough problems. After trials, I redesigned the original p.c.b. using pre-wound inductors to make the project more reproducible in performance.

Problems Overcome

To produce 70MHz from a drive of 144MHz requires a l.o. of 74MHz (144-70MHz). This is very close to the wanted frequencies of 70-70.5MHz. A filter, such as a Chebyshev or elliptic type with a sharp cut-off, would reduce the unwanted signal to an acceptable level. But, this filter would have many sections and be very difficult to align with simple test equipment. I considered that a rejection of at least 50dB below the wanted output, (50dBc), should be aimed for. There are no other troublesome mixer products, so a complex filter is not needed.

One aid to getting an acceptable answer, is to use a higher l.o. drive frequency. As the 70MHz band is only 500kHz wide, an input frequency of 145.5MHz to 146MHz would allow full coverage. Using this frequency range gives a higher l.o. frequency (75.5MHz). This higher l.o. frequency is appreciably further away from the 70MHz band. A tuned trap filter may be employed to remove a single spot frequency within a band of frequencies. The block diagram in **Fig. 1**, is the final result of the changes.

Filter Design

Design of a filter, incorporating a trap, is a little more complicated than a simple bandpass filter. The reactance of the trap circuit off-resonance may be considerable, and this has to be considered when designing the filter.

Using computer simulation of the filter was the solution adopted. A theoretical design for a two section band-pass filter with trap was created. This computer method, allows a trial and error method of changing each element, without recourse to building each new filter(‡). The graphical results of an acceptable response are shown in **Fig. 2**, the computer generated theoretical response for this network. In practice the l.o. notch will not be as deep as this plot suggests, because of leakage and less than ideal components. Despite this, a notch depth of 40-50dB should be easily attained.

Transverter Design

The circuit in **Fig. 3** is of the main transverter, a power amplifier will be presented later. The transmit chain, based on the 'Meon' circuit, has several changes made and includes the new notch filter components L3/C11. Most coils for the project are ready wound, screened, adjustable inductors. This reduces the number for trimmer capacitors in the design and makes for repeatablity.

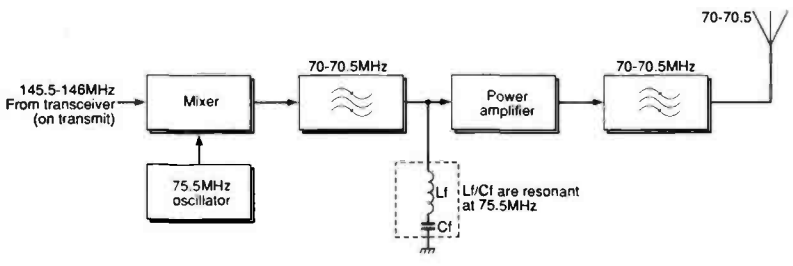


Fig.1: Block diagram of the Meon-4. In general it's almost the same as its predecessor the *'PW Meon'*.

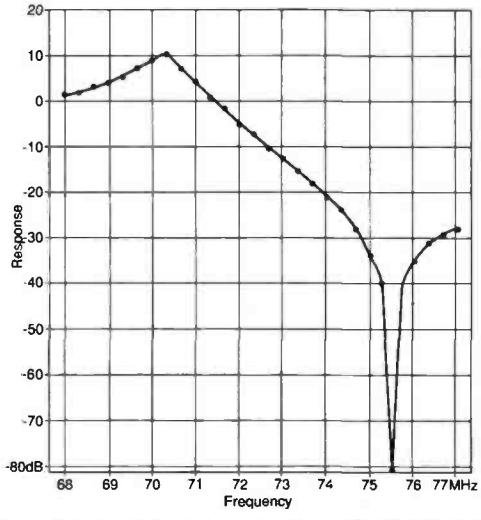


Fig. 2: This is the computer simulated and generated filter frequency response of the Meon-4.

Coil No	Turns	Wire s.w.g.	Coil Former	Remarks
L1	4.5	-	Toko MC120	0.14µH shelded with ferrite core
L2	2.5	-	Toko MC120	0.60µH shelded with ferrite core
L3	8.5	-	Toko S18	0.45µH molded white with ferrite core
L4	7.5	-	Toko S18	0.39µH molded violet with ferrite core tapped two turns up from the drain of Tr1
L5	12	20	5mm dia	self supporting close spaced
L6	4	16	6mm dia	self supporting close spaced
L7	7.5	-	Toko S18	0.39 µH molded violet with ferrite core
L8	7.5	-	Toko S18	0.39µH molded violet with ferrite core tapped at 2 turns from earthy end
L9	8	16	6mm	inside diam tapped 2 turns from earthy end
L10	7.5	-	Toko S18	0.39µH molded violet with ferrite core
L11	7.5	-	Toko S18	0.39µH molded violet with ferrite core tapped at 2 turns from earthy end
L12	2	20	Ferrite	Fair-Rite ferrite bead type No. 24-43002402

Table 1: Inductors for the transverter board.

Local Oscillator

The local oscillator (TR3) employs a series resonant fifth overtone 75.5MHz crystal, running from a stabilised 8.2V rail. The oscillator chosen is a very reliable design. Take care, if you intend using this circuit at other frequencies, or with differing transistor types. The output purity and stability are dependent on just sufficient feedback for reliable starting. At other output frequencies the circuit values have to be changed. Feedback should also be reduced, if the wrong frequency is produced. When this feedback is correct, the circuit jumps in and out of oscillation at the correct frequency on adjusting L7. A buffer amplifier (TR4) follows the oscillator to increase the output to a suitable level for the transmit and receive mixers. This buffer produces about 40mW (+16dBm) of output. The higher level is needed for the transmit chain, but it's reduced by a 'Pi' network to the correct drive level for the receive mixer.

Transmit Chain

A resistor and p.i.n. diode attenuator accurately set the level of the 144MHz transmitted input. It also allows the later option of an automatic level control loop. If this option is not needed, replace the p.i.n. diode with a resistor giving the optimum drive level. The mixer uses a Siemens SO42P active double balanced i.c. device. This provides mixer gain of a few dBs, and has the higher output impedance to drive the filter of L1-3. The trap filter of L3/C11 follows the mixer output and is in the gate of a m.o.s.f.e.t buffer amplifier, TR1. A second transistor, TR2 a 2N3866, following the m.o.s.f.e.t., raises the output to around 300mW at 70MHz at the output port.

Receive Chain

The receive chain is more conventional. A BF981 (TR5) low-noise m.o.s.f.e.t provides around 12dB of gain to feed a two section band-pass filter. A 3dB attenuator pad of R32-34 ensures both correct level, and termination at 50Ω for the double balanced mixer (X1). A similar 5dB pad, R26-28 on the local oscillator port of the mixer, reduces the drive to the optimum of +7dBm for the SBL-1. At the output of the mixer, pins 3/4, termination of the mixer products are in two parts. The image frequency, between 5MHz and 5.5MHz, is separated via a small choke in series with a 47Ω resistor. The desired frequency (145.5MHz) termination is provided by the v.h.f. transceiver.

For a typical 144MHz transceiver no further amplification should be needed. If the receiver has particularly poor sensitivity, a conventional pre-amplifier could be added.

Construction

Printed circuit boards layouts and component placement diagrams for the transverter are shown in **Fig. 4/5.** The transverter p.c.b. is designed to fit across the width of a standard diecast box. This allows room for both the r.f. power amplifier and control circuitry. The transverter is on double-sided printed circuit board with the upper side used as a ground plane. Solder directly to the top layer of the p.c.b. those connections to be made to the negative rail. Do not forget to solder pins 1, 4, 6, 9 and 14 of the SO42P to the ground plane.

Remove the location tabs on each screened Toko coil. These can be spot soldered directly to the p.c.b. ground plane. It is helpful to mount the coils and their cans first. Soldering the screening-cans to the p.c.b. can be tricky with other components in place. Wire

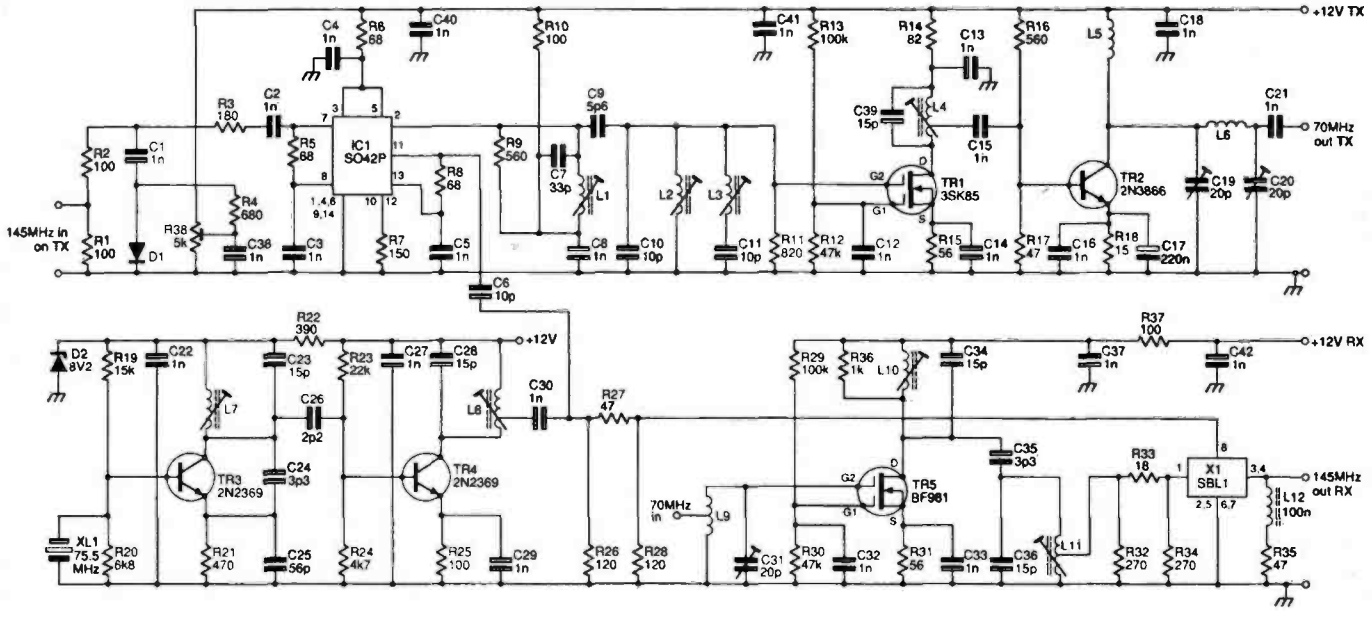


Fig. 3: The transverter circuit diagram.

Fig. 4: The 'earth' plane patterns for the transverter board.

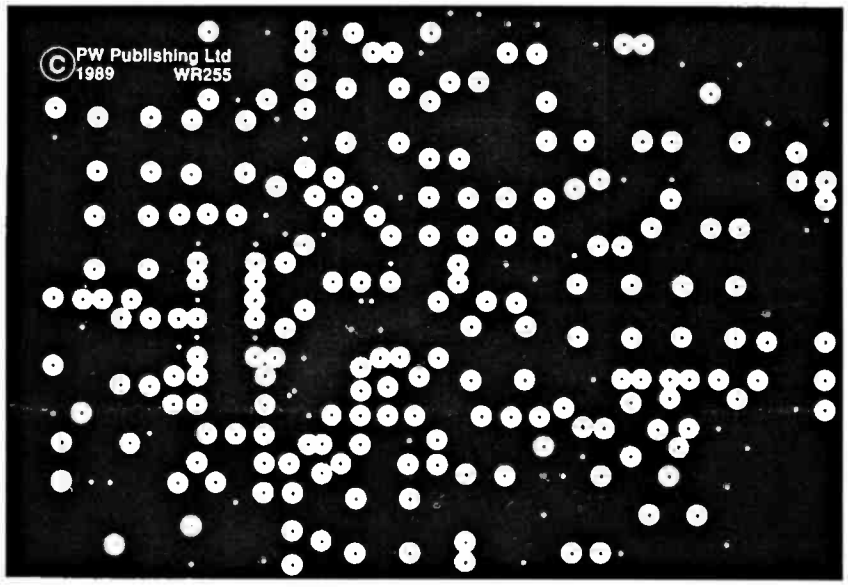
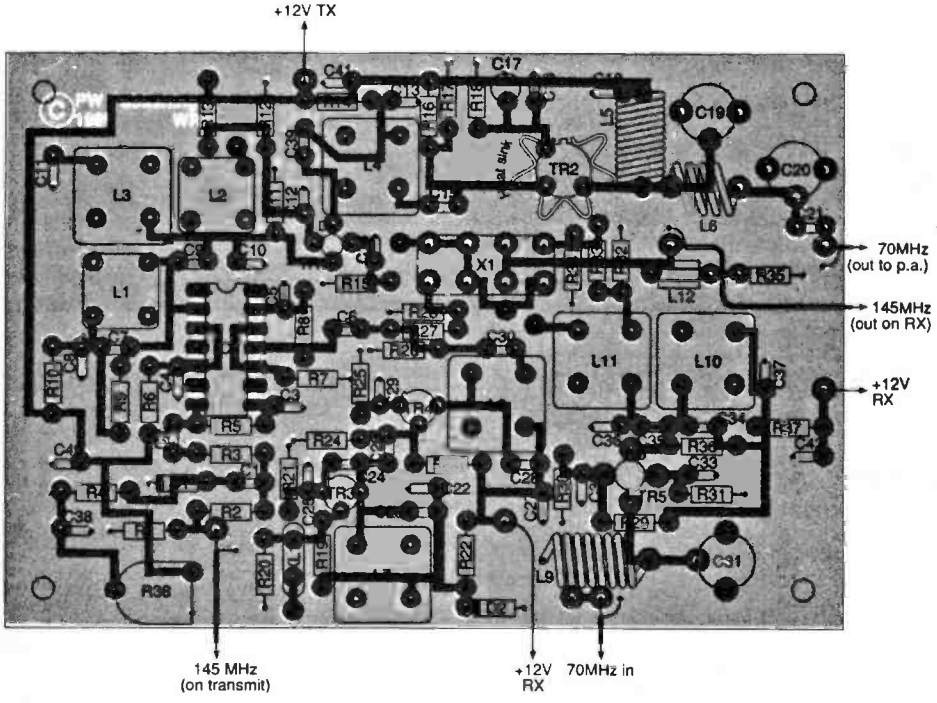
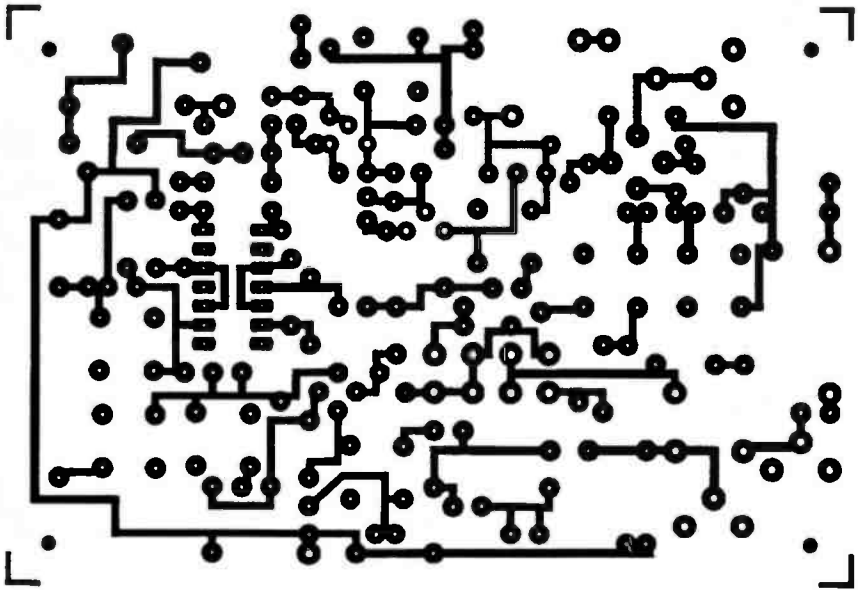


Fig. 5: Full-size component placement overlay for the transverter.



Full-size underboard track layout.



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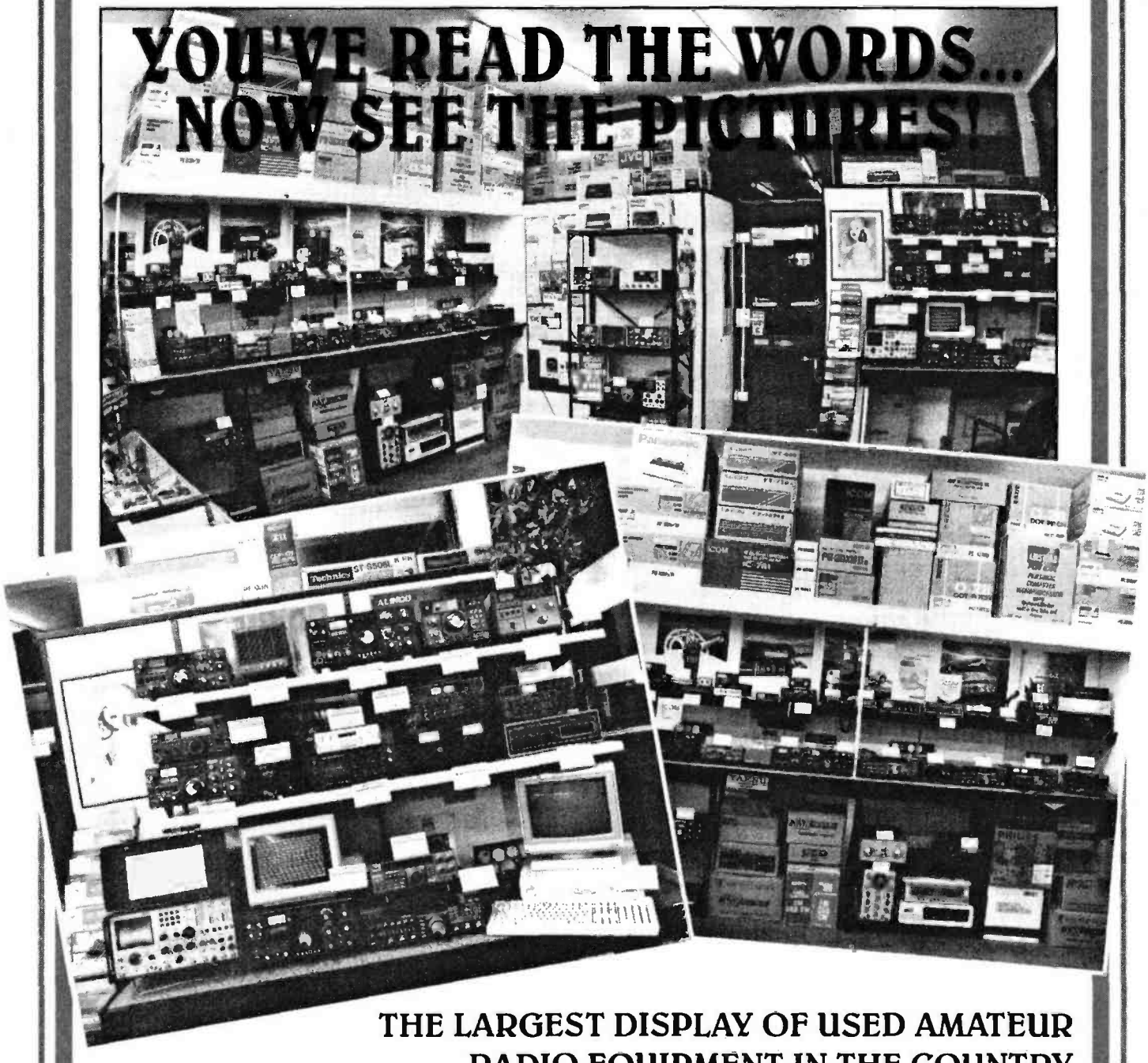

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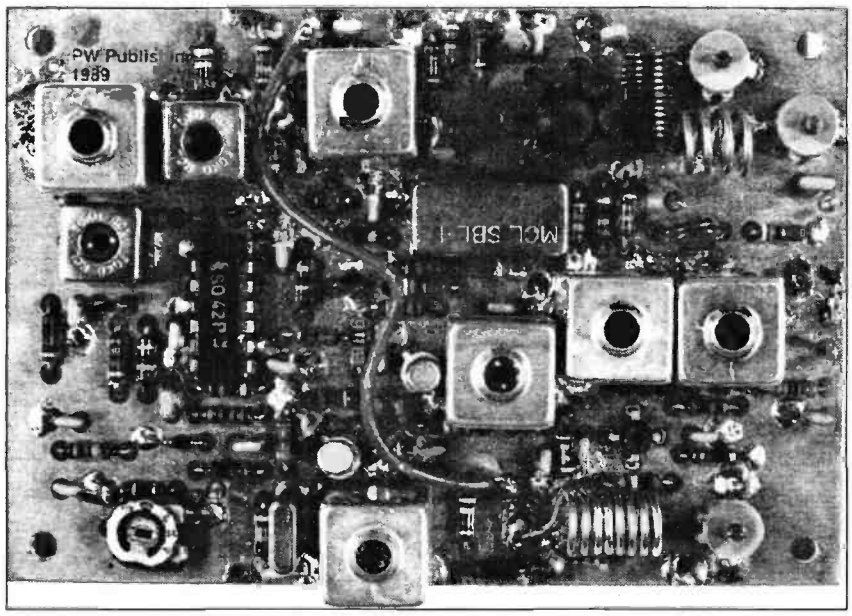

The completed *PW* 'Meon' project.

Further Reading (§)

'The *PW* Meon 50MHz Transverter' by Dave Powis G4HUP & Sam Jewell G4DDK, published in *PW* October 1985.
Diode r.f. probe shown as part of '*PW* Irwell Transceiver' by Rev. George Dobbs G3RJV, published *PW* January-March 1990.

‡ Not really further reading but, programs for circuit analysis on a PC (IBM 'clone'). At professional standard, Number One Systems Ltd. (Harding Way, Somersham Road, St Ives, Cambs.PE17 4WR) have Analyser II. While on the 'Shareware' side, PDSL (Winscombe House, Beacon Rd., Crowborough, Sussex TN6 1UL) have several programs in their catalogue, available for £2.

links, passed through the board, connect the earthy ends of L2 and L11, also pins 2, 5, 6 and 7 of the SBL-1.
Fit the m.o.s.f.e.t.s, by bending their tabs to fit through the holes in the p.c.b. Then orientate them in such a way that the identification number is on the top.

Alignment

Alignment of the main transverter is straightforward, but must be done in the order given. Make a simple power meter, with a 50Ω load resistor and diode detector. The simple r.f. probe as described in *PW* January '90 page 28(§) is a useful starting point. The capacitor charges to the peak r.f. voltage across the 50Ω. Adding the forward diode drop of 0.6V, then squaring the resulting voltage and dividing it by 50Ω gives twice the peak power. The 'r.m.s. power' is half of this figure. This home-made low power meter can give remarkably accurate measurements down to about 7dBm input power (5mW & 0.11V).

Connect the r.f. probe to the output of the oscillator buffer at the junction of R26 and R27, and peak L7 and L8 for maximum l.o. output. The meter should read about 0.6V, corresponding to an output level of some 12dBm (16mW).

To set up the receive chain, connect the antenna to the input. Connect the 145MHz out to a transceiver tuned to 145.7MHz. Inductors L10 and L11 should be adjusted to maximise the noise level at the transceiver audio. This audio level should not change greatly between 145.5-146 MHz. If it does, 'stagger-tune' these inductors slightly to flatten the response. Inductor L9 may be roughly adjusted by peaking for maximum noise. This peaking, is then modified by listening to stations or beacons and adjusting for L9-11 for the best signal-to-noise ratio. The best signal-to-noise ratio is not always at the loudest signal level.

The Buxton beacon GB3BUX in Derbyshire, on 70.05MHz can be heard, even on a simple antenna, in many parts of the country. Beacons provide an ideal tuning signal, but in heavily populated areas many spurious signals can be picked up and used. These are especially noticable in the early evenings and at weekends. Poorly suppressed domestic and industrial equipment noise makes good tuning signals.

That's the transverter side of the 'Meon-4'. The companion 10W power amplifier and the switching circuitry will be described in Part 2.

PW

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18Ω	1	R33
47Ω	3	R17, 27, 35
56Ω	2	R15, 31
68Ω	4	R5, 6, 8
82Ω	1	R14
100Ω	4	R1, 2, 10, 25, 37
120Ω	2	R26, 28
150Ω	1	R7
180Ω	1	R3
270Ω	2	R32, 34
390Ω	1	R22
470Ω	1	R21
560Ω	2	R9, 16
680Ω	1	R4
820Ω	1	R11
1kΩ	1	R36
4.7kΩ	1	R24
6.8kΩ	1	R20
15kΩ	1	R19
22kΩ	1	R23
47kΩ	2	R12, 30
100kΩ	2	R13, 29

Horizontal Skeleton Preset

5kΩ	1	R38

Capacitors
Miniature Plate Ceramic

2.2pF	1	C26
3.3pF	2	C24, 35
5.6pF	1	C9
10pF	3	C6, 10, 11
15pF	5	C23, 28, 34, 36, 39
33pF	1	C7
56pF	1	C25
1nF	24	C1-5, 8, 12-16, 18, 21, 22, 27, 29, 30, 32, 33, 37, 38, 40-42

Miniature Film Trimmers

2-22pF	3	C19, 20, 31

Tantalum Bead 35V

0.22µF	1	C17

Semiconductors
Diodes

BA379	1	D1
BZY88C 8V2	1	D2

Transistors

BF981	1	TR5
2N2369	2	TR3, 4
2N3866	1	TR2
3SK85	1	TR1

Integrated Circuits

SO42P	1	IC1

Miscellaneous
X1 SBL-1 double balanced mixer, XL1 (75.5MHz) HC18/U 5th overtone crystal (1); circuit-board pins; inductors (see Table 1); die-cast enclosure (Electromail 509-254) (2); p.c.b.

(1) £8.40 (inc. p&p) from
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Tel: (0460) 73718

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REVIEW

Icom IC-970E

Multi-band VHF and UHF Transceiver

Multi-band v.h.f. transceivers have been developing ever more features in recent years. The IC-970E is the latest offering from Icom and Mike Richards G4WNC took the opportunity to try it out.

The IC-970E is the latest multi-band, multi-mode transceiver to be introduced by Icom. In fact, the review model was the first one in the country.

In standard trim it comes equipped for full duplex operation on the 144 and 432MHz bands. However, this can easily be extended to give transceive coverage of the 1296MHz band plus receive only on 50 through to 905MHz.

The wide range of features make the IC-970E an extremely powerful transceiver that should meet the needs of today's most demanding amateurs. So I took a closer look to see just how it shapes up in practice.

First Steps

I must admit the IC-970E certainly looks impressive and is, in fact, a large and heavy transceiver. A contributory factor to this was the optional built-in a.c. power supply fitted to the review model. The standard model requires an external 13.8V 10A power supply.

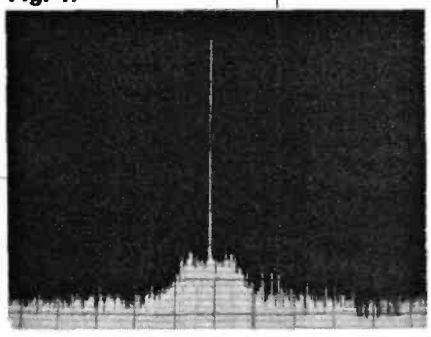
The antenna connections were all made via the rear panel and good quality sockets were used throughout. The N-type connectors were used for all antenna sockets, except 144MHz where a SO-239 type was used.

The key jack provided was a 6.3mm stereo type, enabling connection of either paddles or a straight key. However, the iambic keyer is not included in the standard model, it's an optional extra.

There was also a standard 3.5mm external speaker jack that disabled the internal speaker when a jack was inserted. An additional feature here was that you could choose to split the main and sub-band audio signals.

This meant that, for example, you can direct 144MHz signals to the internal speaker while 430MHz signals use the external speaker. Besides these basic connections, there were a few others that gave access to some more advanced features of the IC-970E.

Fig. 1.



The first of these is the CI-V socket that enables computer control of the IC-970E. Before this can be used, an optional CT-17 level converter is required.

Just to ensure that you buy the Icom version, the details of the command language are in the CT-17 manual! One of the particular advantages of this computer control system, is that up to four transceivers or receivers can be connected to one computer. This provision has great potential for total control of the station by computer.

The two remaining sockets were for the connection of external equipment such as Packet TNCs or other specialist equipment. Facilities provided included squelch, modulator, detector output, 13.8V d.c. at 1A and an a.l.c. input.

Good Manual

With all modern and sophisticated transceivers, a good manual is essential to get the best from the rig. The manual supplied with the IC-970E is a very well presented 47-page, A4 sized, book.

The manual uses many diagrams and some clever indexing. One very clever idea is the use of a picture of the front panel, marked into sections with the relevant page number associated with each section.

For people like myself who are impatient, the first few pages contained simple explanations of each control function. This provided enough information for the experienced operator to get on the air quickly.

The main core of the manual covered the operation in great detail with clear step-by-step instructions. The final sections of the book gave details of the fitting of the optional modules and some useful adjustment and maintenance details.

Logical Operation

Although the front panel of the IC-970E was extremely busy, the layout was in fact very logical and easy to use. The most obvious feature was the liquid crystal display unit.

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The display unit was used to convey most of the operational information from frequency and mode, right through to a signal strength scale for the sub-band. An important point with l.c.d. units is the illumination system used. The IC-970E handled this very well with a permanent back-light system. The brightness of the display could be varied by a small pre-set control, accessed from underneath the rig.

As the IC-970E is a multi-band unit, the user needs to be able to tune both of the active bands. The technique used is to define the two bands as main and sub bands. The main band is then tuned using a useful range of features, while the sub band could be tuned by the small **Sub Dial/RIT** control on the front panel. The main band frequency selection methods are very versatile and included manual, direct entry, scanning and memories. Of these procedures, the manual method, using the large knob on the front panel, is perhaps the most used. In common with all synthesised transceivers, the tuning is actually in steps rather than being continuous.

The tuning steps were fixed at 10Hz for s.s.b and c.w. but could be set at one of six rates between 5 and 100kHz for f.m. A useful extra is the ability to quickly select 1kHz or 1MHz steps for rapid tuning.

Another unusual, but useful, feature is the ability to switch the mechanical click-steps of the tuning knob. This facility is activated by a button on the front panel. The main use for this is on f.m. where channelisation makes continuous tuning inappropriate.

The facility is further enhanced by a pre-set option which automatically disabled the click-steps when the transceiver is set to modes requiring tuning steps of less than 5kHz. This meant that when switching between s.s.b. and f.m. modes, the click-steps were automatically switched in and out.

Keypad Entry

Direct frequency entry is also provided via the keypad on the front panel. The implementation is very straightforward and simple to use.

Included with this facility is an automatic trailing zero entry. This means that when the operator is entering 145.000MHz on the keypad, all that they've got to do is type in 145. The software does the rest!

All these features are supplemented by the provision of dual v.f.o.s on both the main and sub bands. The dual v.f.o.s can also be set-up to enable split frequency operation, i.e. transmitting and receiving on different frequencies in the same band.

User Memories

No self-respecting, microprocessor-controlled rig would be complete without provision for memory operation. It's no surprise to find that the IC-970E is equipped with a comprehensive set of memories.

Each band is provided with 99 main memories and two scan edge memories. Selection of the memory channels is very simple with two methods provided.

The first method uses the memory channel control on the front panel. This is a simple click control that increments or decrements the memory number.

However, if you want to tune directly to a specific memory, the memory number can be entered directly in much the same way as direct frequency entry. The only difference is that the **Function** key has to be pressed first.

Storing information in the memories is equally simple, all the operator has to do is select the appropriate memory and press the **Memory Write** button. This process automatically transfers the dial frequency into the selected memory.

Besides being able to store and retrieve frequencies from memory, it's also possible to use the memories as the basis for several scan modes.

Scanning Options

The IC-970E is provided with a very good range of scanning options that should help the user get the best from the rig. Besides the basic provision of being able to scan the memories of the main band, it's also possible to scan the sub-band and 1200MHz module (if fitted).

An internal switch determines the action taken by the receiver when it detects a carrier. There are two options available. The receiver can either abandon the scan or pause for ten seconds.

Although pretty basic in scanning terms, these options should prove adequate for most operators. In addition to the basic scanning there's also a very useful **Mode Scan**.

Operating this control sets the IC-970E scanning all memories with a common mode, the required mode being chosen and set by the operator in advance. This facility could be used to great effect for keeping an eye on favourite f.m. channels, without having to wade through the s.s.b. frequencies.

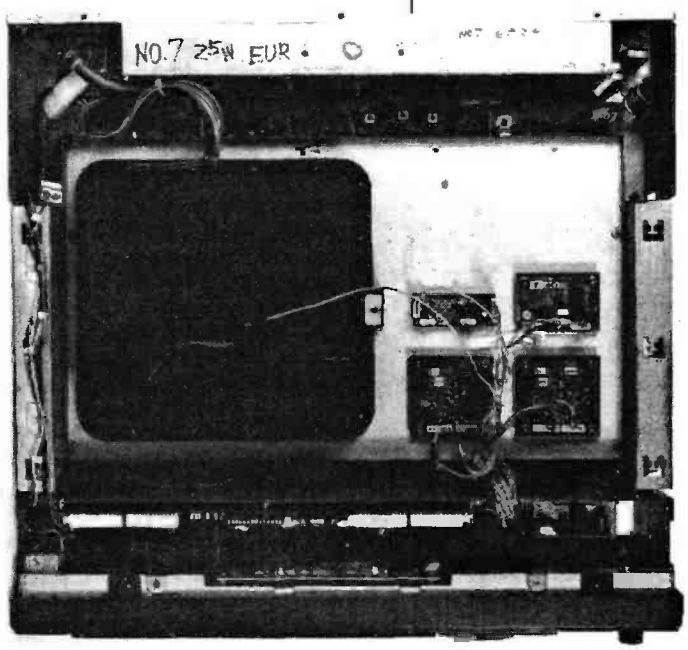
Programme Scan

The final scan mode is called **Programme Scan** and this is similar to the search facility provided on many more conventional scanners. In this mode, the IC-970E searched between two user-set frequencies in any one band. The search was continuous in that there is a flyback (roll-round) to the start of the search at the end of each sweep.

One useful extra is the provision of a feature that Icom has named the **Call** facility. This was in fact three additional memories, one for each band plus one universal.

Each of these memories could store both frequency and mode just like the normal memories. The difference is that they are accessed simply by pressing the **Call 1** or **Call 2** buttons on the front panel.

The obvious use of these buttons is for the storage of favourite calling channels. You could then use the main v.f.o. to select a suitable working frequency and



The intensive use of surface mount technology means that there is a lot of gear in a relatively small space.

REVIEW

use the **Call** memory to put out a CQ. When you receive a reply you can very quickly switch to the operating frequency.

Satellite Operation

The IC-970E is highly likely to be bought by those who have an interest in this fascinating area of amateur radio satellite operation. Icom have made sure that satellite users will not be disappointed, by including a host of useful features.

In its standard form, the IC-970E is ideal for Mode B 432MHz/144MHz operation. The addition of the optional 1200MHz unit enables full Mode L operation as well.

One of the features of satellite operation is the split frequency modes and this can present problems to conventional tuning systems. The IC-970E is very well equipped with options to cover just about every eventuality.

The first special facility is the provision of ten additional memories that can store the up and downlink frequencies plus the mode. This is a great starting point and makes the switching of modes very quick and easy.

Keeping Track

One of the problems created by using different up and downlink frequencies is that of tracking. The Icom has solved this difficulty by the provision of linked tracking between the main and sub bands. This tracking copes with all eventualities as it can be set for both normal and reverse tracking.

Paging Friends

The IC-970E is fitted with a few interesting features that could prove particularly useful for f.m. operators. The two main features are the pager and code squelch.

In simple terms, the pager lets you contact either an individual or a group of friends monitoring an agreed frequency. This is achieved using an identity code comprising seven dual-tone multiple frequency (d.t.m.f.) tones.

The system is rather ingenious and should prove particularly useful to those living in heavily populated areas. The code squelch is a simpler form of the pager system that only uses three d.t.m.f. tones.

When using this system, all users in the group use the same code and so will be able hear only stations using that code. The only worry I have is that the system encourages operators to transmit, without first listening to see if the frequency is clear.

Receiver Features

The IC-970E receiver is very well thought out and includes many facilities often only found on h.f. receivers. The provision of a very effective notch filter was one such feature.

The filter has a range of ±1.5kHz with a useful notch depth of 25dB. There's also provision to switch between slow and fast a.g.c. time constants.

Although pulse interference is not normally too much of a problem on v.h.f. and u.h.f., the IC-970E also has a pre-set threshold noise blanker.

On the audio side, the single internal speaker is used to handle the output from all the fitted modules. However, by operating a front panel push button the audio could be split with the main band using the internal speaker and the sub band using the external speaker (if plugged in). There was also provision to adjust the audio quality via a simple rotary tone control.

Transmitting Features

The c.w. operator is very well provided for, with the option of an internal iambic keyer as one of the many advanced features. This keyer can be enabled and adjusted from the front panel, making operation very easy. The operator can also adjust the sidetone volume and break-in delay, which again is very useful.

For the 'phone operator there's a built-in speech processor with a variable compression level. This provides the operator with the flexibility to match the compression to the prevailing band conditions.

Output levels and the fine control have not been forgotten either! The adjustable r.f. power could be set over the range 3.5 to 25W on all operating modes.

Acid Test

A look through the operational features indicates that the IC-970E has been designed as a top flight transceiver. However, the acid test comes with the assessment of its performance in the lab and on the air.

Before carrying out the lab tests, I installed the IC-970E in my shack so that I could get accustomed to the operational features. I found all the controls to be very well laid-out with no awkwardly placed knobs or buttons.

Despite its obvious complexity, I found I was able to get to grips with most of the features without having to refer to the manual. The only exception to this was when I used the memories.

Sensitive Receiver

My first impression when I tuned around the bands was that this was a very sensitive receiver indeed. Stations that were barely readable on my equipment were lifted out of the noise by the IC-970E.

I was also pleased to see that it was equally at home operating in the presence of very strong local signals. The next stage was to try a few CQ calls and get comments on the transmission quality.

When using the transceiver I received good reports from all the stations I spoke to. This story was repeated through all the modes and bands. As the review model was fitted with the optional UX-R96 receiver, I was interested to see how it performed on p.m.r. and commercial broadcast station frequencies.

As expected, the n.b.f.m. performance of the IC-970E was comparable to that on the amateur bands. The airbands were tried next as they are very popular among listeners. The audio quality on these frequencies was again very good, well up to the standards of the best a.m. communications equipment.

Moving on to broadcast w.b.f.m. transmissions, the recovered audio quality, although good, was spoilt by the small internal speaker. Any operators seriously wanting to use the Icom for broadcast signals would be well advised to use a good quality external speaker.

The IC-970E has well laid-out controls.

Lab Testing

After such a good on-air performance I decided it was time to move into the lab and see just how the IC-970E shaped-up. My first measurements covered the receive sensitivity, where I prefer to use the 12dB SINAD measurement instead of the 10dB signal-to-noise measurements quoted by many manufacturers. I also use e.m.f./2 to define the input voltage level.

When measuring the IC-970E, I found myself making double checks of the test equipment as the results seemed too good to be true. The best sensitivity was obtained when the rig was switched to s.s.b. reception, resulting in a figure of 0.07μV for 12dB SINAD.

My test results represents -130dBm, which is quite remarkable and rivals the performance obtained from specially modified contest rigs. This level of performance also says a lot for the quality of the filtering employed.

Another remarkable feature was the consistency of the sensitivity, as it remained constant throughout the 144 and 432MHz bands. The f.m. performance was equally good with measured results of 0.13 and 0.14μV for 432 and 144MHz respectively.

The general coverage receiver was not quite up to the same levels of performance, but nevertheless was very good. The n.b.f.m. sensitivity varied from 0.16μV at 60MHz through to 0.44μV at 904MHz, the tail-off being gradual.

The w.b.f.m. performance followed a similar line, ranging from 0.56 through to 2.22μV at 905MHz. Finally, the a.m. sensitivity was measured at 0.29μV at 60MHz and 1.04μV at 905MHz.

This was a very fine performance in terms of sensitivity, but does not tell the whole story. One measurement that's extremely important is the third order intercept.

The third order intercept measurement gives an indication of how the receiver will cope with strong adjacent channel signals. It's quite common for receivers with high sensitivities to show up badly on the intercept test.

The IC-970E sailed through the intercept test with an incredible calculated intercept point of +8dBm. Considering the remarkable sensitivity, this is an excellent performance that makes the IC-970E a force to be reckoned with. The receive tests continued in many areas with the object of checking the performance against specification, and they were all successful.

Transmitter Testing

The transmit section was next to come under the microscope. The tests started with a simple power measurement that showed that the IC-970E equalled its specification in all modes.

Analysis of the purity of the transmit signals was carried out with the aid of a spectrum analyser. Spurious output was very low indeed, being better than -60dB on all bands.

The carrier rejection at better than -50dB, was also very good. To illustrate the purity of the output I've included a photo of the spectrum analyser screen in **Fig. 1**. In this test the Icom was delivering 25W into a dummy load at 432MHz.

As you can see from the range of tests carried out, the IC-970E is a superb transceiver.

Specification

Frequency range	144 - 146MHz 430 - 440MHz
Tuning steps	10Hz on s.s.b./c.w. 5, 10, 12.5, 20, 25 or 100kHz on f.m. All mode 1kHz/1MHz
Modes	A3J (s.s.b.), F3 (f.m.), A1 (c.w.)
Power supply	13.8V ±15%
Current drain	Receiver 2.5A, transmitter 9.0A
Antenna impedance	50Ω
Frequency stability	±3p.p.m.
Transmitter	
Output power	3.5 to 25W all modes
Spurious emissions	>60dB below peak output
Carrier suppression	>40dB below peak output
Unwanted sideband	>40dB below peak output
Receiver	
Sensitivity	s.s.b/c.w. <0.11μV for 10dB S/N f.m. < 0.18μV for 12dB SINAD
Squelch sensitivity	s.s.b./c.w. < 0.56μV f.m. < 0.18μV
Selectivity	s.s.b./c.w.2.3kHz/-6dB, 4.2kHz/-60dB f.m.15kHz/-6dB, 30kHz/-60dB
Audio output	1.5W/8Ω at 10% distortion
RIT range	±9.99kHz
Notch filter	±1.2kHz/25dB
Dimensions	425mm x 149mm x 406mm
Weight	14.5kg

REVIEW

Summary

Quite honestly I've found it difficult to make any real criticism of this excellent transceiver. It's certainly big, but this level of excellence cannot be achieved in a small space!

The price, although high, is not unrealistic for a transceiver that can boast such a fine performance. Anyone with a serious interest in satellite operation will find that the IC-970E has all they need, except for high transmit power.

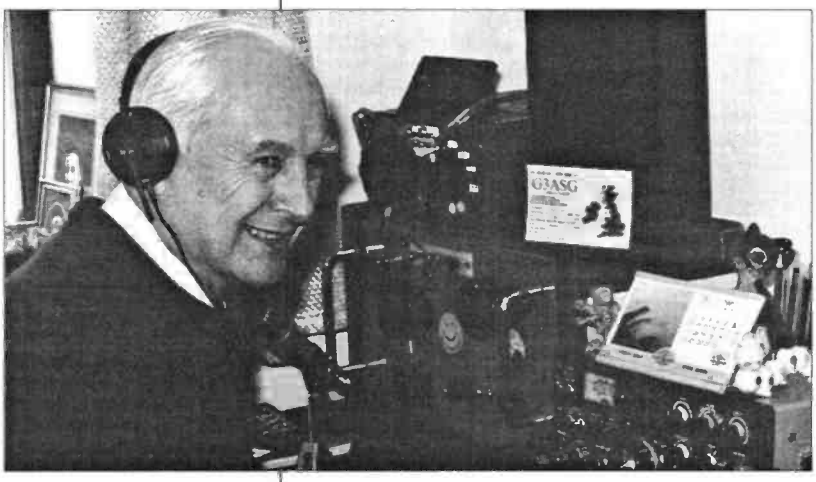
I'm sure this transceiver will also find favour with contest operators. The basic performance is well up to the standard achieved by specially modified contest equipment.

Overall then, a truly superb transceiver that will, I'm sure, become a classic in time.

The IC-970E costs £1995.00 and the optional general coverage receive unit costs £275.00. An optional unit is available to cover the 1296MHz band. The IC-970E can be obtained from Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 363859 who I thank for the loan of the review transceiver.

Theory

Mathematics for the RAE



In the third part of this series Ray Fautley G3ASG turns his hand to the manipulation of decimal numbers.

Before we carry on with this section, I think I'll put you out of your misery. The answers to last month's problems are shown here:

(a) $1\frac{11}{35}$ (b) $1\frac{11}{12}$ (c) $1\frac{5}{6}$

(d) $\frac{11}{16}$ (e) $-\frac{1}{6}$ (f) $\frac{17}{20}$

(g) $\frac{1}{2}$ (h) $\frac{3}{16}$ (i) $\frac{1}{2}$

(J) 0.5 (k) 0.125 (l) 0.625

(m) 0.75 (n) 1.625 or 1.875

(o) 0.33333333333333333333333333333333·

There were two deliberate surprises for you in that 'exam'. Answer (e) gave a negative number. This is like an 'Overdraft' at the bank, and I will deal more fully with what it means later in the series. Question (n) had two answers, as it was possible to see two questions. If you read 'one and five eighths', then the first answer is correct. Should you have read it as 'fifteen eighths' (one and seven eighths), then the second answer is the one you should have had. Answer (o), however has no exact answer, as it is a never-ending series of '3s'. The '·' behind the last '3' means 'without end'. Recurring is the mathematical name given to results of this nature. This is said as, 'nought point three recurring'.

Did you have a hundred percent correct? I hope so.

If you had any problems with the questions, then send a (long type) s.a.e. to the editorial offices. We will send a copy of the solutions back to you. Please quote 'April Maths Problems' on one corner of the your covering letter.

This last example highlights one problem that may happen, and that is of accuracy. **Fractions are always accurate**, no matter how complex. Decimals **may be only a close approximation.** Accuracy problems occurs in other cases, such as with 1/6 or 1/7 or 1/9.

Multiply Decimally

We turn now to the multiplication of decimal numbers. This is more difficult, the decimal point has got to go somewhere in the answer, but where?

Let's try to multiply 3.56 x 2.81

Rules for Multiplication of Decimal Numbers:

(i) Write down as if they were 356 and 281, **Completely Ingnoring** the decimal points in the two numbers, and then use the multiplication method.

```
  356
  281
  356
28480
71200
100036
```

(ii) Count how many digits there are **after** the decimal point in each number of the multiplication.

3.56 has 2 digits **after** the decimal point

2.81 has 2 digits **after** the decimal point

(iii) Add the totals counted in (ii) together:

2 + 2 = 4

(iv) This total of four is the number of digits AFTER the decimal point in the answer found in (i) which was 100036.

(v) Starting at the right-hand side of our number 100036 (just to the right of the '6') count four places to the left and that's where the decimal point goes:

10.0036

The answer then, is 10.0036 which wasn't too difficult was it?

Now we'll have just one more example of multiplication.

Multiply 0.0376 x 25.1.

Using the rules,

```
  376
  251
  376
 1880
75200
94376
```

There is a total of five digits **after** the decimal points in the two numbers to be multiplied together so the answer is:

0.94376

The '0' in front of the decimal point indicates that there is no whole number in the answer, i.e. the answer is a decimal fraction.

Decimal Division

(i) Change **BOTH** numbers to **WHOLE** numbers by multiplying **BOTH** numbers first by 10, then by 100 or by 1000 etc, until **BOTH** numbers are **WHOLE** numbers:

Divide 23.0967 by 3.5 the result to be to 3 decimal places. That means there must be three digits AFTER the decimal point in the answer.

Multiplying **both** numbers by 10 gives us:

23.0967 x 10 = 230.967 not a whole number

3.5 x 10 = 35. which is a whole number

The decimal point after '35' has been put in to remind you that 35 is a whole number.

Multiplying **both** numbers again by 10:

230.967 x 10 = 2309.67 still not a whole number.

35 x 10 =350. a bigger whole number.

Multiplying **both** numbers again by 10:

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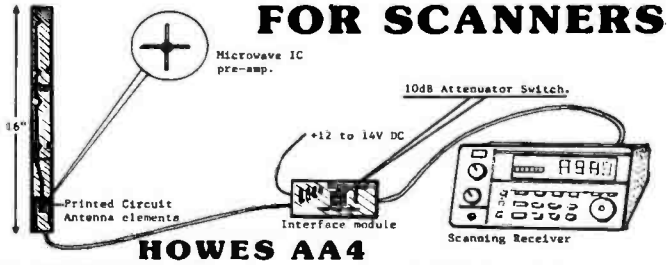
ACTIVE ANTENNA FOR SCANNERS



HOWES AA4

The **HOWES AA4** Active Antenna gives full coverage from 25 to 1300MHz. It is designed to be the ideal solution for those requiring a compact, broadband antenna for use with scanning receivers. The AA4 features advanced technology with a low noise microwave IC amplifier.

- ★ Fully broad-band covering 25 to 1300MHz.
- ★ Low noise microwave IC (NF <3dB). Over 15dB gain. IP3 +15dBm.
- ★ Coax powering 12 to 14V DC at less than 20mA.
- ★ 10dB switched attenuator on the receiver interface board.
- ★ 16 inches long, 1.2 inches wide. Easy to build kit or ready built modules.

If your scanner reception could benefit from the addition of a remotely located antenna, or you would like a much neater, more compact alternative to the ugly discone types, then the **HOWES AA4** could be just the job! You can read the review in the November '90 Short Wave Magazine. Excellent performance in a small space!

AA4 Kit: £18.80 **Assembled PCB modules: £24.90**

AA2 ACTIVE ANTENNA for 150kHz to 30MHz

The **HOWES AA2** is the active antenna to use for general coverage HF reception. Broad-band performance that does not tail off at the higher frequencies. The neat, compact answer for those with limited space, holiday use, mobile operation etc. Two selectable gain settings, local or coax powering (12 to 14V). IP3 +38dBm. Easy to build and much liked by customers!

AA2 Kit: £7.50 **Assembled PCB: £11.50**

HF SSB and CW RECEIVERS

Our range of simple, but very effective receivers opens up the world of long distance radio communications for a very modest outlay. Most of the kits listed below are designated for use on various amateur bands. Give us a ring to discuss your requirements for frequencies not shown here.

The kits contain the electronics to build the receivers. "Hardware packages" contain the mechanical items (case, dial, knobs, sockets etc) to go with the "works" supplied in the basic kit. In addition, all our amateur band receivers have **matching transmitters** to suit the **Novice** and full amateur licence. These can be combined with other kits to form complete transceiver projects.

SSB/CW RECEIVERS		Kit	Assembled PCB
DXR10	3 Band (10,12 & 15M) for DX amateur work	£24.90	£36.90
DcRx54	4.45MHz Aircraft band (rescue etc)	£15.60	£21.50
DcRx20, 40 or 80M	Single band amateur receivers.	£15.60	£21.50

DXR10 Hardware package: **£14.00** **DcRx Hardare** package: **£15.50**

RECEIVER ACCESSORIES			
CBA2	Buffer to enable use of DFD5 counter	£5.80	£8.90
CSL4	Sharp, dual bandwidth (SSB & CW) filter	£9.90	£15.90
DCS2	"S Meter" kit for above receivers	£8.90	£12.90
DFD5	Digital frequency counter/display	£39.90	£59.90
XM1	Crystal Calibrator, 8 marker frequencies	£16.80	£21.90

CV100 - ADD SHORTWAVE TO YOUR SCANNER!

This kit converts 1 to 40MHz up to 101 to 140MHz so you can tune these frequencies with a normal VHF scanner. No mods to the radio are needed.

CV100 kit: £25.90 **Assembled PCBs: £35.90**

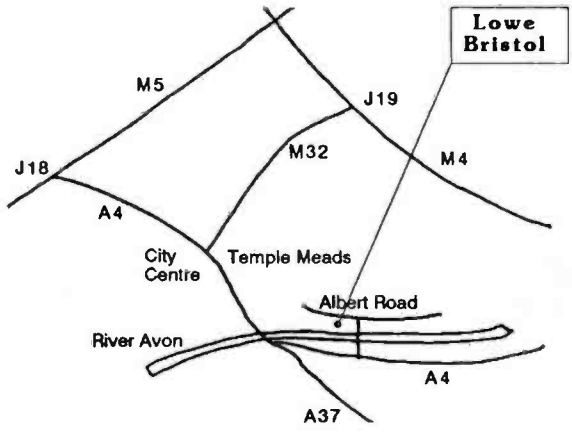
PLEASE ADD £1.20 P&P to your total order value.

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.

73 from Dave G4KQH, Technical Manager.

LOWE DOCKS AT BRISTOL

In addition to Heathrow, we have now opened our latest centre in Bristol to serve the South West.
Similar to Heathrow, we are stocking a full range of communications equipment from transceivers, both commercial and amateur, to a large selection of VHF scanners and HF communications receivers.
There are full demonstration facilities in the showroom plus a fully equipped workshop to take care of any first line servicing problems on the spot.
Like all our branches, there is a selection of fully tested and guaranteed second hand equipment for you to choose from.
The new centre is being managed initially by Dave, G6CXA, but we are looking for a full time manager, so we will welcome approaches from anyone who is interested in turning their hobby into a full time job.



TS-850S

HOW TO FIND US

The new Lowe Communications Centre at Bristol is just over the Totterdown bridge from the main A4 Bath road in St Philips. From the traffic lights on the A4, go across the bridge and turn immediately left at the 'T' junction. You will see the centre on the left in front of the river. Turn first left and park anywhere in front of it. Parking is free as you would expect at one of our shops. We are just 10 minutes from the end of the M32 motorway and a short walk from Temple Meads station.

LOWE ELECTRONICS LTD

Bristol: Unit 6, Ferry Steps Industrial Estate, Albert Road, St Philips, Bristol BS2 0XW. Tel: 0272 771770
Heathrow: 6 Cherwell Close, Langley Slough, Berks SL3 8XB. Tel: 0753 45255

2309.67 x 10 = 23096.7 still not a whole number.
350 x 10 = 3500. an even bigger whole number.
Multiplying **both** numbers again by 10:
23096.7 x 10 = 230967 at last, a whole number.
3500 x 10 = 35000. quite a big whole number.
(ii) If you can do 'long division', all that is necessary to do is to divide 230967 by 35000:
(iii) Where does the decimal point go in the answer? As 230967 is a whole number it can be written as: 230967.000 (Three '0s' as we require the answer to 3 decimal places).
So we can write the long division sum like this:

```
          6. 599
3500 ) 280967. 000
       210000
        20967 0
        17500 0
         3467 00
         3150 00
          317 000
          315 000
            2 000
```

That's taken it far enough, for we have reached three decimal places. The answer is 6.599 to three decimal places.

Now as a form of 'homework' work out the following as an exercise. There are also one or two from previous issues. You should work them out yourself using the methods I've shown you. No **cheating with a calculator**
Tick the answer you think is the correct one from the four alternatives. The correct answers will appear in the next article.

(i) The decimal equivalent of $^1/_5$ is:?
a) 0.5 b) 0.25
c) 0.2 d) 0.3

(ii) The decimal equivalent of $8^1/_4$ is:?
a) 8.6 b) 8.35
c) 8.45 d) 8.25

(iii) The decimal equivalent of $5^3/_5$ is:?
a) 5.3 b) 5.6
c) 5.75 d) 5.65

(iv) The decimal equivalent of $11^1/_8$ is:?
a) 11.125 b) 11.85
c) 11.185 d) 11.825

(v) 45.08 + 0.075 =?
a) 45.15 b) 45.83
c) 45.155 d) 45.875

(vi) 5.006 - 0.45=?
a) 4.556 b) 4.61
c) 5.015 d) 4.961

(vii) 350.685 - 19.012 =?
a) 330.673 b) 331 565
c) 348.7838 d) 331.673

(viii) 25.76 x 1.007 =?
a) 259.4032 b) 25.94032
c) 2.594032 d) 25.77803

(ix) 0.0087 x 0.093 =?
a) 0.08091 b) 0.008091
c) 0.00008091 d) 0.0008091

(x) 45.9 / 5.6 =?
(answer to 4 decimal places)
a) 8.1960 b) 8.0190
c) 0.8196 d) 8.1964

(xi) 4.771/0.085 =?
(answer to be to 3 decimal places)
a) 56.129 b) 5.612
c) 560.129 d) 56.001

That's all for this month. Remember, ***keep busy and practice.***

Theory

Getting Started - The Practical Way

In the third part of his series for the radio newcomer, George Dobbs G3RJV looks at diodes, relays and saving your equipment from damage if you connect it incorrectly to a power supply.

I suppose that diodes could be called the definitive radio component. The first radio sets were crystal sets and the crystals can be considered as diode detectors.

For those of you who really want to try the most basic piece of radio technology, it's possible to make a simple radio receiver from just a diode and a high impedance headphone.

Connect the diode across the headphone terminals and join an antenna lead to one side and you should hear the loudest radio signal, or signals, in your area. It's even possible to go simpler than this!

You can make the diode from a piece of coke (the variant of coal - not the drink!), some types of old razor blade or some types of natural crystal. That's why the instructions for making the so-called 'fox-hole receivers' of World War II began: ".... creep up to a tank and steal a pair of headphones". Everything else could be made from alternative materials.

Simple Device

The diode is a simple device with two connections. 'Di' actually means two, twice or double. The two connections to the diode are called the **cathode** and the **anode**.

The circuit symbol for a diode is shown in **Fig. 3.1**, below the typical example of a small diode. Notice that the cathode is marked with a stripe around the body of the diode. Getting the diode the right way round in a circuit, the correct **polarity**, is not only essential but is the key to way they work.

The operation and structure of the diode is outside the scope of this practical article, but many textbooks give a simple explanation of its structure and workings. For the moment, we're going to regard the diode as a rectifier and a one-way switch. This will enable us to build up a simple, but very useful, circuit.

For our practical purposes, we can say that the diode only allows an electrical current to pass one way. In fact, that's not quite true as we shall see later, but forget I said that for the moment!

The diagram, **Fig. 3.2 (a & b)**, shows this particular property of the diode. If a battery is connected to a bulb, it does not matter which way the positive (+) and negative (-) terminals are joined, it will still light up.

However, if you place a diode in the battery and bulb circuit this changes the way the circuit works. If the cathode end of the diode is connected to the battery negative terminal, the bulb will light. But if the anode end of the diode is connected to the negative terminal it won't light. This simple test proves that in this application, the diode is effectively a one-way device.

Diode Rectifiers

The illustration in **(a) Fig. 3.3**, shows the diode in one of its commonest applications, that of a **rectifier**. This means that the diode is being used to turn **alternating** electrical current (a.c.) into **direct** current (d.c.).

Also shown in **(a) Fig. 3.3**, is the alternating current (a.c.) on the left-hand side of diode. This is electrical current that 'swings' from positive to negative, either side of zero, with time. You've already come across a.c., at 240V, for this is what's available from our mains supply sockets at home.

Positive Pass

You can also see from **(a) Fig. 3.3**, what happens when a.c. passes through a diode. Only the positive half-cycles get through. This is a form of d.c., since it's all positive although it comes in ripples.

The next diagram (b), in **Fig. 3.3**, shows the action of a **diode bridge** which is a combination of four diodes connected as shown. This circuit is a little more complex, but it's a quite clever idea.

By following the direction that the diodes can pass current (conduction) you'll see that the bridge rectifies both halves of the a.c. input to produce a d.c. output with less 'ripple'.

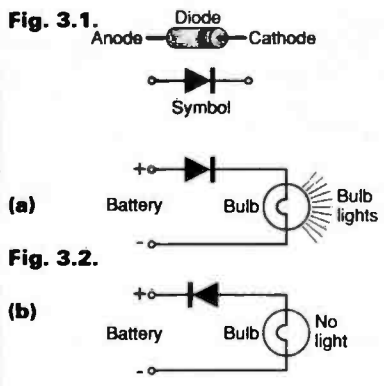


Fig. 3.1.

Fig. 3.2.

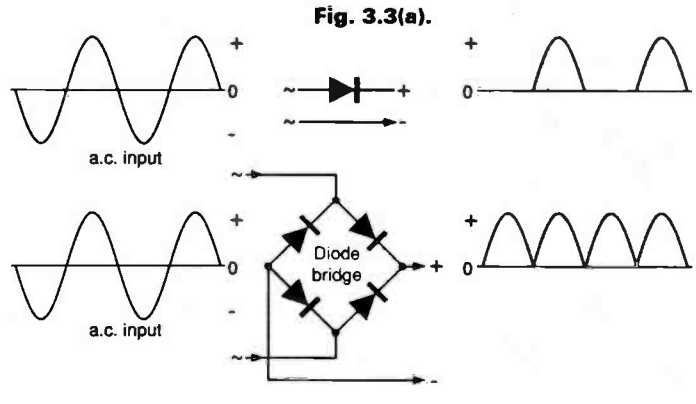


Fig. 3.3(a).

Fig. 3.3(b).

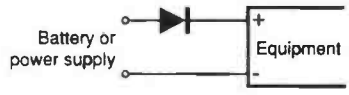
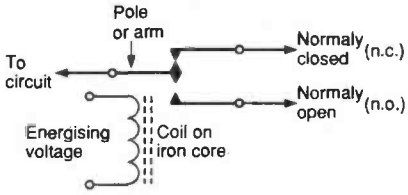


Fig. 3.4: Single diode polarity protector.



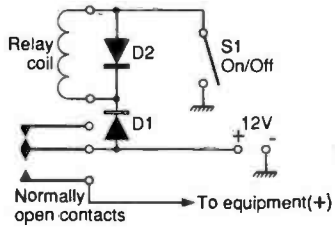


Fig. 3.6: Circuit of a practical polarity protector.

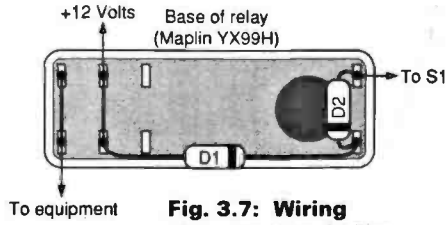


Fig. 3.7: Wiring diagram of polarity protector circuit.

Fig. 3.5: Circuit of a single-pole change-over relay.

Rectification is one of the most useful applications of the diode. You'll become very familiar with diodes, their applications and principles as we use them in practical projects.

Protector Diodes

Electronic equipment needs to be connected to its power source in the correct polarity. In other words, the positive and negative sides of the supply must be wired up the correct way round.

A lot of modern amateur radio equipment is designed to run from a supply of 12V, or thereabouts. This often requires the user to provide an external power supply.

Unfortunately, it's sometimes possible to connect this supply the wrong way round, and this can bring disastrous results. A unique combination of Murphy's Law and bad luck seems to combine on these occasions. You can almost guarantee that all the most expensive devices in the equipment are those which blow when polarity is reversed!

Simple Method

A very simple way of providing protection is shown in **Fig. 3.4**. The diagram shows that a single diode can be added to the power leads, to prevent a reversed polarity connection.

The equipment only receives the power if the polarity is correct. Connect power the wrong way round and it simply does not get through the circuit. This is a very simple and practical way to protect a piece of equipment.

Voltage Drop

This simple method does have two disadvantages. The first is that there's a voltage drop across the diode. This 'drop' is the voltage required to get the diode to conduct and it's called the forward or barrier voltage.

In the case of a silicon diode, the type commonly used in this application, the voltage drop is 0.6V. So a 12V supply will only deliver 11.4V through a diode.

The other problem is that all the current required to operate the equipment passes through the diode. The chosen diode has to be able to pass whatever current is required. In some items of equipment, that would call for a large diode.

Bridge Protection

Incidentally, a full-wave diode bridge could be inserted in the power supply leads. This would mean that the power supply could be connected either way round, but only the correct polarity would arrive at the equipment.

Perhaps you should sketch this idea out, and work out why the circuit works in this way. At first glance, the bridge circuit would seem to be the ideal polarity protection circuit until you look into it more carefully.

Unfortunately, the two problems we've already discussed (voltage drop and current limitations) still apply but even more so as there are now four diodes. There is a better method but to understand that, I have to introduce you to a new component, the **relay**.

The Relay

A relay is an electromagnetically-operated switch, a simple function diagram for which is shown in **Fig. 3.5**. A coil wound onto an iron core provides the electromagnet. An energising voltage causes the iron core to attract an arm, or pole, which then completes a circuit between a pair of contacts.

Change-over relays with two contacts are very common. In this type, when the coil is un-energised the contact which connects to the arm is called the **normally closed** contact (n.c.). The other contact is called the **normally open** (n.o.) contact. When the coil is energised, the arm closes the normally open contact and opens the normally closed contact.

Relay Types

The relay we've just looked at, acts as a change-over switch. Double-pole change-over and even triple-pole change-over relays are also available. The operating voltage of a relay depends upon the d.c. resistance of the coil, and this is governed by the number of turns and the gauge of wire.

There are dozens of types of relay, some designed for a.c. operation and some with anti-bounce contacts. There are also relays with contacts inside sealed protective cylinders.

The size and spacing of the contacts limits the voltage and the amount of current that the relay will switch. When you order a relay you'll have a wide choice of type and specifications. The specifications will state the operating voltage of the coil, the voltage and the current-carrying capabilities of the contacts.

Polarity Protector

The diagram in **Fig. 3.6**, shows a Polarity Protection Circuit using 2 diodes and a relay. This circuit has been around in amateur radio circles for many years.

I was introduced to the idea by Ian Keyser G3ROO. The circuit offers a considerable improvement on the simple diode protection circuits.

The amount of current that the equipment can draw through this circuit, depends upon the capabilities of the relay contacts. The diodes pass very little current so they may be small inexpensive types. The equipment has no contact with the power supply unless the supply polarity is correct.

Simple Operation

This circuit operates in a very simple way. The equipment is isolated from the supply positive lead by the normally open contacts. The supply positive also goes to the coil of the relay via a diode, D1. A single-pole on/off switch completes the circuit to energise the relay.

If the positive feed is connected to D1, it will switch the relay and close the contacts to allow the equipment to receive power. If not, power will not reach the equipment.

In this circuit, the diode D2 is placed across the relay contact to prevent high voltage build up as the electrical field builds up or decays. This effect, known as the 'back e.m.f.' and it's a common problem in relay coils.

The back e.m.f. is caused by the magnetic field building up or collapsing, when the relay supply is connected and disconnected. It can be particularly destructive when the supply is disconnected. The high-density magnetic field, focused around the relay core by the field core, collapses and can 'generate' (it's usually referred to as 'induced') a very high voltage.

This is the main reason why a set of contact 'points' on a car ignition system, will burn out very quickly if the protective capacitor stops working. It's also the reason why you can get an electrical shock from a very low voltage circuit - so treat coils carefully!

Practical Wiring

The practical wiring of the relay base is shown in **Fig. 3.7.** This example uses a Maplin relay type YX99H. The relay has a 12V coil and the contacts are capable of switching 16A (amperes).

My choice of relay should cope with the majority of amateur radio equipment. For equipment which draws a lower current, a smaller relay can be used.

If you use a double-pole change-over relay, it's possible to connect the two sets of contacts across each other (in parallel). This will enable them to share the switched current.

Another cheaper alternative relay, could be an automotive type designed for use in cars. These rugged relays are for 12V (volts) operation and they can usually switch large currents.

Useful Circuit

The project shown in **Fig. 3.6,** is a useful little circuit that could be added at the back of any item of 12V powered equipment. It can also be included within home-made equipment to ensure that no damage occurs through reversed polarity connections.

That's the lot for this month. Get to work and protect your gear. See you next time!

Shopping List

Semiconductors
Diodes

1N914, 1N4148, 1N40001 or similar 2 D1, 2

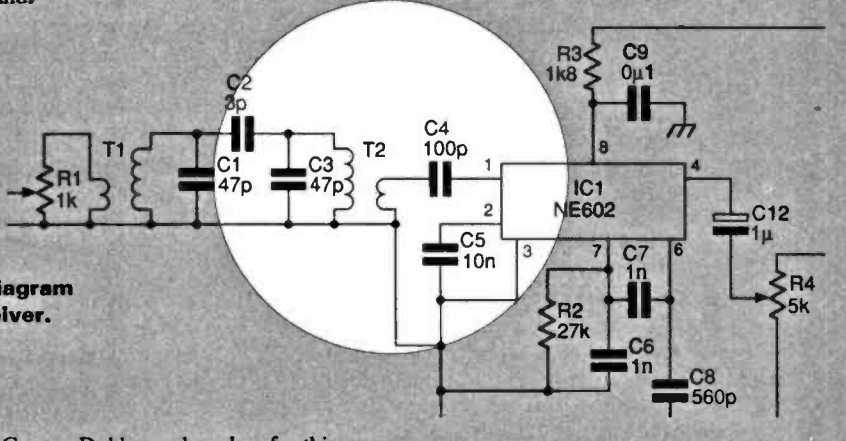
Miscellaneous
Relay Maplin type YX99H or similar, switch on/off toggle type to suit.

Errors & Updates

***PW* Sudden 3.5MHz Receiver**
March 1991 Page 38

One small, rather niggely, mistake crept into the circuit diagram of the *PW* 'Sudden' on page 38. The Circuit diagram shows the input coupling capacitor to pin 1 of IC1, on the secondary of the preselector transformer T2. The secondary of this transformer is not used. The capacitor is actually connected to a tapping on the primary winding of T2. The p.c.b. overlay and layout are not affected by this change.

Readers considering building the *PW* 'Sudden' for the 14MHz band, should ensure that only the 10pF section of C11 is used. The tuning is otherwise a little sharp and sensitive. When built to the Rev. George Dobb's design, the stability is adequate enough to resolve s.s.b. speech on this band.

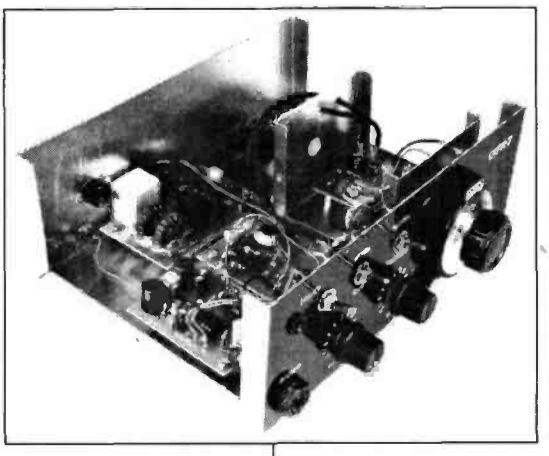


Part of the circuit diagram of the 'Sudden' receiver.

Our apologies to Rev. George Dobbs, and readers for this error.

Lake DTR-7

CW Transceiver Kit for 7MHz



Home construction and QRP go hand-in-hand. Mike Richards G4WNC, built the recently introduced Lake Electronics DTR-7 7MHz c.w. transceiver kit. Mike's constructional efforts produced a QRP outfit that should appeal to many constructors.

REVIEW

Having reviewed the DTR-3, the 3.5MHz c.w. transceiver kit from the same stable some time ago, I was pleased to have the opportunity to look at their latest offering.

The DTR-7 is a direct conversion c.w. transceiver featuring coverage from 7 to 7.1MHz. The unit is supplied either ready built or as a very comprehensive kit containing everything from the hardware through to connecting wire. The review model was supplied in kit form, so I'll start with details of that.

Important Instructions

With any kit the quality of the instructions is of paramount importance in ensuring the final quality of the kit. The instructions for the DTR-7 were contained on 28 loose-leaf, A4 pages.

The information contained in the documentation was very comprehensive. For home-brewers with limited construction experience, there's a very good section that provides a useful reminder on areas like resistor and capacitor identification.

There's also some very useful soldering tips illustrated with simple diagrams. This section concluded with some constructional notes and a few tips on how to go about fault finding.

The remaining documentation could be split into four sections. These various sections contained full circuit diagrams, parts list, building instructions and setting-up information and advice.

Modular Form

The level of detail in the documentation was very good, with each stage of construction well covered. The DTR-7 is built in modular form with separate p.c.b.s for the v.f.o., product detector, audio and r.f. power amplifier.

One great advantage of this approach is that construction can be spaced over several sessions with one or two p.c.b.s completed at each session. This technique also helps to minimise errors.

Self Contained Testing

Because each module is self contained, a certain amount of testing can be done prior to final assembly. By using this technique you can be reasonably sure that failure in the final unit is likely to be just a simple wiring problem.

Having now built two of these kits, I would strongly recommend that the construction is easier if it's spread over five or six two-hour sessions. This helps to minimise errors and will result in a better quality unit.

The component standard used in the DTR-7 was very good, with all branded components and a good-quality glass fibre printed circuit boards. Although the p.c.b.s were not printed with a component overlay, clear layouts were supplied with the circuit diagrams.

Comprehensive Hardware

Anyone who has built kits will be aware of the importance of getting the hardware right. The Lake kit is very comprehensive in that all the metal work is supplied.

By metal work I mean the case, plugs, sockets, dial and all nuts and bolts. However, the user is required to mark and drill all the holes in the case.

Drilling the case is simplified somewhat as self adhesive sheets are supplied for the front and rear panels. Besides giving a very smart finish, these were used to mark the location of the holes in the panels. It's well worth taking extra care with the panel drilling, as this will determine the quality of the final finish.

Spreading The Load

The construction time for the review model was approximately ten hours spread over five days. At the end of this the DTR-7 worked first time!

With the basic construction complete, it was time to sort out the alignment. As the receiver is a direct conversion type, alignment is very simple. The only equipment you need is a frequency counter, voltmeter and a 7MHz signal source.

The first stage is to set the frequency coverage of the v.f.o. This involved the adjustment of three trimmer capacitors. There's one trimmer for each end of the band plus another to improve the tuning linearity.

The only complication with this adjustment is that the v.f.o. is mounted in its own screened box. Removal of the lid of this box changed the operating frequency of the v.f.o.

In practice, this is not a great problem, as the v.f.o. could be set slightly h.f. of the required frequency to compensate for the effects of the lid. A more professional solution would be to drill some adjustment holes in the top of the v.f.o. compartment.

The only other adjustment on the receive itself, is the need to tune the product detector. This involved the adjustment of two trimmers.

Transmitter Alignment

The transmit alignment was equally simple, with just the p.a. input circuit to tune. The p.a. stage was rated to provide 2W output. However, due to component variations, the full power may not be realised without some further adjustment. This required a simple trial and error adjustment of a resistor in the p.a. input circuit.

With the DTR-7 lined-up, the physical assembly was completed by fitting the top half of the case. The completed unit was very smart, as can be seen from the heading photograph.

Important Performance

The most important aspect is how it performs on-air, but I decided to run a few technical tests to enable comparison with more conventional equipment.

One of the problems with measurements on a direct conversion receiver, such as the DTR-7, is the lack of an automatic gain control facility. This means that the sensitivity is dictated by the gain of the receiver

instead of the signal-to-noise ratio.

The result, when I tested the rig, was that a conventional 12dB SINAD measurement could not be made. This is because the recovered audio had dropped below the threshold of the measurement system before the 12dB SINAD point had been reached.

This result implies that the DTR-7 design could stand a little more gain without degrading the S/N ratio. As I wasn't able to measure the sensitivity in the conventional way, I applied some lateral thinking to come up with a new system!

Mike's Method

The solution was to key my Marconi signal generator with computer generated Morse. The generator output was then reduced to the point where the signal was just readable on the DTR-7.

This test produced a sensitivity of 0.4µV for the DTR-7. To provide a comparison, I tried the same test on my Icom 720A. This transceiver has a measured 12dB SINAD sensitivity of 0.2µV.

Respectable Sensitivity

This new test gave a result of 0.07µV as the weakest signal that could be resolved. From these tests you could approximate the sensitivity of the DTR-7 at a respectable 1.1µV for 12dB SINAD. The method I used was perhaps rather crude, but it does serve as a useful form of comparison.

The r.f. output power of the DTR-7 was checked next and in supplied form gave just 1.1W. However, this was easily set to the rated 2W by the adjustment I described earlier.

These were very good measured results, especially when you consider the price of the DTR-7. The next stage was to see just how the DTR-7 performed on-air.

On The Air

For the on-air tests the DTR-7 was connected to my full size G5RV antenna via a Yaesu a.t.u. Tuning around the 7MHz band soon confirmed the sensitivity measured in the lab. There were many stations to be heard and the selectivity was plenty good enough to separate most of the signals.

Having confirmed that all appeared to be working well, I put out a CQ call on the QRP calling frequency of 7.030MHz. I was pleasantly surprised to make my first contact after only a couple of calls.

This contact was with another QRP operator located in Stratford-on-Avon. He was running about 2W from a Trio rig and was coincidentally using the Lake QRP a.t.u.

Although the QSO went well, he reported that my signal was drifting badly. This did, in fact, become apparent during receive, as I had to continually adjust the r.i.t. to keep the signal within the filter pass band.

A quick check of the v.f.o. p.c.b. didn't show any obvious problems, e.g. dry joints, so it was back to the lab'. When I measured the drift using a frequency counter, I recorded a steady h.f. drift of 3.8kHz/hour. It's not surprising I was having to chase signals up the band!

Sensitive Capacitor

I felt confident that this problem must be due to a component fault, as the lower frequency DTR-3 transceiver was noted for its stability. After some careful checking I found that the fixed capacitor on the main tuned circuit (C4) was extremely temperature sensitive.

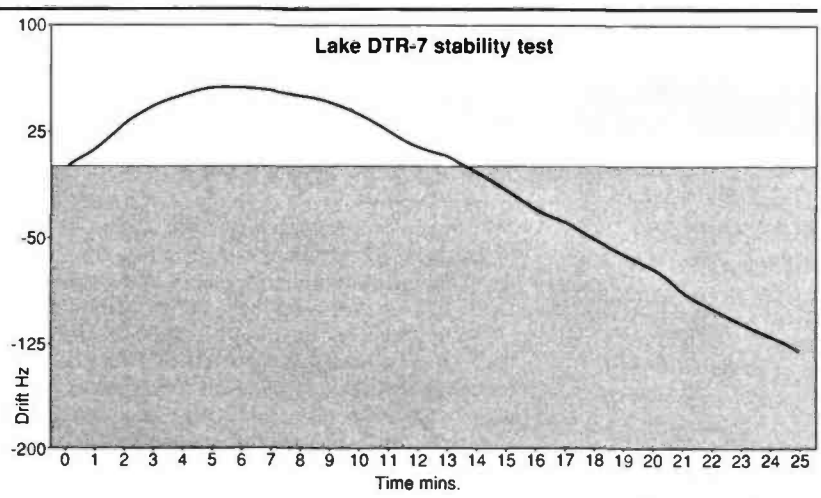


Fig. 1.

Replacing this capacitor cured the problem and resulted in the expected very good stability. To illustrate the new stability of the DTR-7, I've shown its performance in graphical form in **Fig. 1**.

This test shows the drift in Hz plotted over a twenty-five minute period following a five minute warm-up. As you can see the stability is excellent, particularly for a free running v.f.o. operating at this frequency.

You'll also note that, after an initial small h.f. drift, the review model settled down to a steady 8Hz/minute low frequency drift.

With the stability problem sorted out, operating the DTR-7 was a real pleasure. The audio filtering was very good and the sensitivity was perfectly adequate for the 7MHz band.

Improved Side-Tone

When I reviewed the 3.5MHz version, I criticised the side-tone levels. This has been corrected on the DTR-7 and I didn't experience any level problems.

However, the slow start-up of the multivibrator produced more of a squeak than a beep and that can hardly be considered a serious criticism!

On the audio front, the output level was more than adequate for headphone use. I also tried connecting a small speaker to the phones jack and found that the resulting volume was perfectly adequate for use in my shack.

Summary

The Lake DTR-7 was very similar to its lower frequency cousin the DTR-3. The construction was very straightforward, but does demand some familiarity with soldering techniques and components. The performance of the DTR-7 was very good and well up to the requirements of this type of QRP rig.

I have no hesitation in recommending the DTR-7 as very good value for money. The DTR-7 can be obtained direct from **Lake Electronics, 7 Middleton Close, Nuthall, Nottingham NG16 1BX**. The price is currently £84.50 in kit form and £135.00 ready built.

My thanks to Alan Lake for the loan of the review model.

PW

Specifications

Frequency range	7 to 7.1MHz
Mode	A1A (c.w.) only
Transmitter r.f. output	2W
Output impedance	50Ω unbalanced
Power requirements	12 to 15V
Power consumption	350mA transmit, 50mA receive
Dimensions	206 x 83 x 185mm

REVIEW

Theory

The Oscilloscope In Your Workshop

In the second part of his series on the 'scope in your workshop, Fred Judd G2BCX continues with a further look at frequency measurement of repetitive waveforms.

One of the applications dealt with in Part 1, was measuring of the frequency of different waveforms by using the 'time calibration' of timebase ranges. This time I'll begin with an extension of this application.

But before we go further, you should bear in mind that while it's adequate for some purposes, the technique cannot compete with the accuracy of a digital frequency counter. Frequency comparison is also a common application for a 'scope, and although this technique can only be as accurate as the signal source calibration, it can often prove useful.

Time To Frequency

Some examples of converting the 'time' of one cycle of any repetitive waveform to its recurrence frequency are provided in **Table 2.1.** (see also Part 1 of the series). Conversion is simple. Frequency is equal to - one second of time in milliseconds (1000ms), or in microseconds (1000000µs), as applicable, divided by the time taken (as appropriate) for the occurrence of one cycle of a waveform as measured on the oscilloscope.

CONVERSION EXAMPLES
Time in milliseconds of 1 cycle of Frequency (Hz)

ms	Hz	ms	Hz
10	100.0	60	16.7
20	50.0	70	14.3
30	33.3	80	12.5
40	25.0	90	11.1
50	20.0	100	10.0

Time in microseconds of 1 cycle of Frequency (kHz)

µs	kHz	µs	kHz
100	10.0	600	1.7
200	5.0	700	1.4
300	3.3	800	1.3
400	2.5	900	1.1
500	2.0	1000	1.0

1000 microsecond (µs) = 1 millisecond (ms)
1 cycle per µs = 1MHz.

Table 2.1: Conversion. Time taken for one cycle of a waveform to frequency. (Examples).

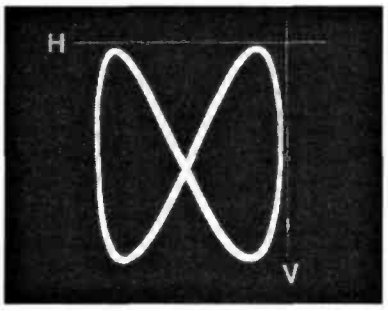


Fig. 2.1: A 2:1 Lissajous Figure. Fred explains frequency comparison using Lissajous Figures in the text.

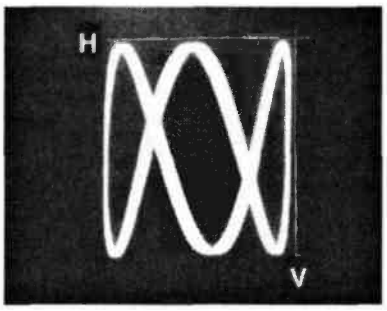


Fig. 2.2: A 3:1 Lissajous figure.

Frequency Comparison

The 'unknown' frequency of a signal with an alternating characteristic, (more or less any waveform), can be found by directly comparing it with the 'known frequency' signal from a calibrated generator. The 'known frequency' signal (f1) is connected to the X plates and the unknown signal (f2) to the Y plates.

Virtually all 'scopes have provision, by switching, for doing this. As the signals go through the amplifiers the magnitude of the display on the c.r.t. screen can be set as desired.

If the unknown frequency (f2), is the same as that of the known frequency (f1) then a single circular ellipse is formed. At other frequencies more complex patterns are produced. These are known as Lissajous figures, or patterns.

They're named after the French physicist who discovered the relationship (or ratio) between two different frequencies with the aid of tuning forks. With a 'scope, the ratio of f1 to f2 is found by counting the number of 'loops' touching a horizontal line on the graticule and dividing this by the number of loops touching a vertical line.

A simple 2:1 ratio pattern is shown in the oscillogram in **Fig. 2.1.** If the frequency, f1 is 1kHz then f2 = 2kHz. (1x2). If you turn **Fig. 2.1** sideways, it then becomes a 1:2 ratio pattern, in which case, with f1 as 1kHz, then f2 is 500Hz.

Another example is shown by the oscillogram in **Fig. 2.2** which shows a 3 to 1 ratio. If f1 were 1kHz then f2 would be 3kHz. With the page turned sideways as we've already tried, what would be the frequency of f2? If f1 = f2 the pattern will be a circle, but see later, my reference about 'phase difference'.

Note: The slight blurring of the trace in the reproduced oscillograms is due to the frequency of one of the signals changing very slowly. It's difficult to avoid this, even when you use high speed Polaroid film (3000ASA), a small camera aperture and a fast shutter speed.

Difficult Higher Frequencies

Frequency comparison by the Lissajous figure method becomes difficult at higher frequencies, unless the signal generators are very stable. It's also difficult when the frequency ratios become high, and in either case the signals cannot be locked using an XY display.

However, on some modern multi-trace 'scopes, signals of different frequency, on different traces, can be synchronised. In this case the number of cycles on each trace, in a given time across the screen, can be counted. They can then be related to one of known frequency. An example is shown by the oscillogram in **Fig. 2.3.**

Here's a check for you! If we assume the duration of the single sinewave (A) in **Fig. 2.3** as 1ms, what is its frequency and what's the frequency of the sinewave in B?

Phase Difference

If (f1) and (f2) are pure sinewaves equal in frequency and amplitude and also exactly in phase with each other, the resultant trace 'pattern' would be a stationary, diagonally orientated, straight line in one direction or the other, as in **Fig. 2.4.**

If the phase difference between the two signals is

45, 135, 225 or 315°, the pattern will be elliptical. A perfect circle will be obtained if the phase difference is either 90 or 270°.

Such displays can only be stabilised for very short intervals. One of the two signals will change phase relationship with the other, and it will run slowly but continuously through all the phase angles from 0 to 360°. The display will then appear as a slowly changing figures as in **Fig. 2.4**.

Phase shift can, however, be displayed with a perfectly stationary pattern by using a sinewave fed directly to one of the Y inputs and simultaneously via a capacitive/resistive network, to the other Y input. During this operation the 'scope is switched to the XY mode.

The oscillogram in **Fig. 2.5** was obtained with a 1kHz sinewave. Can you work out how 'OXO' was produced?

With a double-trace 'scope, approximate phase difference can be obtained with the reference signal on one trace, and the out-of-phase signal on the other. Both signals are synchronised.

The oscillogram in **Fig. 2.6** shows two identical squarewaves with the signal B out of phase with the signal A by approximately 90°.

Phase difference often occurs between signals at the outputs of two different channels, when each is carrying the same signal derived from a single source. This may be due to additional capacitive or inductive components and/or an extra amplifier in one of the channels.

There are however, other methods of measuring phase difference. It can be done with the aid of special equipment and an oscilloscope, to an accuracy of plus or minus a degree or so. I'll be showing some examples later in the series.

Plotting Frequency Response

Plotting the overall frequency response of a high quality audio amplifier, tone control or filter with a conventional audio frequency (sinewave) generator and voltmeter, can be very tedious and time consuming. The same applies when plotting the responses of tape recorders, graphic equalizers, radio frequency amplifiers, bandwidths of a tuned circuits and that of an antenna relative to its operational frequency band.

This task can be done much more quickly with frequency sweep generators, synchronised with a 'scope, or pen chart recorder. Better still, the plot provides a more or less 'instant visual' record.

I must emphasise however, that the equipment used for this application must function to a very high degree of accuracy.

For the examples shown in the illustration, the 'scope was a dual-trace model, the Advance OS250. I designed and built the auxiliary equipment, audio and r.f. sweep generators, each employing a beat frequency oscillator system and ramp voltage control systems to the specifications required.

Audio Applications

The sweep generator used for the examples shown, provided an output signal of 1V (r.m.s.) over the range 10Hz to 100kHz ± 0.1dB. The sweep time was approximately 10s.

The oscillogram, **Fig. 2.7**, is typical and shows the frequency response of a high-fidelity amplifier to be virtually flat from 20Hz to 20kHz. The marker at 1kHz was to ensure alignment of the sweep with the logarithmic graph.

Double exposure photography was used to produce the oscillograms. First the graph over the c.r.t. screen

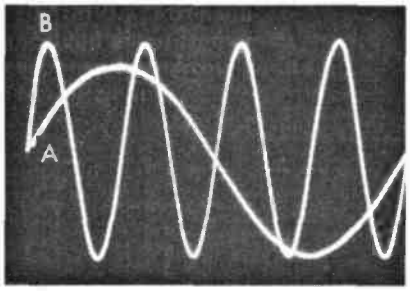


Fig. 2.3: Frequency comparison (A) Time of one cycle measured. (B) Four cycles of unknown (?) frequency (see text).

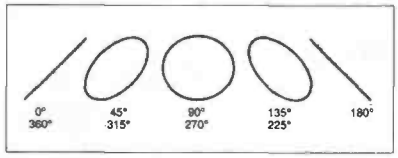


Fig. 2.4: Phase difference patterns with sinewave signals as explained in text.

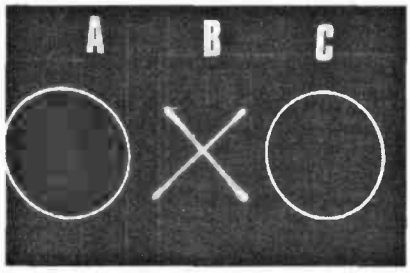


Fig. 2.5: Can you work out how this was done? (see text).

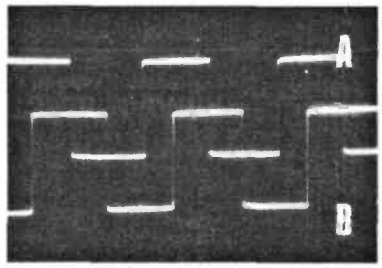


Fig. 2.6: (A) Squarewave of frequency f1. (B) Squarewave of frequency f2, leading (or lagging) (A) by approximately 90°.

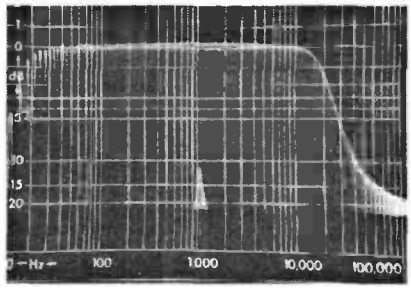


Fig. 2.7: Overall 'flat' frequency response of a high-fidelity audio amplifier using the frequency sweep technique. Marker frequency is at 1kHz. (see text for further details).

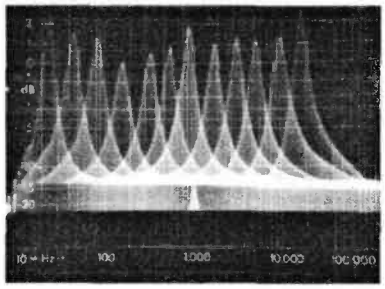


Fig. 2.8: Frequency response of a 'Graphic Equaliser' (using frequency sweep technique) with all controls set for maximum 'lift' (+10dBV).

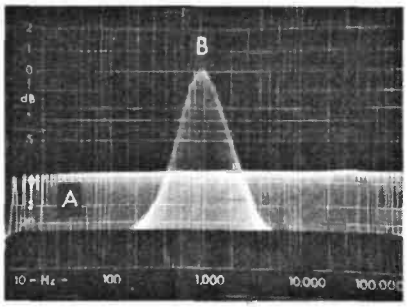


Fig. 2.9: (A) frequency response of the sweep generator (±0.1dBV). (B) transmit-to-received audio frequency response for narrow band f.m. (144MHz band).

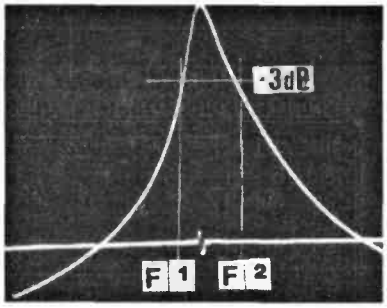


Fig. 2.10: Frequency (bandwidth) response of a 144MHz antenna to -25dBV using a v.h.f. frequency sweep technique. Usable bandwidth f1 to f2 (2MHz) is to the -3dBV points (see text).

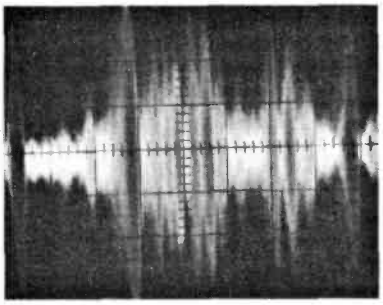


Fig. 2.11: Occupation of the 3.5MHz amateur band displayed on a 'scope by using a swept frequency receiver. See text for reference to signals and analysis, etc.

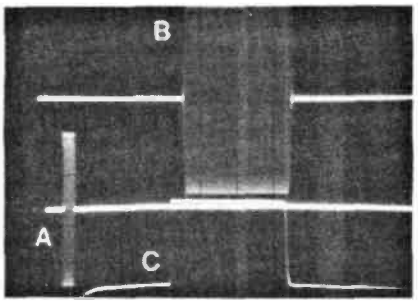
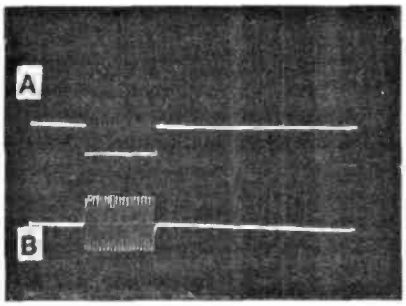


Fig. 2.12: Using a line sampler to obtain (A) format of pulsed r.f. transmission reference duration of display timebase. (B) measurement of same pulse (150μs) using expanded timebase. (C) pulse initiating squarewave (see text).

Fig. 2.13: (A) Initiating squarewave. (B) 1kHz (gated) pulse with exact number of complete cycles.



and then the actual display. Another example is the oscillogram in **Fig. 2.8**, which is the response of a graphic equaliser with all the controls set at maximum.

Interesting Application

Operators of narrow band 144MHz transceivers may well be intrigued with the oscillogram in **Fig. 2.9**. The trace (A) is the audio signal sweep, 10Hz to 100kHz from the generator.

This signal was fed into a 144MHz transceiver microphone input at an appropriate level and transmitted. The trace (B), is the audio response from a second transceiver. This is a typical 'transmit to received' narrow band f.m. audio response based on the usual centre audio frequency of 1kHz.

Radio Frequency Examples

The first radio frequency example uses an r.f. sweep frequency generator for visualising the bandwidth of a transmitting antenna for 144MHz. The oscillogram in **Fig. 2.10** shows this to be relatively wide, when it's plotted to -25dBV (extreme left and right ends) from the 'marked' band centre on the lower trace.

This plot is well beyond the limits of the band itself. The usable portion of the response is to -3dBV between F1 (146MHz) and F2 (144MHz).

The v.s.w.r. was 1:1 at the marked band centre, and was not above 1.5:1 at the -3dBV points. The same method can be used for 'visual' antenna v.s.w.r. versus bandwidth performance, tuned circuit and r.f. filter responses, etc.

Band Occupation Analysis

Some time ago I carried out an analysis of the occupation of the 3.5MHz amateur band. The analysis was over a period of several weeks and involved the use of a swept frequency receiving system (sometimes referred to as a panoramic receiving system).

The system was linked with a 'scope so that photo's of single sweeps, like that of **Fig. 2.11**, could be taken as required. All the large amplitude signals are 'commercial' stations of one kind or another. Between, but mostly beneath these, are regular amateur s.s.b. and c.w. transmissions.

The final analysis, which was very detailed, plus a selection of oscillograms, similar to the one shown, were sent to the Radio Regulation Dept of the DTI on behalf of UK radio amateurs. They were also published in *Practical Wireless*, in April 1985, but no acknowledgement was ever received from the DTI.

Line sampling

Next, we'll look at checking the shape and width of r.f. pulse transmissions, as well as other types of amplitude modulation, at the actual transmitting frequency, with the aid of a 'line sampler'. The sampler is a simple device for taking a small amount of signal from a transmission line between the transmitter output and the antenna. (Circuit and constructional details later).

The sampler consists of a very short section of 50Ω coaxial line with a built-in loop. The signal is picked up by this loop and is fed via an attenuator to a 'scope.

The oscillogram, **Fig. 2.12**, shows (A) the transmitted pulse relative to the time between pulses. For accurate measurement of the pulse duration and uniformity of shape, a faster timebase speed (50μs per division) is used so that the pulse appears as at (B) with a good shape and a width of 150μs. The carrier frequency of the pulse is at a frequency of 6.5MHz.

Time Errors

I should mention at this point, that the leading edge of the pulse-initiating square-wave, (C) in **Fig. 2.12**, starts about 25μs before the leading edge of the r.f. pulse at the transmitter output. Why? I hear you ask!

The answer is simply because the r.f. pulse itself is produced at an earlier stage in the transmitter, i.e., at the master oscillator. The signal then passes through low level amplifiers and into the final power output stage, which delivers a 2kW pulse for ionospheric sounding purposes.

Small time differences of this nature may also become 'serious time errors' in pulse 'radar type' transmission and reception or similar applications. For example, 25μs may not seem much, but it's actually the time taken for a radio wave to travel to a distance of approximately 6.9km.

Time errors may also become important in low (audio) frequency applications. The oscillogram B, in **Fig. 2.13**, is a 1kHz audio pulse used for measurements connected with acoustics.

For this application it was important that the pulse started on a positive half-cycle and ended as negative. The rise time and fall time of the initiating square pulse, A, could not be greater than 1μs.

Time measurement of this nature depends very much upon the accuracy of the 'scope timebase calibration and accurate interpretation of the c.r.t. display.

That's the lot for now. Next time we're going to look at phase measurement, harmonic distortion in audio amplifiers, simple waveform shaping circuits (with oscillograms), Z or brightness modulation, video waveforms and photographing c.r.t. displays.

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Piping Up On 144MHz

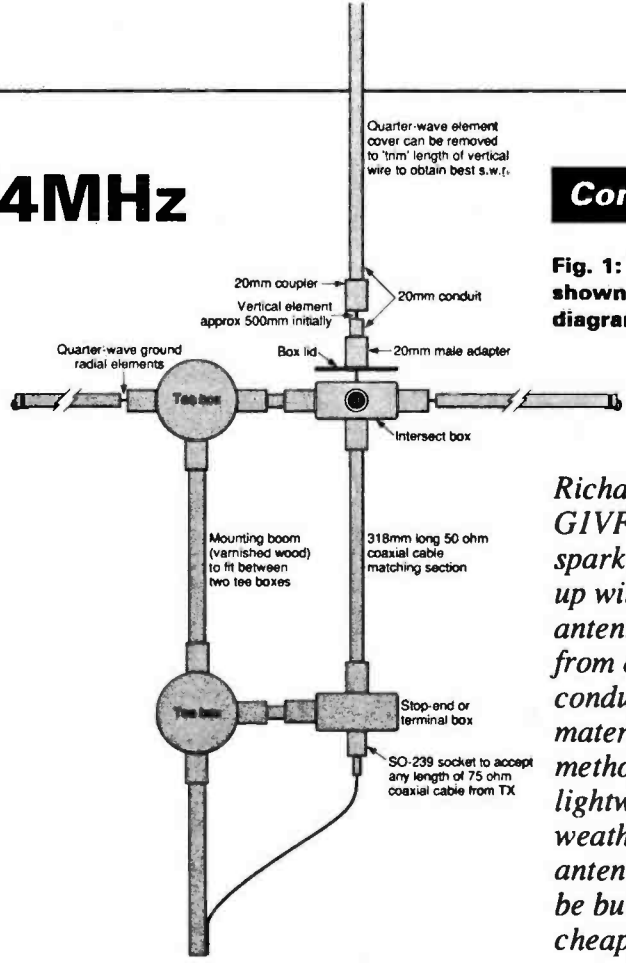

Fig. 1: The antenna shown more diagramatically.

Richard Barrett G1VFV is a bright spark. He's come up with the idea of antennas made from electrical conduit trunking material. The method results in a lightweight, weather-proof antenna that can be built simply and cheaply.

There have been countless articles, in magazines aimed at the radio enthusiast, dealing with the subject of antenna construction. These projects have ranged from multiple element beams, to the simplest form of antenna, a length of wire cut to a theoretically calculated measurement.

The wire method requires just a few inexpensive and readily available materials and is easy to adjust. However, a multi-element beam made from aluminium or stainless steel rod will be considerably more expensive, harder to make and will probably not react well to experimental changes in design.

Despite this, especially at v.h.f. frequencies, the reasonably compact beam antenna will offer useful gain and null patterns and is usually chosen in preference to a simple wire dipole design.

Problem Wires

Constructing an experimental antenna made from copper wire, for example, might not cost a great deal, but a beam antenna made in this way would have the mechanical strength of a length of cooked spaghetti. Conversely, aluminium might be stronger, but if the experimental design ends up being scrapped, the financial loss could easily deter the experimenter from further ideas.

As an inquisitive home-brewer with limited financial resources, I've endeavoured to find a way around these problems. Fortunately, I have recently discovered a material that assists greatly in my quest to save money and experiment at the same time.

My magical discovery is pvc conduit. Not the oval type buried in your house walls, but the heavy gauge round type of conduit used to encase surface wiring in light industrial applications. The type that I have used is manufactured and supplied by Walsall Conduits Ltd., and it's available in black or white, easily obtained in 20 and 25mm sizes four metres long, and marked HG BS6099-2-2 with the manufacturers code CP113 or CP114 for the sizes mentioned.

Conduit Support

I use the conduit to support, enclose and protect 2.5mm² wire elements in experimental antenna designs. The tube is quite cheap, (about £4 per length) and there are several inspection fittings, boxes and couplers available in the same material.

The conduit is very easy to work. It may be cut with a small hacksaw and securely joined with the correct pvc cement (glue). Care should be taken when using this cement, it gives off fumes. **It's best to do this particular job outside** and well away from naked flames.

Another useful benefit with this material is, that with a bending spring (about £5) the conduit can be bent up to about 120°, retaining the bend afterwards. The 25mm conduit and fittings will slide, trombone fashion, over the 20mm tube and it is easy to realise an experimental 'beam' shape that's adjustable in all directions.

Inexpensive Elements

The tubes can house inexpensive copper wire elements, that may be scrapped with little financial or material loss if the design fails to please. Alternatively, if the antenna works to your satisfaction the assembly can be fixed to provide a permanent addition to your antenna array.

Of course, quad or delta shapes are easily made in the same way. Although I claim no antenna design expertise or originality, the photograph shows one of my early efforts, a 144MHz quarter-wave whip antenna with four ground radials.

The antenna elements are made from cheap 2.5mm² copper wire, with a 318mm section of 50Ω coaxial cable between the bottom of the vertical element and the SO-239 socket. Any length of 75Ω coaxial cable may be attached to feed the antenna from the transmitter, as the short length of UR-76 cable or similar acts, as a matching section.

Using a couple of extra fittings, I included a method of attaching the antenna to a varnished wooden pole. The v.s.w.r. in the finished antenna is 1.2:1 at 145.500MHz, increasing slightly to 1.35:1 at band edges due to the small diameter of the elements used. Despite this, at the end of the day a robust and effective antenna was constructed for less than £5!

Further Designs

In addition, more complicated designs are planned for the near future. I think that the only limit will probably be that imposed by the imagination of the constructor, and the urge to 'have a go'.

The antenna I've shown you could be made in about an hour or so using a minimum of handtools and parts. There are no critical dimensions. The most 'technical' stage involves snipping 5mm or so from the vertical element to tune the antenna. If you refer to the diagram and photograph, construction should pose few problems.

Construction

After preparing a 318mm length of RG-58, or similar cable, for the matching section, five 500mm element covers should be cut from the 20mm conduit.

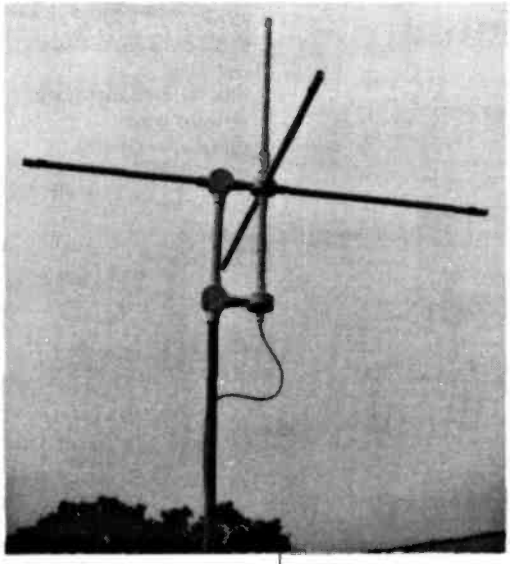

Fig. 2: The completed antenna on test.

Next, you should cut a fairly accurate 20mm hole in the bottom of the stop-end box.

A hole to take an SO-239 socket may then be made in another box lid, to which the RG-58 matching section can be soldered. The other end of the matching section should then have the core connected to the bottom of the vertical element. Solder the screen to all four of the ground-plane radial elements.

Make certain that the radial and vertical elements don't make contact with one another, to avoid possible damage to your transmitter. The 2.5mm² bare copper wire elements can all start off at about 500mm in length. After construction is completed, the transmitter and s.w.r. meter should be connected and you're ready to start testing.

Antenna Adjustments

To start the adjustments, you can carefully remove 5mm or so from the top of the vertical elements. With this method, the s.w.r. can eventually be brought down to perfectly acceptable levels for safe use of the antenna.

Of course, if you go too far with this process it's easy to start again. You simply cut another length of vertical element and start the process off once more.

I've no doubt anyone who has discovered to their cost that they have snipped too much from a stainless steel whip, will appreciate the reduction in tension brought about by this cheap and effective method.

To finish off, you should seal the box lids with a suitable sealant against moisture not forgetting the exposed ends of the plastics tube. Your new weather-proof, and inexpensive, simple antenna will then be complete!

How Much?	£5-8
How Difficult?	Beginner

Shopping List

Plastics conduit from electrical suppliers (see text for details), various junction boxes and end fittings, pvc cement (see safety warning), heavy gauge copper wire, coaxial cable for connections and matching, plugs and sockets to suit. **Note:** Many of the plastics components can be used more than once. Suitable solvents can be obtained from the conduit supplier to remove fittings fixed with cement. Care should be taken when handling the pvc cement and solvents. The use of a suitable barrier hand-cream is advised (available from chemists and hardware shops).

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WANTED Eddystone EA12. Mr G. Leese, Barnsley. Tel: (0226) 288718.

FOR SALE Icom IC-781, £3000 (sorry no offers), carriage £15 extra. Mr R. Surman G3FPD, April Rise, Cox Green, Rudgwick, Horsham, West Sussex RH12 3DE.

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FOR SALE 144MHz all-mode station - TR-9000, B09, PS20, SP120 - mint - g.w.o.- original cartons and all accessories. Jaybeam vertical collinear C5/144MHz and 5-el Yagi with UR-67 cables. Prefer cash, buyer collects, £350. Bob Radford G3GPB, 21 Farm Close, Ringwood, Hants BH24 1RZ. Tel: (0425) 471677.

WANTED Codar Radio Company equipment: AT5, T28, PS250S, CR7OA, PR30 etc., for working museum of 1960/70s amateur equipment. Needed urgently Spectrum 48K Plus computer, and also Yaesu FIF232C Cat interface. John Hackett G0OAF, 42 Central Avenue, New Basford, Nottingham NG7 7AF. Tel: (0602) 606552.

WANTED A clean copy of *Second Thoughts on Radio Theory* by Cathode Ray, at any reasonable price. John Hughes, 6 Claypotts Terrace, Broughty Ferry, Dundee DD5 1LE. Tel: (0382) 79665.

FOR SALE Labgear colour bar generator. Labgear crosshatch generator. Heath, scope 5in 10MHz, offers on either. **Wanted** Old type h.f. receiver. Mr M. Stevenson, 124 Green Lane, Eastwood, Essex SS9 5QJ. Tel: (0702) 522929.

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Readers' Ads
May 1991 Coupon

The PW Speed-Brush

The Key To Successful Morse

With the introduction of the Novice Licence in mind, Steve Ortmayer G4RAW has come up with a delightfully simple combined practice oscillator and Morse key. It should prove useful to both beginners and more experienced operators.

The novice licence is to be introduced very soon. My simple project will be of interest to anyone who hopes to take the five words per minute Novice Morse test. I've no doubt that any other operator learning or 'brushing up' their Morse will find it useful.

Popular Circuit

The circuit I've used for the *PW* 'Speed-Brush' is based on the popular 555 oscillator. This design is perhaps the most popular circuit for a Morse practice oscillator and it works well.

By extending the p.c.b. the circuit becomes a novel and very useful combined Morse key and oscillator. The p.c.b. must be of glass fibre for bending strength as it's the brush-like extension of the board that gives the project its name!

Building The Brush

The p.c.b. layout is very simple and can be made by using a marker pen as the etch resist. The large areas can be masked with plastic tape. If you don't want to tackle the job of making a p.c.b., the *PW* PCB Service has a suitable board on offer at £4.76.

Four 20 x 3 mm wood screws hold the p.c.b. above the wooden base. The base is soft wood 170 x 100 x 20mm, the ideal source of the wood is from floor-boarding off-cuts. If you can't get off-cuts, or you want to build the 'Speed-Brush' as a club project - a local builders' merchant will be able to sell you some.

The contacts are 6BA (3mm) nuts and bolts. One screw fixes through the p.c.b. and contacts the earth plane. The other screw fixes through the base. A suitable soldering tag provides a fixing to a wire to take the 9V battery (positive) terminal.

Setting Up

The unit is very simple to set up and use. The tone of the oscillator is set by adjusting R1, a 50kΩ potentiometer. Apart from the tonal adjustment - that's it!

No on-off switch is needed as the key part of the unit operates as its own switch. Battery life should not

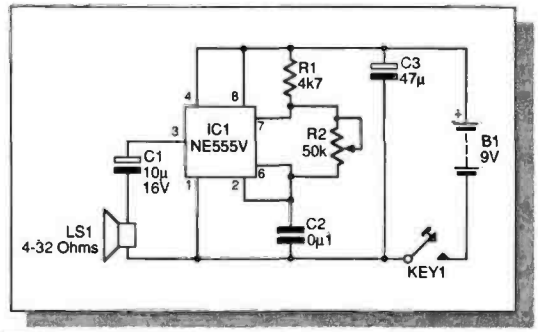


Fig. 1: Circuit diagram of the *PW* 'Speed-Brush'.

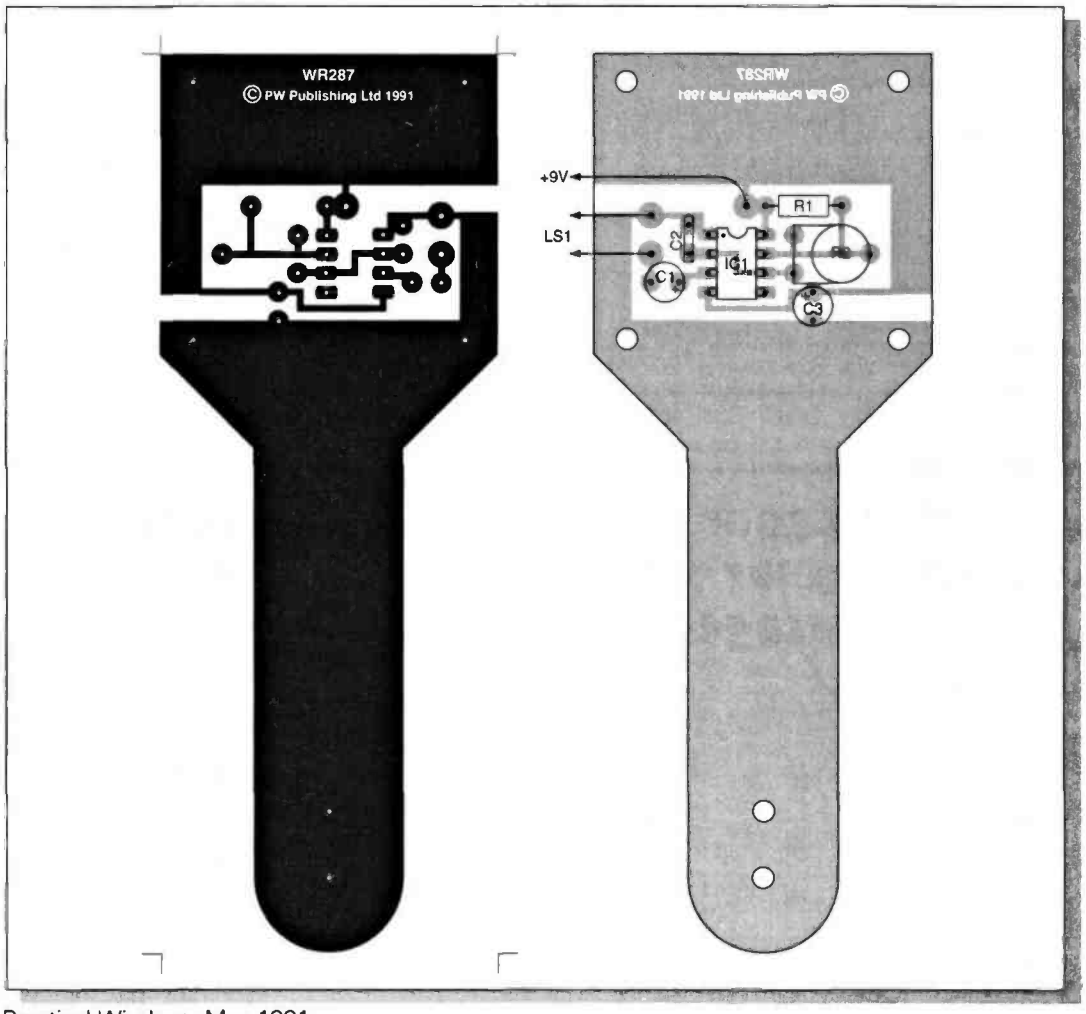
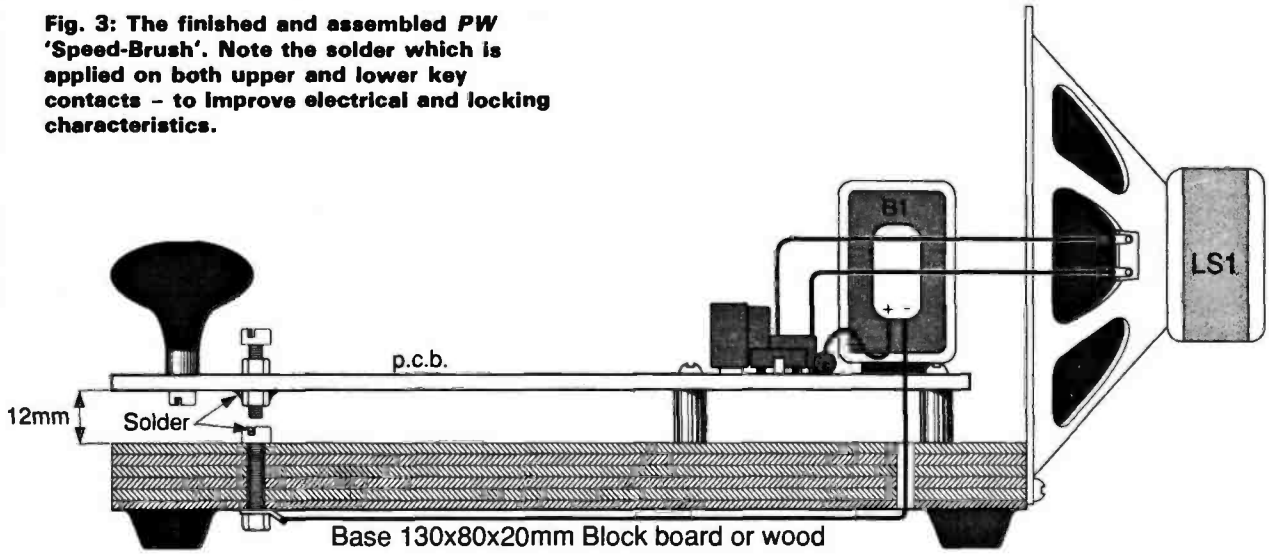


Fig. 2: The p.c.b. track details and overlay for the Morse key project.

Fig. 3: The finished and assembled *PW* 'Speed-Brush'. Note the solder which is applied on both upper and lower key contacts – to improve electrical and locking characteristics.



How Much ? **About £10** - depending on your 'junk' box.

How Difficult? **Beginner.**

Shopping List

Resistors
Metal film 1%, 0.25W
4.7kΩ 1 R1
Variable pre-set
50kΩ 1 R2

Capacitors
Miniature ceramic
0.1µF 1 C2

Miniature Electrolytic
10µF 1 C1

Integrated circuit
NE555V 1 IC1

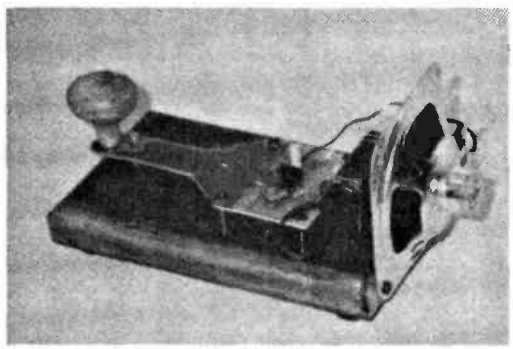
Miscellaneous

Battery (9V PP3 type), battery connector, loudspeaker of between 4 and 32Ω (speaker can be obtained from a scrap receiver) and suitable knob for key. (small wooden knob, bathroom cabinet-size is suitable). Wood for base (see text).

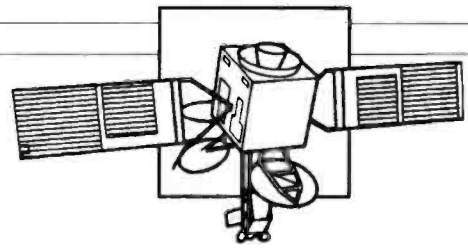
be a problem either because the oscillator unit only draws a few milliamps. The actual current drawn will depend on the impedance of the speaker used.

At first sight the absence of the normal 'back stop' for the Morse key itself, looks as if it's a drawback. However, in operation you don't even notice it and the key is easy and pleasant to use.

Happy keying - and the best of luck with your Morse practice! **PW**



The completed 'Speed-Brush'.



SATELLITE SCENE

by Pat Gowen G3IOR

This month Pat Gowen G3IOR, writes about the long awaited RS-12 and RS-13 satellites which were finally launched on February 5th.

It was announced in mid-January that the long-awaited RS-12/13 launch was to come about at 0412UTC on 22 January 1991, prior to the postponed launch date given for RS-14.

The long-awaited RS-12/13 combination was finally successfully launched at 0236:45UTC on February 5 into a 1019.319km apogee, 960.638km perigee, 82.9293° inclination, 104.87' period orbit, with an increment 26.34° west per orbit. By 1500UTC the next day most of the RS-12 satellite's sub-systems were checked out by the command station RS3A, with RS-13's check-out following on February 21.

Below are the frequencies used, some of which now appear to be slightly higher than as measured prior to launch.

Parameter	RS-12	RS-13
MODE A uplink	145.910-145.950	145.960-146.000
downlink	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE K uplink	21.210-21.250	21.260-21.300
downlink	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE T uplink	21.210-21.250	21.260-21.300
downlink	145.910-145.950	145.960-146.000
beacons	145.9125/145.9587	145.8622/145.9083
MODE KA uplinks	21.210-21.250	21.260-21.300
	145.910-145.950	145.960-146.000
downlinks	29.410-29.450	29.460-29.500
beacons	29.4081/29.4543	29.4582/29.5043
MODE KT uplink	21.210-21.250	21.260-21.300
downlinks	29.410- 29.450	29.460-29.500
	145.910-145.950	145.960-146.000
beacons	29.4081/29.4543	29.4582/29.5043
	145.9125/145.9587	145.8622/145.9083

Table 1.

Both auto-answering ROBOTS are on modes A, K, T, KA and KT. The RS-12 h.f. uplink is on 21.1291MMHz alternating with the v.h.f. uplink on 145.8308MHz, with the corresponding downlink(s) on 29.4543MHz (measured at 29.4566MHz) and/or 145.9587MHz. RS-13's uplink alternates on 21.1385MHz and 145.8403MHz, with the corresponding downlink(s) on 29.5043MHz and/or 145.9083MHz.

The new satellite has not been without its initial problems. The attenuators commanded into circuit made low power access of both the transponder and ROBOT difficult. Dense 'E' ionisation not only gave the wipe-out intrusion from strong terrestrial f.m. users in the 29MHz space exclusive downlink passband, but also made downlink attenuation so severe that signals could not be heard until the satellite was above 12° elevation.

As if these problems were not enough, the COSMOS-2123 NAVSAT was also under test. Its 149.9MHz transmission not only completely blocked both the transponder and ROBOT uplinks, but introduced RTTY-like signals over the entire downlink passband.

I was only able to make three QSOs in the first two weeks of operation! Hopefully, by the time you read this news, all systems will be fully operational and usable.

DC Power Consumption	RS-12	RS-13
All systems off	4.6W	3.5W
All systems on (maximum output)	35W	25W
RF output power:		
Beacon and ROBOT (low/high)	0.45/1.2W	0.45/1.2W
Transponder TX (29 or 145)	approx. 8W	approx. 8W

Table 2.

RS-14/OSCAR-21 Flies

The RS-14, the joint AMSAT-U-Orbita RM-1 and the AMSAT-DL RUDAK-II, is now operational as OSCAR-21. It was first postponed to January 7, then January 20. Finally it blasted off from the Northern Cosmodrome at Plesetsk at 1159:52 on January 29. The 145.821MHz c.w. telemetry was commanded on just three days later. The A-O-21 period is 104.8368 minutes, inclination 82.947°, and the increment 26.3350°W per orbit.

This satellite too is having problems. While the initial telemetry looked very good and the systems all seemed functional, on March 6 the RUDAK RTX2000 onboard Digital Signal Processing Unit giving f.m. speech on 145.983MHz was placed on for test.

The signals were very strong, and could be heard fully quieting on a hand-held. It said (quote) "I am completely operational and all my systems are functioning perfectly" although they weren't!

Uplink command work is now progressing, which will hopefully, restore full function of all systems by the time that this news is read.

The basic details of this new satellite have already been published in *P W*, but if you require full details, send an s.a.e. to the editorial offices.

The identifiers and Keplerian element sets for both the new satellites now in orbit and operational are as follows: (**Tables 1-3**).

Remember, if you need the latest updated Keplerian element sets for all the other satellites just send in a large s.a.s.e. marked 'Keplerian Elements PSE' to the editorial offices.

Packet In Space

Musa U2MIR, continues to be active on 145.550MHz f.m., and is now on packet radio also. We all expected to wait until the 'AREM' experiment commenced in late March or early April before we heard any packet radio from MIR. Despite Boris Stepanov UW3AX stating "..the end of January.." and Musa saying on January 17 ".. packet radio tomorrow .." we all knew it could not be. Happily,

Fig. 1

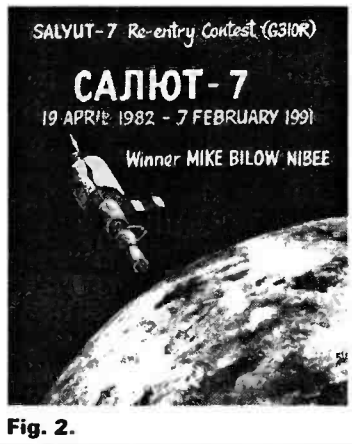
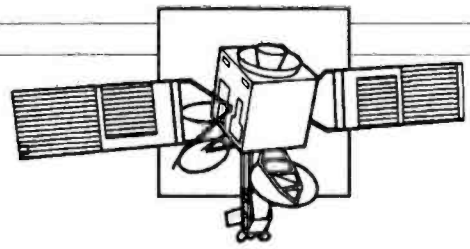


Fig. 2.

Parameter	OSCAR-21	RS-12/13
Catalogue No:	21087	21089
Epoch Year:	91	91
Epoch Day:	53.22001973	49.93251436
Inclination:	82.9472	82.9239
Right Ascension:	318.7973	191.7413
Eccentricity:	0.0034188	0.0028095
Argument of Perigee:	218.7400	248.5878
Mean Anomaly:	141.1310	111.2279
Mean Motion:	13.74342424	13.73856783
Decay:	1.09E-06	1.12E-06
Orbit:	323	190

Table 3.



we were all wrong, as on Saturday evening of January 19 and the following day up came U2MIR calling CQ on packet on 145.625 and 145.675MHz!

Musa U2MIR, who is UV3AM, has been reported active by many stations all around the world initially using his normal 145.550MHz speech f.m. frequency for packet, this being the joint popular packet frequency in the USSR. He had a heavy schedule of EVA external work on MIR from January 20, but had told Boris that he would be back in force from February 1. However, he left his U2MIR-1 mailbox on, later moving to 145.325MHz to avoid the continuous blocking caused by the multitudes of earth-bound amateurs calling him.

Ian McAvoy G0NKA of Lincoln, saw on his screen at 1538:19 'U2MIR*>F3NW-1 [C,P]'. Later, at 1448:53 on February 4, using 25W from his 736R to a 9-element beam on 145.550MHz, Ian managed to connect, sadly this soon followed by a 'disconnect'. **Joe Kasser W3/G3ZCZ** of Silver Spring, Maryland noted brief connects from W2RS, N8IGJ, N9AB, WB9CEU and others, and that some were using the MIR space station system as a digipeater.

Colin Grellis G1YIL of Dorset spotted activity throughout a whole day's passes, and sent in printer copy of Musa's CQs and connect packets with DF4TA, I0LYL, G6ZRU, DL1SBY, F9XG and F6EXK. **Fred G6ZRU** managed two 'connects' to U2MIR-1 whilst competing with his other locals G6CSX and G0BAF. Both times, Fred received the prompt 'Logged on to U2MIR's Personal Message System' but retried out on both occasions! Fred also noted connects also to I0LYL, F6EXK, HB9RSQ, DD1UU, DL1SBY and DF4TA.

Stuart G6FTB, received Packets from U2MIR containing the message 'CQ, HELLO FRIENDS'. Like the vast majority, **Ray Solfer W2RS,** found that due to the QRM in Musa's receiver it was impossible to use the mailbox. While unable to access myself, I monitored over three passes connects with an additional number of European stations, logging IK5EHR, IK3ASM, DF4TA, G8AFG, GM0KDC, LA1K and DG2SBL.

One of the lucky ones is **Martin EI3FI** on the West coast of Sligo, who gets a full two minutes of access before MIR comes under the hammering from all of Europe. He has connected to U2MIR-1 at least once daily since his first connect on January 30. Martin is one of the few in Europe who has been able to receive Musa's 'J' list, and quotes some very amusing messages, e.g. "Ed to Musa....How's the weather up there?" plus another from a KA call: "Hi Musa ... don't drop in!"

Should you be fortunate enough to have the opportunity to use it, here are the U2MIR-1 mailbox requirements as given in response to the the 'H' help command:

B(ye) B [CR] disconnects you from PMS.

H(elp) H [CR] or ? [CR] displays this help file.

J(log) J [CR] displays a list of callsigns heard (optional date/time)

K(ill) K n [CR] deletes message number n (only to/from your callsign).

KM(ine) KM [CR] deletes all READ messages addressed to your callsign.

L(ist) L [CR] lists the ten latest messages.

M(ine) M [CR] lists the ten latest messages to/from your callsign.

R(ead) R n [CR] reads message number n.

S(end) S (callsign) [CR] begins a message addressed to (callsign).

Subject: max 28 characters ending with [CR].

Text: End each line with [CR]. End message by typing /ex [CR] or CTRL-Z [CR] at the beginning of a new line.

SR(eply) SR n[CR] Sends a reply to message n prompting only for text.

V(ersion) V [CR] displays the software version of the PMS system.

Musa is now using a donated Icom-228A transceiver that can run up to 25W, a lap-top computer, and a Pac-com TNC-220 with a mailbox addition that permits multi-station access. Changes are planned for this that will permit more stations simultaneous access. Consideration is also being given to split frequency and cross-band operations, as Musa will soon have a 430MHz hand-held.

Boris Stepanov UW3AX, the RSF 'Ham in Space' project co-ordinator, informs us that amateur radio training courses for the MIR cosmonauts are presently being organised for the next crew due to take over MIR in May. One of these will be the British 27-year old 'JUNO' mission cosmonaut Helen Sharman visiting MIR for a week. She will have the callsign GB1MIR and will be making good use of this for educational contacts with many university, school and college club stations through the medium of amateur radio before she returns back home to earth with Musa U2MIR and Victor U9MIR, the mission commander.

Although Boris has been handling most of the QSLs for the U-MIR operations to date, he is a very busy person and suggests that your QSL to UA6HZ should obtain a faster response than cards via Post Box 88 in Moscow. The address to send to is: Valery Agabekov UA6HZ, Box 1, 375600 Yessentuki, USSR. You will not have to wait for the return of Musa in May, as several who have made QSOs, e.g. G6SVJ, have already received their cards from Boris.

Re-Entry Contest

SALYUT-7 the 40 metric tonne one-time pride of the USSR Space Fleet, with its attached COSMOS-1686 module, launched in April 1982, manned until November 1985, finally came to rest at 34.9°S/63.8°W, mainly in Argentina at 0347UTC on 7 February 1991 during orbit number 50200. The contest for the prize of the complete set of Soviet space stamps and certificate to the forecaster nearest to predicting the UTC time and date of the re-entry, proved to be very popular, with over one hundred entries coming in from all parts of the world.

Estimates ranged from mid November to early March, and some even put the decay time to the nearest second. The winner was **Mike Bilow N1BEE** of Rhode Island. His February 7 0330UTC prediction was just 17 minutes earlier than the event! Mike, read Celestial Mechanics at the University of Rhode Island, yet modestly puts his success down to "pure luck"!

Second came **Hazel Kerrison** of Norwich, shown with OM Sid G3MFQ in **Fig. 1,** who plumped for February 7 at 0419UTC and so was thus only 32 minutes late in prediction.

Chris Wallis G3CMV, of Ickleford, near Hitchin in Hertfordshire came third, having gone for 0824 on February 7. All of the above will receive diplomas, as seen on **Fig. 2,** and duplicates of the space stamp series, a few of which are shown in **Fig. 3.**

Very close 'runners up' included LA4XC, G4ODC, G4BDW, W3/G3ZCZ, G3LDI and his son Robert, KA6UCD, G3CDK, G3MFQ, G4CUO, G4FKC, PA0DLO, G3RWL, N5WX, G0BAF, G4ULS, VE3EFX and WB6LLO, all of whom gave predictions far superior to those estimates given by the 'official' non-amateur agencies themselves. I shall be covering some of the interesting findings and techniques of satellite re-entry in a future treatise.

Good Reading

For those who could not attend, or who could not manage to write 154 pages of notes, the *Proceedings of the AMSAT-UK Colloquium* now published by AMSAT-UK will fill you in on the many and wide ranging papers produced, and provide lots of good reading on may satellite related topics. Details are to be had for a s.a.s.e. to Ron Broadbent G3AAJ, AMSAT-UK, London E12 5EQ. This years Colloquium will be held from July 25-28 at the University of Surrey. If you wish to attend, write to AMSAT-UK at G3AAJ QTHR with a s.a.s.e., who will send you costings and a booking form. **PW**

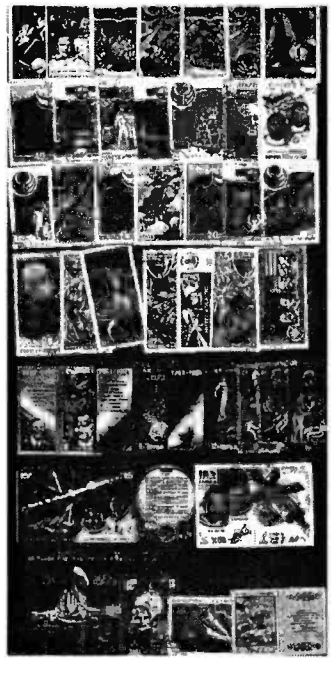


Fig. 3.

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1N4148	4p	BD131	35p	TIP31	30p	**For lists**	
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Reflections

This month, Ron Ham reminds us about the potential hazards that exist with the highly explosive gas-air mixtures which can devastate freshly-charged car batteries - and you if you don't take care!

Around this time last year I talked about the use of rechargeable accumulators in an article about the change of receiver low tension supplies from 2V 'wet' to 1.5V 'dry' cells. When 12V is required, as for a car, six of the 'wet' cells are wired together in series (2V x 6 = 12V) and fitted into an outer casing to form a battery

If one cell gives trouble, then the performance of the whole battery suffers. The little story that follows will emphasise this point, and also serve as a further warning that accumulators must always be treated with care.

The incident began while I driving home on a rainy winter's evening with the heater fan, head and fog tail lamps, rear window heater and windscreen wipers gobbling up current. I had noticed, that although the alternator was generating, the battery condition indicator kept dropping to 11V, although all the electrics were working properly.

Obviously the alternator was carrying the load with little help from the four year-old battery. On arriving home I disconnected the battery and put it on charge overnight (with stoppers out of course).

The next morning, after some 15 hours of low current charging, I refitted the battery in the car. A few minutes later a loud 'bang' occurred after I'd used the starter. When I checked the battery, I found that the casing had burst open at one end and split along the top.

I think this happened because one of the cells had an intermittent connection (the reason for the sudden drop in volts) and after a long period of charging, it, like the other cells, was venting gas. Consequently, the high current drawn by the starter motor caused the faulty cell to 'arc-over' which, in turn, ignited the gas. Apart from a text-book lesson, it cost me £41 for a new battery!

Observations Solar

At 1115 on February 1 **Patrick Moore** (Selsey) made a drawing, **Fig. 1**, with his special apparatus, of the large sunspot group which he observed almost on the centre of the sun's disc. The sharp rise in solar flux during the last week in January, seen on **Neil Clarke's** computer print out, **Fig. 2**, suggests that the group was active as soon as it appeared on the eastern solar limb around the 25th. Prior to this the daily number of solar flux units for the month had hovered around the 200 mark.

Neil also sent a graph, **Fig. 3**, showing the fluctuations in the earth's magnetic field for January. He reports that the Ap index during the month was very quiet, with only five days when it was above 10.

Ern Warwick (Plymouth) heard a burst of noise on 28MHz lasting several minutes from 1230 on the 26th, and others again at 1323 on February 1 and 1015 on the 6th. On the 1st, **Cmdr. Henry Hatfield** (Sevenoaks), using his spectrohelioscope, located three sunspot groups, 11 filaments, five quiescent prominences and a small flare. He told me that one of the groups was very large, with possibly 16 spots. On the same day his radio-telescope recorded individual bursts of radio noise on 136 and 1297MHz. Henry, **Fig. 4**, is an active astronomer and apart from designing and building his spectrohelioscope and two radio-telescopes, he had a book published by Butterworth entitled *Amateur Astronomer's Photograhic Lunar Atlas*. He is a past President of the British Astronomical Association for whom he currently holds the post of treasurer.

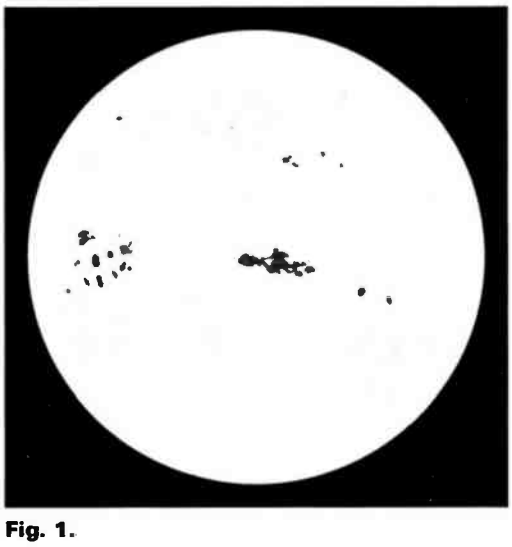


Fig. 1.

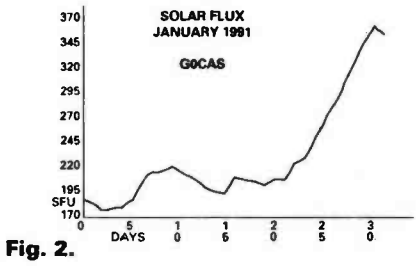


Fig. 2.

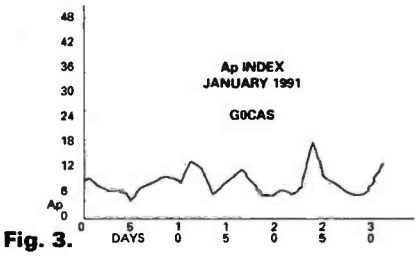


Fig. 3.

The 28MHz Band

Judging by the propagation log sent in by Ern Warwick, the 28MHz band was very active during the period January 26 to February 25. He logged signals almost, daily, from tiny beacon transmitters in the Americas, (PY2AMI, WC8E, W3VD, W8UR, W9UXO), Canada (VE3TEN), Europe (DF0AAB, DL0IGI, EA3JA, HG5GEW, IY4M and OH2TEN) and South-Africa (ZS1LA, ZS5VHF, ZS6PW) and less frequently from Australia (VK2RSY, VK5WI and VK6RWA), Scandinavia (LA5TEN) and South-America (LU1UG).

Ern also reports hearing 'echos' on the signals from ZS6PW on January 30 and February 16, and fast-fading on ZS6PW and Z21ANB on February 5. I've a personal 'soft-spot' for the Norwegian beacon (LA5TEN). This is because, way back in November 1979, I sent in the first report of its signals and the beacon-keeper, **Pal Justinaes LA5PN**, modified one of his own QSL cards, **Fig. 5**, to mark the occasion.

Pal told me that LA5TEN, with its tiny 0.3W output to a 5/8λ ground-plane antenna, was radiating from his home near Oslo and that it had also been heard by LA2PH/MM near Florida, USA.

Beacons

Looking at beacons from another direction, I had an interesting letter from **Bob Cooper, Jr. ZL0AAA** (Houhora) in the most northern portion of New Zealand. Bob heard the UK 28MHz beacons GB3RAL (Rutherford Appleton Laboratory) on February 1, 4, 5, 6, 8, 9, 13 and 15 and G0MVL on the 1st, 5th and 6th. "Recently", wrote Bob on the 17th, "the first beacon to appear, as early as 0525UTC, is OH2TEN followed within 15-30 minutes by DL0IGI, DF0AAB, EA3JA (et al)."

Fig. 4.

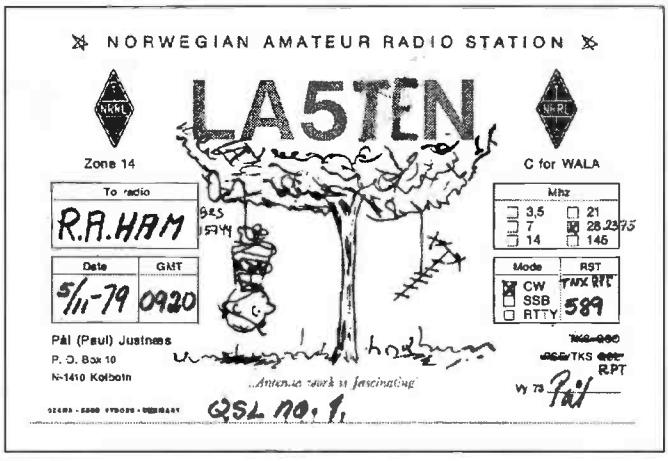


Fig. 5.

Band I Observations

Bob continued "The same 'pattern' appears on 40-50MHz as well; far north, then gradually south. By the same token, as late as 1430UTC, EA3JA may still be in (with IY4M, 5B4CY et al) while further north stations are gone".

Simon Hamer (New Radnor) received smeary and distorted television pictures, between 40 and 60MHz, from Australia, China, Malaysia, Thailand and the USSR via 'F2' openings on the 2nd and 4th, and from Australia and New Zealand on the 4th. Simon has received confirmation of his reports from the latter television stations.

The sought-after DX in this region came again for Simon on the 7th when he caught one of those brief bouts of winter Sporadic-E. He logged pictures from Denmark on Ch. E3 (55.25MHz), Finland and Iceland on Ch. E4 (62.25MHz) and Czechoslovakia and the USSR on Ch. R2 (59.25MHz).

John Woodcock (Basingstoke) heard utility stations from the USA, at the lower end of Band I, on January 30 and February 3, 5 and 6. By allocating a few memory buttons to these vision channels, readers with scanning receivers should get an early warning of Sporadic-E when the television synchronising pulses (a low pitched variable buzz) appear on one or more of those frequencies.

The most vulnerable frequency to even the mildest Sporadic-E disturbances are Chs. E2 (48.25MHz) and R1 (49.75MHz). Such advanced information can be a great help to operators on the 50MHz amateur band. By the time you read this, the start of the 1991 Sporadic-E season (May to August) should not be far away, when you can expect 'rock-crushing' signals to suddenly appear on frequencies between about 20 and 150MHz.

Rising Signals

Within this range, radio amateurs can look for DX in the 21, 28, 50, 70 and 144MHz bands. The broadcast station enthusiasts however, have Bands I & II for TV DXing and the East-European band (66-73MHz) and the European Band II (87.5-106MHz) for those rare signals. A typical example of a Sporadic-E opening is the television test-card from Iceland, **Fig. 6**, received on Ch. E4, by me while one such disturbance was in progress.

Tropospheric Observations

While the high atmospheric pressure (30.5in - 1032mb) was beginning to fall on the 4th, Simon Hamer took advantage of a tropospheric opening and logged pictures in Band III (175-230MHz) from Denmark, Norway and Sweden and in the u.h.f. band from Germany and all of Scandinavia.

Computing Techniques

Over the past five years, I've prepared my text for this magazine on an Amstrad PCW computer, **Fig. 7** (left), using the word processor package Locoscript 1 that was supplied with it. The completed work is then sent on a 3in diskette to our editorial offices in Poole where they transfer the information to their own computer system.

About 18 months ago I added a 3.5in external disc-drive, (small shelf top centre **Fig. 7**) and fitted the extra 'chips' to upgrade the memory from 256 to 512K on each of the PCW8256 machines used by Joan and myself.

The additions gave us a larger disc-storage capacity, up to 720K, and of course compatibility, so that we can, as often happens, carry out work for each other. Last June I installed an Amstrad PC2086D, (right **Fig. 7**) with a high resolution colour display, a pair of internal 3.5in drives and a Commodore MPS 1230 printer.

Words And Pictures

Although I use the Windows 'paint' program, packed with the 2086, for the drawings that periodically appear in my columns, I decided to use Locoscript PC for word processing. The next problem was transferring my numerous Locoscript 1 files from the PCW to the PC and, if need be, back again. However, I solved this by purchasing the '2 in 1' (version 2) software package from Moonstone Computing, Strathclyde Business Centre, Clyde Street, Clydebank G81 1PF, Scotland.

Briefly, the program's easy-to-follow on screen instructions make the transfer of text-files simple and, not only does it format both PCW and IBM-PC discs, it also provides a very good disc manager. The program alone costs £29.95 including post and packing and VAT.

Software Bridge

The same company's advert in the March 1990 *8000 PLUS* magazine (page 28) will show that the program is supplied free of charge when you purchase a second 3.5in drive from them, for the PCW8256 or 9512 machines. This external drive assembly sells for £99.95 plus £3 carriage. It is of course essential that you have 3.5in drives on both computers.

PW

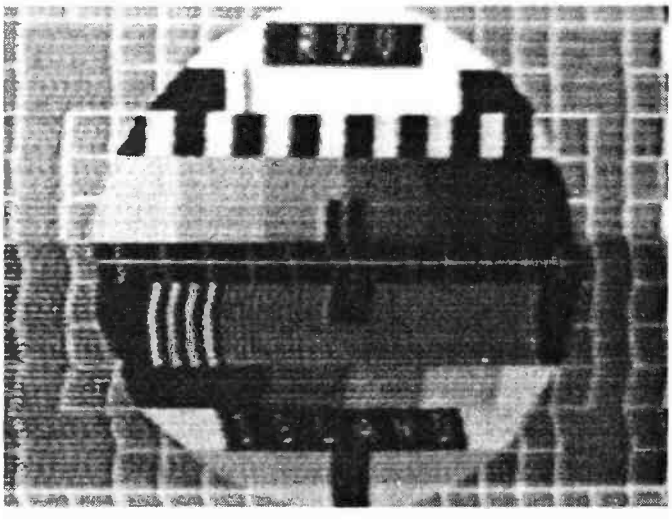


Fig. 6.

Fig. 7.

PACKET PANORAMA

World-wide packet. News this month, from Roger Cook G3LDI, of activity from all corners of the globe.

Activity in Western Canada

Fred Wyatt VE7DFW and I have a weekly 'sked' on 21MHz. s.s.b. Fred, pictured in **Fig. 1**, visited me a couple of years ago along with Dave VE7DFS. They stayed a few days to look around the Norfolk area. Since then, Fred has become active on packet and takes quite a strong role in the running of the Victoria Amateur Packet Association.

Thanks to Fred, at the moment I'm the only 'G' member of VARPA and for that honour I appear at the top of the monthly members list. The fact that the list is in alphabetical order is purely accidental of course! The group now boast a membership of 82, and the only non-Canadians are SP5TAO and myself. The Secretary of VARPA is Paul Johnson VE7DHM, and his address is Sheringham Pt Rd. RR 2 Sooke BC, Canada VO5 1NO.

I suppose the membership for overseas amateurs is a little pricey at $38.50, but you do get a solid brass lapel badge to wear proudly on your coat!

A regular news-letter ,*Connect Request*, is edited by Larry Joe VE7DIE, pictured in **Fig. 2**. This newsletter is devoted entirely to packet related matters and appeals to both the hardened packeteer and the newcomer alike.

Connect Request covers such items as: 'How to Start in Packet', 'Introduction to TCP/IP', 'What is Aplink', 'Net/Rom explained' and so on. The publication also handles subjects appealing to the pioneer types, with emphasis on the new high-speed, full duplex repeater linking at 56kb. This makes our 9.6kb links look positively slow!

An extensive software library is available including Public Domain (PD) and Shareware as well as specially written programs. It was Fred who, some time ago, encouraged me to run 'MSYS'. Having started with version 1.05, I'm now running 1.10, as are several other local BBS sysops. In fact, I've already passed the program around to other sysops in other parts of the country.

The program is quite versatile, having its own Node, capable of running and forwarding with TCP/IP, database search facility, built-in editor and lots more.

Packet in Cyprus

By the summer of 1991, Cyprus will have its first node 5B4CYP-1. Every amateur on the Island is anxiously waiting its arrival. The source of this latest news is an update coming from Costis 5B4TX:

"This node is not going to be just any old node. Hopefully, it will be one piece of a link which will speed up traffic on the v.h.f. network. We have been planning this for just under two years. Let me explain. Most sysops know the call 4X1RU Jim, who is one of the transatlantic gateways into the USA, Roger, GB7LDI, being the other. As far as I know, Manos (SV1IW) is working on getting organised in Rhodes, Crete and, of course, Athens.

"Thus we will have a link from the USA into Israel, then into Cyprus, (conditions permitting), from Cyprus to Rhodes, then on to Crete, and from Crete into Athens, completing a direct link into Europe.

"This will take a very heavy strain off the h.f. network and hopefully enable a quicker and more efficient feed of both bulletins and personal mail. The only problem occurs during the winter months. For about two to three months, the link between 5B4 and 4X dies a sudden and dramatic death, but we are working on that problem and hopefully will soon have the solution.

"Packet radio is growing steadily here in Cyprus, and once the node is in place, Cyprus will become even more active on the packet scene and more people from all over the world will find out where Cyprus is. The reason I say this is because all mail sent to the UK from Cyprus seems to reach its destination without any problems. However, mail from the UK to Cyprus seems to get lost en route. So, please, all sysops in the UK, please put 5B4 and ZC4 in your forward files toward Roger GB7LDI.

"We presently have 3 BBSs here. The main one, 5B4TX-6, sits on 21MHz/144.675MHz and is operated by myself (Costis). Jon the Syop of 5B4ZL-6 operates on 144.675MHz at Troudos at 1746m ASL. ZC4BBS-6 is a new BBS which is presently being activated on v.h.f. but still undergoing tests. It is hoped to put this on h.f. also. Its location is Dhekelia on the British Eastern Sovereign Base Area. The sysop there is Steve.

"Jon Carp 5B4ZL, who lives on Mount Troudos was kind enough to activate both a BBS and digipeater. He links most of the Island so that most of the amateurs now have access to at least one BBS.

"Here are a few callsigns of packet-active 5B4s: 5B4DV, 5B4ES, 5B4FN, 5B4FZ, 5B4MD, 5B4NC, 5B4QA, 5B4SF, 5B4TX, 5B4UZ, 5B4WF, 5B4XA, 5B4YU, 5B4YX and 5B4ZL". Thanks for the news from Cyprus Costis! Costis, by the way, is responsible for the distribution of the SV9AIZ BBS program and plays an active role in HFNET.

Table 1. Packeteers in China.

Name	Call-sign	Club	Equipment
Meng Chao	BZ1FB	BY1PK	KAM, AST286, TS-940S,TH7DX
Gong Kelu	BZ1AG	BY1SK	PK232, IMB-PC, DRAKE-7, 4-ELE YAGI
Li Yan	BZ1PYL	BY1SK	
Wang Baokang		BY1QH	PK232, PC/XT, IC-750, 4-ELE GAGI
Sun Hongqi		BY3CC	PK232, PC/AT, TS-820S, DIPOLE
Chen Rong	BZ4AYL	BY4AA	PK80, PC/XT, TS-940, TH7DX
Ni Kangwei	BZ4AR	BY4CPA	PK80, PC/XT, IC-750, DIPOLE
Zheng Zhengwen	BZ4CW	BY4ALC	PK232, PC/XT, TS-820, 4-ELE YAGI
Ni Feng	BZ4RDX	BY4WNG	PK232, TRS-80, IC-735, 3-ELE YAGI
Cheng Xiaosu	BZ4RCC	BY4WNG	
Ling Tao	BZ4ROM	BY4WNG	
Li Wensheng		BY4WNG	

Note: BY1 located in Beijing, BY3CC Tianjin, BY4AA BY4ALC BY4CPA Shanghai, BY4WNG Nanjing. At present no BBS in China, so we use VS6UF as our home BBS.

Activity in China

A file received recently from VS6UF quotes a letter from Meng BZ1FB, giving some idea of how packet is spreading. I found it quite difficult to believe when reading some of the equipment involved. Obviously most of it is operated from a club station and I would imagine there is a fair bit of pent-up enthusiasm from some of the younger students out there. The mainly club stations, are shown in **Table 1.**

Fig. 1: Fred Wyatt VE7DFW.

Fig. 2: Larry Joe VE7D1E.

Starting Frame

A few hints from Peter G0GSZ, regarding Lan-Link. Peter and I have sent out dozens of disks to Europe, South Africa, Cyprus, Australia and quite a few to the UK!

WARNING: Lan-link will not work correctly on all TNCs (if any) having only three wires connected in the RS232 lead. I have made up a lead with pins 1 - 8 and pin 20 connected at each end, and this seems to work fine with just about anything.

BEACON: To remove the Lan-link beacon and display your own, go into the parameters menu, (Esc - p), press I to switch the beacon OFF, then press U to upgrade. Then Exit from Lan-link and re-load in the normal way. As long as you have 'programmed' your TNC with your beacon text, etc, it's ready to go!

CAPTURE to DISC and AUTOMATIC LOGBOOK ENTRY not working: If you're using a KAM TNC and only have the normal five pins connected on your RS232 lead, then the 'DCD FLAG' in the parameters menu (Esc - p then X) must be OFF. If you're using any other TNC or, if you're RS232 lead has more wires connected, then the DCD flag should be set to ON. Remember to press the U to upgrade and exit. You should then reload so as to implement any changes.

MAIL SNATCH: If you find that, although you've already told Lan-link that your home BBS is (for example) GB7LDI, and you can see the header from that BBS showing MAIL for you, and you still can't get the ZAP BBS to work - take another look. Check again the header coming from your home BBS. In some cases, instead of the beacon header saying GB7LDI (or whatever) it may say, something like, LDIBBS! This is what Lan-link looks for!

LAN-LINK.SYS: Is a file which is read by Lan-link on first running. If you've been given a copy of LL by a friend he may have modified this file to suit his TNC. This is fine if your TNC is the same. If it's not the same - you could have problems! If you intend editing the file yourself then **READ THE MANUAL. This is the place to find the answers to just about all the questions you may have. Also, don't forget the file README.158, and the APPNOTES 1, 2 and 3.** If you don't have a full copy of the distribution disk, send me a formatted disk plus postage and I'll send you an up to date copy of the full set of program files. The only other thing to remember with this file is that if you do edit it - **don't leave any blank lines.**

REGISTRATION: I know you want to. If you do this will encourage Joe, to do even more work on this already superb program, by writing more upgrades. Arrangements have been made for UK users to register easily. The contact is: Terry G0BIX, P.O. Box 75, Chatham, Kent. or, Tel: 0634 687168.

RTTY BUG: This has been fixed and v1.59 will be out soon I think.

RAM: Rumour has it that Lan-link won't work if you only have a 512K machine. It WILL, but Lan-link needs 450K so, as long as you only have the MS DOS system files loaded (and you are NOT using MS DOS 4.01) you should be ok. If needs be, put Lan-link on a floppy disc formatted as a system disc (i.e.; format A:/s), switch off the machine and re-boot with this disc in drive A:. Better still, upgrade the computers memory.

MESSAGES to JOE via PACKET RADIO: If you do send any packet messages to Joe please do not make them of a commercial nature, i.e.: do NOT mention money or cost, etc. At least one sysop is removing such messages from his box, before they even get to Joe, so you won't get a reply as Joe will never get your message. Be careful with your wording.

South American Packet

The packet activity in South America today, is widespread, although the main activity is in countries like Argentina, Chile, Venezuela and Peru. In Brazil, packet radio is recent, and at present they are creating v.h.f. nets in the cities of Rio de Janiero, Brasilia, Porto Alegre and Sao Paulo. In these cities there are already h.f. and v.h.f. Gateways with entry in QRG 14.103MHz:

Rio de Janeiro: PY1CYL-4 (KA-node, gateway to 145.090MHz) PU1JUD (BBS-W0RLI, 28.113MHz and 145.090MHz

Sao Paulo: SPNET-4 (KA-node, gateway to 145.030MHz) PY2QE (BBS-W0RLI, 14.105MHz and 145.030MHz), PU2NPQ (BBS-W0RLI, 145.030MHz)

Brasilia: PT9KC-4 (KA-node, gateway to 145.010MHz), PT2PO-4 (KA-node, gateway to 145.010MHz)

Porto Alegre: PAE010:PY3SS-8 (NET/ROM, in experience)

See **Fig. 3** for the Rio De Janeiro Net, **Fig. 4** for the Brasilia Net and **Fig. 5** for the Sao Paulo Net.

That's it for this month, please send any news, information, hints, and brickbats, etc., to G3LDI QTHR, @GB7LDI or tel: (0508) 70278.

73 and happy packeting de Roger G3LDI.

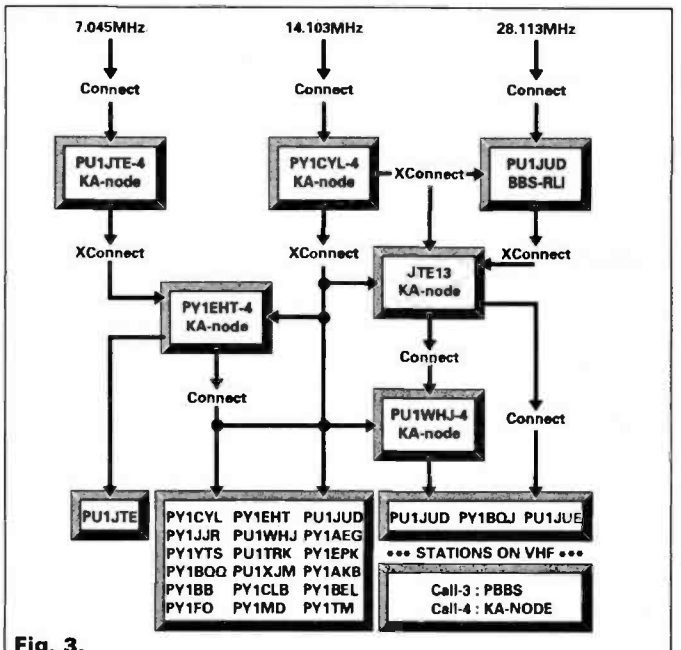


Fig. 3.

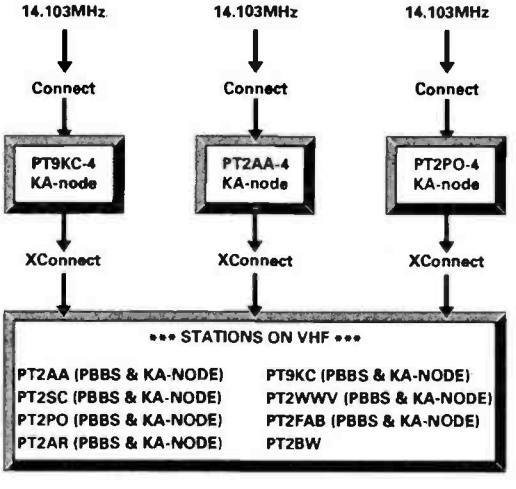


Fig. 4.

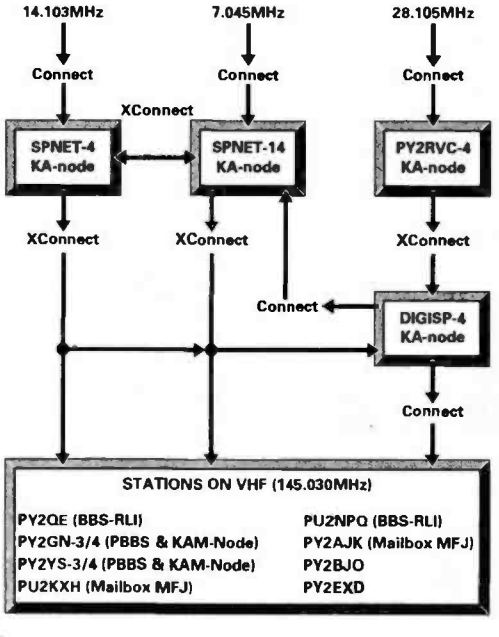


Fig. 5.

FOCAL POINT
The World of ATV

Andy Emmerson G8PTH

Spring is sprung, the rally and contest season is upon us and it's time for another round-up of ATV news. A quick peep in the filing cabinet finds a pile of letters, so let's air them without further ado (count the cliches in that sentence!).

Several of the more enlightened TV repeater groups sent me their newsletters. These often contain valuable nuggets of information, which I am happy to relay here to a wider audience. In addition, their publicity receives a bit of a boost. So, many thanks to the Rugby, Severnside and Kent groups for their good work. I've also 'acquired' a copy of the Home Counties News Sheet this time, I can pass on some of their news as well. As for the other groups, I must assume they went into hibernation for the winter, but how about putting me on your mailing list?

Men Of Kent

The Kent Television Group seems to be going from strength to strength, with 14 paid-up collaborators. They number G4BBH, G8SUY, G8GHH, G6GHP, G4AYT, G4GJA, G4CZJ, G8NVH, G4DVG, G1FWR, G4GUO, G4BFS and G3OGX. As this is not an exclusive club, more will be very welcome. On the technical front, it was decided to adopt the Teletron logic for the repeater on account of its simplicity. This was duly purchased from BATC club sales.

A prototype vision switcher (CQ-TV 141) was also constructed, to complement the Teletron as used on GB3ET. The next item required was the sync' detect circuit, a suitable one being found in CQ-TV 144 using the NE567 PLL.

This was their first failure! On examination with the 'scope, it was found that a small amount of video was still present on the syncs upsetting the NE567, and causing it not to detect 15.625kHz. More head scratching and another circuit was found to take place of the transistor in front of the NE567 (CQ-TV 138). With a quick circuit mod a 1458 op-amp was installed and tested and bingo! It worked better than hoped, sync' could still be detected even when the video had disappeared into the noise. This mod' is now being built into the final board.

Another problem encountered was the tone oscillator filter circuit, (CQ-TV 144) for the c.w. ident' tones coming out of the Teletron board. Overshoot was suffered on the rising edges, causing the Morse to sound clicky and very unnatural (just like computer generated Morse!). A new approach was pursued using a 741 op-amp in an active band-pass filter circuit. This has proved to be very successful and will be incorporated into the final logic board. Circuit details can be obtained from G8SUY.

The p.a. block (using an Icom SC1040 kindly donated by ICOM UK), was constructed and soak tested for 36 hours, producing a continuous, healthy and clean 19W for the duration of the test. Further site tests have been proposed and will be reported in due course. If you cannot wait you can always ring Andy G8SUY on Faversham (0795) 531541.

Having agreed that the proposed repeater would be sited at Whitstable, the purchase of antennas was the next logical step. The group has decided on two Alford slots. The s.w.r. on the trial system has turned out to be excellent, and the performance was far better than expected. A final decision on this matter has yet to be made.

Home Counties News

The High Wycombe repeater's antenna system has been completely replaced with a new set of flat plates, made by Dave G3MPS before he emigrated to Australia. These are about 3m higher and are giving much improved results to the east.

The black brick p.a. lost power and has been replaced. So far so good, with the repeater back on full power. A new experimental feature on the repeater, is an additional sound carrier on 5.7MHz. This relays 144.75MHz whenever the repeater is on, making 144MHz talkback easier, and this has proved useful.

Recently Mike G8LES built a transmitter for G8CKN to use during GB2RS news broadcasts. Tests show that on just 2W, Roy can produce a P4 picture on GB3HV, which is not bad for 56km! Initially Mike will relay Roy's pictures to the repeater, so that he can insert captions and photos, etc.

The first experimental (not properly scripted) news broadcast took place on Sunday 6 January, with G8CKN transmitting directly to the repeater. This revealed a couple of technical problems which should not be difficult to resolve.

After this, the club will send a tape and letter to the RSGB to formally start the service. This will be the first time that GB2RS news has been televised and it marks a great achievement for the club and ATV in general. Well done Home Counties Group and to G8LES for getting Roy on the air, his activities certainly ought to create new interest in ATV.

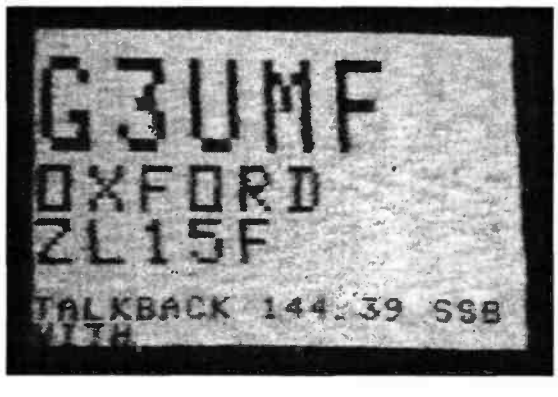
German ATV Club

The latest newsletter from the German ATV club indicates there's trouble brewing. They are seriously considering ceasing their affiliation to their national club DARC, the equivalent of the RSGB. The cause of these bad relations is that the DARC is apparently unable to reconcile the wishes of narrowband-mode users with wideband amateur television. It appears that the 70cm band in Germany is being reduced by 2MHz. The DARC is reportedly not prepared to allow the ATV, packet and RTTY representatives to take part in the necessary replanning of the band.

This does not augur well for the future, and we must all hope something practical does emerge in the end. In the meantime, the 'threatened' groups have united. The AGAF (the ATV club) has linked up with the packet radio groups IGAF, Ampack-Bayern and Nord><Link to form a common strategy to protect the interests of 'technically experimental radio'. This is an excellent move, and one which could well be copied elsewhere.

New Lancashire ATV Operator

Phil Trippear G6GLD, hails from Royton near Oldham in Lancashire. He is just setting up an ATV station with a Sony b/w TV, Microwave Modules converter, and 6-element cubical quad antenna. I didn't know you could get 70cm quads, but he says it all works well, probably on account of the 183m a.s.l. location. He says "I always look forward to your ATV page in *P.W.* It's excellent, I wish there was more of it". So do I Phil, so do I, but thanks for the kind words.



SSTV Revival

"Just to let you know there is life on SSTV ..." So starts a letter from **Eric GW8LJJ**. There's a qualification of course, and that's the news of that life comes from South Wales. History tells us the Romans and Anglo-Saxons made life so unpleasant for the Celts in England, that they withdrew to the relative safety and isolation of Wales. So, perhaps it's the Principality which will become the last stronghold of SSTV in Britain! Be that as it may, I'll allow Eric to resume his tale.

"The latest newcomer is **Bill GW0CIO**. His QTH is Aberbargoed and he used a Spectrum to view SSTV, until he saw the receive set-up of **Cecil GW8MTJ** at Blackwood, Gwent. Bill has now thrown his Spectrum away! Cecil has built the G3WCY/G4ENA converter and has separate transmit and receive units. The latest development is a sampling camera (1970s) with extra mods of his own. I have seen pictures from his system, both over the air and direct, and I am impressed with the results. In fact I think my 'digital' receive system limits the results seen!

"**Bob GW3OVD** of Abercarn, Gwent, used a computer but abandoned it long ago in favour of the, yes, converter circuit; again the same method has been adopted of using separate TX and RX methods.

Glen GW7GTW, of Maes-y-cwmmer, mid-Glamorgan used to have a Spectrum, so did **Keith GW8TRO** and **Peter GW4EAI**, both of Pontllanfraith. (I could have said Blackwood but I felt you probably needed another Welsh word for your vocabulary! (dead right, Eric, I've actually bought a Welsh language cassette course!). Not much seen of Keith with his 'separates', nor of Peter with his receive converter. Glen is our local SSTV repeater. He's the only one who can receive anything from me down in the 'well' of Barry, but he cannot pick up anything from Bob. So Bob sends his SSTV pictures to Cecil, who records them and then plays the recording via 144MHz to Glen, who records them and plays the results over the air to me. Then I transmit SSTV pictures to Glen, and the whole process is reversed. By the time Bob receives my pictures I've gone to bed!

"My set-up consists of separate receive and transmit converters, but I'm also playing with a sampling camera. I would never use a computer for SSTV, and Cecil doesn't even have a computer. We sit on 144.500MHz most evenings and weekends, and would welcome any SSTV contacts. Yes, even computer graphics until you get 'converted'. Hope this will be of some interest."

New Zealand

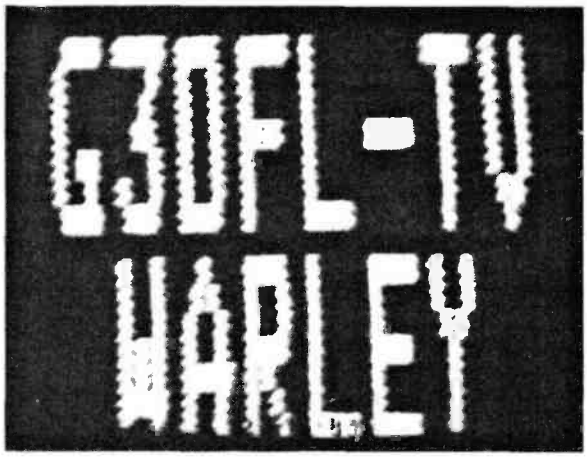
The world's best letter writer, **Mike ZL1ABS,** has been at it again. This time he has sent a list of printed circuit boards for many video and r.f. projects, all ATV-related. The list is five pages long, and several old favourites from *Television* magazine (all the test pattern generators) are included. You might well find something useful here, and the boards would not cost much to post from New Zealand. I'll be happy to send you a copy of the list in return for two unused second class stamps plus an s.a.e. My address is 71 Falcutt Way, Northampton NN2 8PH.

Software Matters

Some while back I mentioned a package called 'AVT Master', and remarked that it was little short of fraudulent that the UK importer charged the US dollar price, only in pounds. With a nearly two-to-one exchange rate this is indefensible and of course, there has been no explanation offered. Accordingly, Mr Everall G6FTA, is wondering if he should order it from the USA, but has heard a tale that the American version won't work in the UK. He finds this unlikely, but wonders if anyone can say for definite and why. If you know please give him a ring on (0992) 27166 - and don't forget to tell us as well!

Old Film

I'll repeat this plea since nobody has responded - yet! If anyone has any old film of ATV activity of more than 20 years ago, please let me know. The archives of ATV are pretty thin, and unless we preserve material now it will be lost forever. Please drop me a line if you can help - all costs will be refunded.



Despite the impression you might get from these pictures, amateur television is not the exclusive province of G3 stations. Anyone can join in!

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*IC-2SE *IC-4SET *Icom WB1 *IC-735 *IC-24ET

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TS430S	***£625***	FRG9600 boxed	***£375***
FT7B c/w 160m	***£345***	TS930S c/w auto ATU v.g.c.	***£1095***
Atlas 210 & VFO rare	***£385***	FRG7 gen. cov. receiver. Clean	***£185***
FT208 H/held 2m	***£100***	ERA Micro, as new	***£135***

Please check availability prior to ordering – don't forget we also take part exchange – phone for details.

Trading Post

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Standard C5800 2mtr mobile m/mode	***£325***	Realistic Pro 32 h/held	***£130***
Lowe SRX30 Gen. Cov. Receiver	***£165***	Sony 2001 Portable s/w rx	***£199***
FT290R 2mtr m/mode Portable	***£345***	Regency 850E h/held	***£120***
TH21E H/held c/w DC con/battery	***£150***	Fairmate HP100E h/held	***£199***
Kenwood TH27 2m H/H	***£195***	Pro 2021 base scanner, choice of 2	***£135***
TOKYO 80m mono bander, boxed	***£245***	MVT–5000 base/mobile	***£199***

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This month 'Quaynotes' starts off by answering a query on the Swiss 934MHz proposals, and then your letters and comments. For 27MHz operators there's the chance of winning a new CB loop antenna - and all you've got to do is think of a suitable name for the antenna!

CB HIGH & LOW

By 'Quaynotes'

As usual, the first job I've got to do in this month's column is to thank you for writing. I'll try my best to write individual replies where I can, but because many of your letters are so interesting it's best to reply via the column.

A good example to start off with at the 'high end' is a fascinating letter from **Bill UK1550** in Dorchester, Dorset. As a keen 934MHz man, Bill wants to know the source of my information about the proposed Swiss 'top end' u.h.f. allocation. So keen was Bill to know - he sent in two letters!

Well Bill, and the various other writers along with the people who, (so I've been told) were bending the *PW* Editor's ear at the London Amateur Radio Show, my sources aren't secret. In fact they were broadcast all over the world by Swiss Radio International. I also read about the proposals in a German-language radio magazine.

Swiss Letter

To try and finally sort out the details about the proposals the Swiss authorities have - I've written to them asking what frequencies they intend to use and what constraints there are planned. So, as soon as I have any news to pass on to you - it will appear on this page.

The many letters and comments passed on to me via the *PW* office tell me, that 934MHz operators are pleased that the 'CB High & Low' is adopting a positive approach to the 934MHz allocation. I can only back up your comments by my own in stating that surely - the only way is forward!

Mick Miller UK569, who also holds the amateur radio callsign of G7EGX, writes from Leigh-on-Sea in Essex with some favourable comments about operating standards on 934MHz. These are, he says, higher than on the amateur 144MHz band. Mick also went on to explain how the 934MHz Club organisation works, with each area representative writing articles for the magazine and reporting to the club secretary.

Rounding off his letter, Mick tells us about the Essex Area 934MHz Club Group's rally which is to be held on Sunday August 4, near Southend. Mick invites anyone wanting more information to call him on **(0702) 512814** or write direct to: The 934 Club UK Secretary, PO Box 934, Featherstone, Pontefract, West Yorkshire WF7 6YZ.

Fig. 1: Bill Reynold's 934MHz station in Kettering.

To round off the 'high end' this time I must mention **Bill Reynolds** in Kettering, Northamptonshire. Bill has been a keen 934MHz operator since 1983 and his homebase rig is shown in **Fig. 1**. Bill says that there are three other 934MHz operators in Kettering. However, the most interesting item he enclosed was a printout of his slow scan television (SSTV) working on 934MHz. Can we have more details Bill? It sounds fascinating.

Thanks also for the letters and cards from **Frank Fuller UK933** and the many others. I'll try and contact you all, or quote from them in the column as soon as I can.

Scene On Twenty-Seven

Again, thanks for all your letters. It seems as though many CB operators regard themselves as being forgotten in the past by *PW*. Well, that's as maybe, but you're not forgotten now!

I've had an interesting letter from **Wyn Mainwaring** from deep inside 'Welsh' Wales. Wyn, who holds the amateur radio callsign GW8AWT, is wondering if there is a diplexer unit available that can sort out 27MHz and 144MHz. This (hopefully) would enable one antenna to operate on either or on both bands.

Speaking for myself Wyn, I've never seen or heard of a combined 27 and 144MHz antenna. It's possible (in the same way we used to do with Band I and III TV antennas!) to use the same feeder cable for both antennas with a diplexer. However, there's a price to pay in the form of insertion loss in the diplexers at each end of the coaxial cable feed. Don't forget that you will need two diplexers, one to combine the two antenna signals and the other to separate them at the rig end.

Loopy Competition

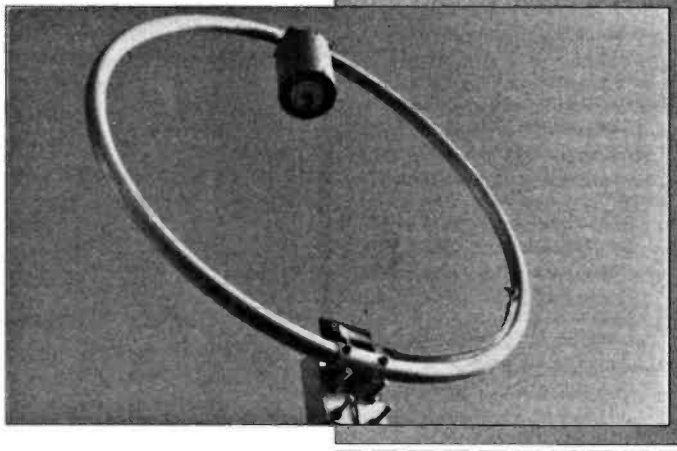
No, I'm not going loopy! But there's a chance for you to win one of the recently introduced CAP.Co. 27MHz loop antennas. The antenna is deservedly proving popular, so much so that I only took delivery of the review model ten days before the May deadline (full review next issue).

However, CAP.Co. aren't too sure if their name for the loop antenna (it's called the 'Hi-Gain DX Exterminator') 'fits the bill' in the way a name should. All you have to do is think of a suitable name for the loop, bearing in mind what it can do. Firstly, the loop antenna can operate efficiently while mounted low down, it can 'null out' interference, and being fairly small, can be mounted inside an average-sized roof space.

So, have a go, avoiding names that have already been used and may be copyright to other products. Send your entry to CB Loop Competition, CB High & Low, Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP, by 9 May 1991 enclosing the corner flash from this page. The competition will be judged jointly by the *PW* Editor Rob Mannion, and the proprietors of CAP.Co. Ltd. Their decision will be final and no correspondence will be entered into.

Best of Luck!

Fig. 2: You could win a CAP.Co. 27MHz loop antenna like this one!



CB HIGH & LOW COMPETITION MAY 1991 COUPON

Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE
287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

I've got a mixture of news for you this this month. Mainly it's about the prolonged spell of good conditions, which has gone on now for quite a while and seems to be continuing for the while. Secondly it's about the clerk of the weather whose rain clouds hereabouts have kept me out of the garden - thanks, pal! **The other, important, item of news that I must include is that the information about the Victorian incoming QSL bureau in Australia (March *PW*), has turned out to be incorrect. The Wireless Institute of Australia (see 'Receiving You') have corrected the report and it's good to know the bureau is fully operational. Sorry about that folks, and I apologise to all concerned for misinforming you with information which was published in good faith.**

The Bands

Conditions weren't just good at h.f., but very reasonable on the lower bands. People who played in the contest weekend, February 16/17, certainly got the works, plenty of sunspots plus very quiet geomagnetic conditions. To keep tabs on what goes on by the week, listen to your local RSGB News broadcasts on Sundays and top this up daily by a listen to WWV or WWVH as appropriate.

Between now and the time this appears, I'll be bending a close ear to the receiver for signs of Jim Smith appearing from Bangladesh S2, and ET2A who is said to be there till April-end. One snag is that the ET2A licence is written in the Ethiopian language and I understand that the ARRL is looking round for a translation. Still with upcoming operations, I must mention the South Sandwich operation by 4K1ZI; there seems to be some doubt both on the Russian and the UK sides about the legality of this one. A pity if it turns out to be South Sandwich Slim, because this is currently one of the most wanted countries on the DXCC list.

The 1.8MHz Band

It's interesting to notice how the news of our local Powys radio club net (1932kHz plus or minus QRM, 1900 on Tuesday evenings) has got around and brought people in to join us. We do enjoy our 'visitors' but on a recent evening I went QRT only to be told later that I'd missed a GM from up in Shetland by ten minutes!

Down in Minster, on the Isle of Sheppey, **G2HKU** puts a good signal out. On s.s.b. ON7BW, GW3JPT, GW0JAI, GW4GNY and on c.w EI7M, GM3PFQ, DL0OV, PI4COM, EI9FK, DL1PM and OY2J.

Short wave listener **Roy Merrall** (Dunstable) noted some 80 assorted European/UK stations on c.w. One Sunday evening N2RM was noted pounding away for 15 minutes before Europe awoke to his presence. In addition a weak N5 and a W8 were noted but they failed to rise much above the noise. On the s.s.b. front, perhaps the prize catch was the GM3YXM/M who was heard to complete with GM4CAZ/P and then put a CQ out 'lost in Glen Garry in the Western Highlands'. However, although he was a thumping signal in Dunstable no one was heard to come to his rescue. He also noted the Powys net on 1.932.

Fig. 1: Paul Essery GW3KFE operating the Powys Amateur Radio Club station.

Down on the coast, **G3BDQ** (Hastings) was another of the many to join our net, and in addition John had the odd session of an evening, in which he worked among others T77V, OY9JD, CT3M and A92BE in Bahrain.

The 28MHz Band

From the lowest to the highest band, and of course, here there is no doubt the good conditions have helped no end. For example, G2HKU mentions that his 4W rig was enough to UA6BCE and N3HKU. On the big box the key was paddled at 9J2BO, K5NA, N4UB, N4AR, 4X4NJ, N3RS, VE3DXR, N6QR, K4LTA, N3RD, W6OV, N7BG, W6DU, K4FU, KN0V, W9GW, N2KW, K4BAI, K8EJ, HI8DA, NR7O, K4XU, W6THN, N3RS, CO1HJ and PZ1DW/4.

Turning to another key paddler, **ON7PQ** (Kortrijk), we find Pat has VQ9AB, 9U5QL, T30DS, TJ1CW, JF2POF/JD1 and 8J8WUS/8.

Now to some s.s.b. Don **G3NOF** (Yeovil) found the band open to N. America till as late as 2300. The G3NOF signal attracted attention from CE0ZCD, FO0IGS, FY0EK, HC1EEV, HK3MAE, HL1AHS, HL9HH, KL7KC, VP2V/VE5RA, TJ1CW, UA4HTT/RV4L, UW0CW, UZ0FWA, VE7DGI, VS6BX, XE2XA, XF0C (Clarion Is.), YJ8RN, ZW0MI (Melo Is), ZX0MXK (Sao Sebasto Is), 5T5HH, 6Y5/N4YBF and 9Y4SF.

Angie G0HGA (Stevenage) mentions she is down to QRP temporarily and in the process of revamping antennas in order to ease a TVI problem; meanwhile just 10W to the long-wire was good enough to raise WW2P, K1TN and UA3QOM.

Short wave listener **Harold Wood** (Manchester) uses a Philips 2935 receiver, a home-brew a.t.u. and some 10m of wire on this band; VP2VE, VO1SA, YV1DRK, 5T5/N5JRC, 5N6JHM, A71CD, YV5ENI, ZF2PZ/P8, ZF1HJ, 5Z4FM, XE2GG, XE2NLD, 7X2BK, CU2BQ, DF2RQ/Z2, ZS6TJ, VU2PS and VP2MR.

The 3.5MHz Band

Firstly I should mention mention the QRP gang. On behalf of the G-QRP and OK QRP Clubs, G8PG notes that the last East-to-West QRP Weekend, held last September, brought in fifty logs. Apparently many more stations than that were active. All the comments have been noted and I understand that the 27-29 September 1991 event will take into account the useful suggestions from entrants. I've also been told that the rules will appear fairly soon. One thing I do know for certain, is that the event will be open to anyone prepared to use c.w. with an input of 5W or less.

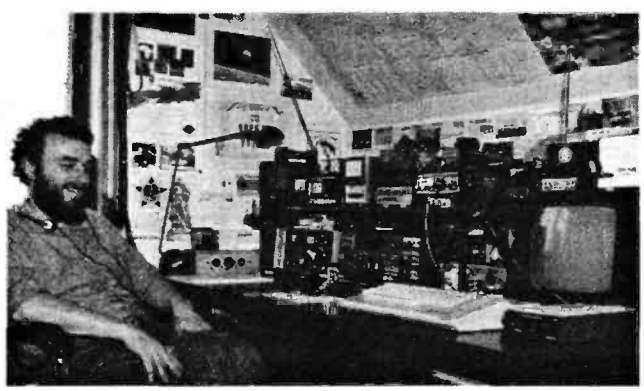


Fig. 2: The well-known contributor to 'HF Bands', Pat Parmentier ON7PQ from Kortrijk in Belgium. Pat's essentially a c.w. operator, and is just completing the toughest of all awards 5BWAZ - with all the outstanding ones on 3.5MHZ.

Now to **G0KRT** in Welling, Kent. Eric continues with his DTR3 at 2W output and Howes receiver, plus an end-fed 25m wire which is operated against a counterpoise. The QRP stations worked included G0JWA, G0IYY, G3INZ, G3LGX, G4CZB, G4GIY, G4TZX, GW3ITT, while FE6DTX, G0ENV, G0EFP, G3ATH, G3OZT, G3PUQ, G4DNC, G4MDQ, G4MZL, G4OXK and G4ZGK were all using normal power levels.

Over to G0HGA again. Angie mentions Y21SL/A, DL1DJL, LY1BWI, UV1AZ, G0DTM, G4ZMH, G4FKH, G4OEC, G3EUK, G4BJM, G3JUT, GW3COI all with 20W to the W3EDP. With 10W to her rig, she managed G0FYP, G4JBD, G3TLB, G4SES, G0GZN, G0KWD and DK6HN.

Turning to ON7PQ, Pat keyed with ZC4CZ, J6LTA, CO8LY, VK2OI, UI8AA and UJ8JI.

Oddments

A letter from **Kevin Walton 9M2ZZ/N4RMF** notes that he is back home and active with the N4RMF call, from Culpeper, Virginia. However, he still has some 9M2ZZ cards and will answer requests sent to him at: Kevin L. Walton 9M2ZZ/N4RMF, PO Box 316, Culpeper, Va 22701-0316, USA.

According to W6OAT, NCDXC is pressing the DXCC Desk to give separate country status to North and South Korea. Their reasoning is that although there has never been any activity from N. Korea since 1948, they believe that some Soviet operators may well be game to attempt to activate N. Korea in the relatively near future. Thanks *The DX Magazine* for this information.

WARC Bands

Pride of place and welcome to a new reporter. **Mary G0ZNA**, (Kirkby-in-Ashfield) got her ticket on September 1 last year, and after a sniff round the bands has decided that 18MHz suits her fine! Her first three contacts on h.f. were on this band, by way of VK5AWG, VK6ADU and ZL1CCS on September 10-11. Since then she raised such goodies as JA2VPO, VK3EO, FG5BG, FM5WD, VP9HE and T77J, all s.s.b. - but the first ZL on the key has been achieved too. On the equipment side Mary has a TS-440S plus a half-sized G5RV antenna.

Down in Yeovil G3NOF notes that 24MHz has increased in popularity of late with a big increase in the USSR stations using the band. On 18MHz Don found AL7I, RA2FF, KB0NL and VE8QL. The list is longer on 24MHz, including A71AL, A92BE, AL7I, CT3FT, EA9TL, FG5BG, GI4WXA, HL1IUA, HP3FL, HF0POL (S. Georgia), JA2KSI, JA3BFL, JA4DND, JA6CUH, JH2UVL, JH5AVM, KB0NL (N. Dakota), KL7XD, KP2A, LX2OX, N7JJN, OD5CX, OY9JD, PY3TD, RD7DZZ, TG9AJR, UA4HTT/RV4L, UA9SAW, UF6DZ, UG6LQ, UL7TC, UO5BG,

Back-Scatter

UW9SR, UZ0AXX, VE8QL, VK1FT, V2/WD4FSY, VK1FT, VK4CEK, VK6GU, VK8GN, VP2E/N0LMD, VU2RX, W7MAD (Montana), ZB2IT, ZP5SR, 6W1QJ, 8P9FC and 9H1MF.

On 24MHz, says ON7PQ, he worked VP2EXX, A22AA, FM5WD, HK7AAG, CO6DD, K8MFO/6Y5, OH0BBF, TJ1CW, FH5EJ. On 18MHz, K8MFO/6Y5, VP2V/W2GUP, TJ1CW, 9Q5UN, PJ9JT, VK9LM and CU2AK. Which left 10MHz to produce C9EC, FH5EJ, ZD8VJ, 9Q5UN, UJ8KA, ZC4CZ, J6LTA, K8MFO/6Y5, CO1RH, JW9VDA, 9M6UY, T30DS and CU2AK.

For G2HKU an interesting c.w. contact on 10MHz was with Rod Newkirk W9BRD, of *QST* fame, LA8UC and K2QPR/4. As for 24MHz, Ted found AB5X, 9Q5UN and W2BA.

The 7MHz Band

From his base in the north-west, **G3LPS** (Blackburn) kicks off here. Eric is another correspondent to note how 'conditions' have appeared thanks to the high spot-count and low geomagnetic level. Interesting c.w. QSOs included UA0QFC who gave the temperature as -32°C (Brr!), UI8IZ, YC0HML/3, K6DC several times, 8P6AU, RA9LBH, JA7IC, ZL0AAD/ZL7, P4 Y, UG6GDA several times, RA9AAV, C30CAG, UA0ACG, YQ3R, W7XR, AD6C, KT7G, W6TC (long path), UJ8JI, JA7BXS, JR1ATQ, JA3FKK, JH7XM, W6TSQ, UA9LQ, AA5DX/MM near KH9 (this one was tough copy due to the presence of an echo on the signal), 4X/YU4OO, UI8IZ, UM8MTT, 4K2/UV3CC, N7UA, VE7SV, UA0ACG, UM8MTT again, N6DKP, RA9OU, V85AA, JA1CXC, JS6CDB, JA0ARJ, RV45/RA3AUU, PY5AJE, PT2DMS, UF6FEI, UA0YO and UV9G/UA9XBE.

Now to G2HKU who notes c.w. to JA4JKR, VP2E/NR1R, K2LE, EA6ZY, HI8A, CT3CU, N4AR, K3ZO, NN8R, W8OZM and WB8YJF.

As always c.w. was the preferred mode at ON7PQ. Pat thus made it to 9M8AX, 4K1A, VK4VB/Z2, 9U5QL, 9X5HG, Z21HQ, T30DS, 9Q5UN, ZK1XL, VK9LM, 9H3JR, 9M6UY and LU6EF.

Yet another c.w. fan is G3BDQ, who notes his QSOs with UJ8JKK, UL7PIG, JA0KAZ, JH3JPM and JA4KGR.

G0HGA also prefers this mode. Her QRP c.w. on this band got out to K2MGR, W3VT, NJ8G, KT10, VE1AYY, UL7PGA, K1ST, NQ2D, K3ZO, EA6ZY and J6LTO for a new one on the band.

The 21MHz Band

Just a couple of contacts for G2HKU. Ted found K4LTA and PJ2JP.

Pat at ON7PQ managed 3D2QB, ZW0MI, 9U5QL, XZ9A, T30DS, ZK1XO, 3D2AG and TJ1CW.

Both the above were on c.w., so now we turn to G3NOF, who offers s.s.b. contacts with A22AA, BZ4DFJ, HS0AIT, P29NMD, VK9LM, VP5DM, WB6UMC/9K (Kuwait Airport), W7LXR and 9U5QL.

The 14MHz Band

G2HKU notes just one s.s.b. contact, with ZL3FV, but on the key he notes N4UB, 4X4NJ, K2LE, W1OT, W1RAN, N3RD, K4LTA, KN0V, N3EA, K9QVB, K4FU and HK3HY.

At ON7PQ, the log entries read: 9J2SZ, T21CE, V63BH, ZK1XO, T30CT, 4K2/UV3CC, A41JV, A22GH, FR4FP, AT0NRO, T30DS, 9M8WB, VK9LM, K8MFO/6Y5, 9M6UY and T32AF.

A92C, BV2AR, BV2FB, BY1QH, DU1KT, FG5BG, HB0/DF3UB, JT1CS, RJ0J, ST0DX, T30A, T30DR, VKs, 4K4/UA0KBZ (Wrangel Is), 5H3DC, 7X2VZK, 7Z1AB and 9U5QL all fell into the lap of G3NOF.

Meanwhile G0NZA does occasionally change from 18MHz and on 14MHz Mary managed to break her duck by way of YV5ENI.

In Hastings G3BDQ was trying his half-wave doublet as a vertical against ground and he found VK2GV, UI8AA and - best of the bunch - OE8NOK/ZL5 in Antarctica.

So there it is for another time! Deadline for the next lot to arrive no later than May 1 and June 1. My address can be found at the head of the column. Meanwhile, enjoy yourselves and I'll be delighted to hear from some more new contributors to join our happy band!

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

Solar Data for February 1991

The last week of January saw an upsurge in solar activity, with flares occurring on January 21, 23, 25, 27, 29 and 31. The solar flux measured a level of 367 units on January 31, the highest so far for cycle 22. The magnetic storm activity during this period was the cause of a 'Scottish type' aurora on February 1. The quieter side of the sun was in view between February 4-17, but even so a number of major flares were observed on February 7 and 8. During this period, those with suitable viewing equipment were able to see some very large sun spot groupings. **But please don't try viewing the sun directly yourself!** From February 18, the more active side of the sun rotated into view again with much flare activity being reported. At 1600UTC, on February 19, another 'Scottish type' aurora was observed in central England. The quiet side of the sun started to come into view from February 25 and the solar activity declined.

The solar flux index see-sawed from 367 units on January 31 down to 175 units on February 10, it then climbing back up to 311 units by February 24. At the end of the month it had reduced in value to 233 units. The daily geomagnetic A index fluctuated greatly during the month, alternating every 5 days or so from values of 3-5 up to values around 10-20. A peak value of 21 units was recorded on February 1, other active days being the 8th and 12th when the A index measured 17.

The increase in February's solar indices lends more credence to the predictions of the past few months of a second 'relative maximum' or at least an extended maximum for Solar Cycle 22. It still does not appear that the increases in activity and solar indices seen over the past several months will be enough to overtake July 1989 as the solar maximum.

Propagation Forecast

It's difficult to predict accurately what will happen during the period April-May. There is certainly an increased likelihood of auroral propagation which may affect the v.h.f. bands between 50-144MHz. I advise you to listen to transmissions from WWV giving the 3-hourly geomagnetic K index. This information is given at 18 minutes past the hour, the figure at 1518UTC being particularly useful in gauging whether an aurora is impending or indeed already in progress. If you can't get away with a communications receiver and a long wire in the office, you could telephone 0101 303 497 3235 for the latest solar terrestrial indices. A K index of five or greater is a sign to stop work and nip out before the boss finds you! During this period, the first indications of the summer Sporadic-E season should also be noticed. This will normally effect the 50-70MHz bands but always be prepared for the unexpected. You won't be able to predict these openings, it's really a case of being in the right place at the right time. The trans-equatorial path, on 50MHz, may possibly allow contacts into southern Africa and perhaps South America. Look for openings to ZS6 around 1000UTC or 1600UTC and those to CX/PY around 1300UTC or 1900UTC.

The 50MHz Band

The conditions on 50MHz were fantastic! Great! I worked all continents in three hours! The band was in tremendous shape during February with openings nearly every day. During the middle of the month the band was open for 12 consecutive days. Propagation was especially good to Oceania and Africa although there were some openings to Asia and North and South America. The excellent conditions continued through to at least the first week of March allowing many stations to work into Australia, Philippines, Guam, Argentina, Uruguay and Brazil but more of that in next month's column.

I start off this month with details of the openings into Oceania and Asia. The first reported opening was on February 5 at 0900UTC when KG6UH/DU1 (PK04) in Manila was heard by G3RFS and G3HBR. From 0945UTC, VK3AMZ and VK3OT also became audible in the UK. This opening was the prelude to five continuous mornings of propagation, mainly to the Philippines but occasionally to Australia and Japan. Among the DX stations worked from the UK during this period were KE9A/DU3, KE0SC/DU3, JR6WPT and JR6WXY. No far eastern DX appeared to have been heard in the UK on February 11, but amazingly **Bob Cooper ZL0AAA** (RF65) reports that his c.w. signals were copied by DK2EG (JN59) at 0821UTC. This is the first time that 50MHz signals from New Zealand have been heard in Europe. An in-depth, three page analysis of these results were published in the February edition of the *Six Metre and Up DXER*, a monthly newsletter that's written by G4VXE and myself. In the UK, openings to DU and VK resumed again from February 15 lasting until the 19th. Callsigns mentioned most often included KG6UH/DU1, VK3OT, VK4ALM and VK6JJ. **Ela Martyr G6HKM** (ESX) also worked VK8ZLX (PG66) on the 15th and VK8GF (PG66) on the 19th. **Geoff Brown GJ4ICD** (JER) heard, on February 19, V73AT on the Marshall Islands, in the Pacific Ocean, working VS6WV! He was peaking 529 at 1000UTC. Geoff heard him again on February 25 but despite signals being quite strong a QSO was not completed. Only one European station, I0DLP, has so far managed to work V73AT.

It seemed there was hardly a day during February that didn't support propagation into Africa. All the regulars were there, TR8CA, TU2OJ, TU2UR, TU4DH, 3X1SG, 6W1QC and 9L1US. A welcome addition to the growing numbers active in Africa was TL8MB (JJ94) operating from the Central

Back-Scatter

African Republic, but be quick, as he leaves there during May. Cards go via his home call sign FD1JKK.

There were also a number of openings into South Africa during the month. On February 2, around 1115UTC, the ZS5SIX beacon (50.321MHz) was heard in southern England. About 20 minutes later, ZS5DW (KG50), popped up and worked a number of UK stations before disappearing around midday. The Ascension beacon ZD8VHF was S9+ prior to this event. Another opening, on February 16, between 1215-1330UTC, gave many UK stations contacts with ZR6EMN, ZS6SS, ZS6LN and ZS6WB.

Geoff GJ4ICD worked PT7NK and PZ1AP and heard PJ4E on February 1. He also worked PY0FF (HI36) on the 4th and heard him again on the 12th and 22nd. There seemed only to be one good day during the month that allowed contacts to be made into South America. This was on February 12, when between 1250-1340UTC, OA8ABT, PT7NK and YV5ZZ were all busy working many UK stations. The French Guyana beacon FY7THF (50.039MHz) was reported to have been heard on February 1, 3, 6 and 11.

Propagation into North America was quite good on a number of days, most correspondents mentioning the openings on February 3 and 24. **Ted Collins G4UPS** (DVN) worked K8ATQ (EN91), K8MFO, W8IDU (EN83), WW8M (EN72), WZ8D (EM79) and W9OEH (EM79) and many others between 1530-1630UTC on February 3. Of course, all this action was not restricted to the UK alone. **Johan Van de Velde ON1CAK** reports that this opening was one of the best he has heard since coming on the band, contacts being made with W1-4, W8 and VE. The F2 conditions were also excellent on February 24, between 1145-1500UTC, with many UK stations making contacts into W1-3 and VE. Apart from the American and Canadian activity during the month, a few operators managed to work KP2A (Virgin Islands), on February 1, 3 and 11.

If you've run out of countries to work on 50MHz, you could try listening on 28.885MHz for a spot of crossband activity. The Radio Club Pane Djukic YU1ANT in Belgrade is now capable of receiving on 50MHz, using a Yaesu FT-726R transceiver and dipole. They expect to have a 4-element Yagi in use for the Sp-E season.

Ralph 4X4IF has in the past worked a large number of UK stations, with 28/50MHz crossband capability. He reports that negotiations, regarding operation on 50MHz, have proved successful and that he is now active on the band. Access will only be available to those with an extra class licence, power limited to 25W output, in the frequency band 50.100-50.150MHz. His first UK opening was on February 15 when he worked GI8YDZ at 0900UTC.

Jon 5B4ZL passes on the good news that the Cyprus authorities have also granted 50MHz operating privileges. The regulations exactly match the UK allocations, 50-52MHz, at a power level of 20dBW e.r.p.

The report that 4X4 and 5B4 have now joined ZC4 in allowing 50MHz operation, means that the UK has three Asian countries within Sp-E range. Good news for those that have worked VK, DU or KG6 and are looking for the difficult continent!

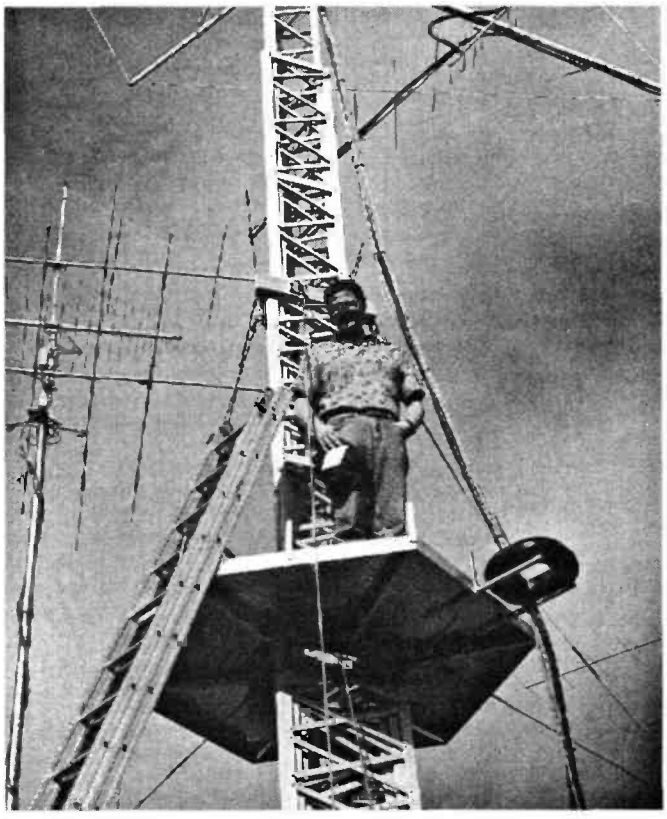


Fig.1: Dan Gautschi HB9CRQ who is proposing to start a 144MHz EME Newsletter.

The 70MHz Band

In the March issue of *PW* I gave details of the new 70MHz band plan which came into force on 1 March 1991. According to **Neil Lasher G6HIU**, national mailbox co-ordinator, this has caused a little consternation among some packet radio operators. I reported that 70.3125, 70.325 and 70.4875MHz are all packet radio usage and indeed this is correct. It's the term 'usage' that has been mis-understood. This is only meant to imply the general use of these frequencies. It is very similar to saying that a certain part of the band is used for f.m. telephony without being specific about the actual use of each channel. And so it was the case with the 70MHz band plan as published. To be specific, 70.3125MHz has been allocated by the v.h.f. committee, of which I am a member, for packet radio usage. However, the data communications committee have yet to decide exactly what to put on there. If you have any suggestions, please contact G6HIU. Regarding the other frequencies, 70.325MHz is mainly used for DX clusters and 70.4875MHz is used for mailboxes, forwarding and user access.

Between January 29 and February 25, I operated from my home QTH using the callsign GB4MTR. During this 28 day period, I made 87 QSOs on 70MHz with 56 different stations. Despite the poor prevailing conditions, s.s.b. contacts were made all over the UK, from the Isle of Wight (G8DDY), up to Aberdeen (GM0FRT), and over to Belfast (GI4SJB/P). I also aired the call on 50MHz contacting stations in DU, TL, VE, W, 3X and 9L.

John Bruce GI4SJB (DWN) is well known to many 70MHz operators for his portable activities from County Down, especially during the recent cumulative contests. Following comments from a number of stations, he has agreed to operate from the much wanted counties of Fermanagh and Tyrone. He will operate from one of these during the 70MHz w.a.b. contest on June 9 and from the other one during the Trophy contest on September 29. John mentions that he now has a 5-element Yagi up at home, and despite the poor take-off to the east and south, hopes to make some contacts in a northerly direction via aurora. He runs an FT-290R into an RN Electronics transverter giving about 25W output.

The 144MHz and 430MHz Bands

There has been very little feedback regarding 144 and 430Mhz, despite tropo conditions being excellent into central Europe on a number of days during January and February.

Gerry Schoof G1SWH reports working GM3JFG (IO77), for a new country and county, on December 30. He is hoping to work the Scottish station on 1.3GHz, maybe this year, as GM3JFG has now increased his cavity amplifier output to 70W.

Being honest G6HKM confesses to have spent very little time on 144-430MHz, most of the time having been spent chasing the DX on 50MHz. She contacted her first GM of the year, GM8ORG/P (DGL), on 144MHz, during the contest on March 2-3. The same contest enabled 12 counties and three countries to be contacted on the 430MHz band.

Steve Damon G8PYP (DOR) found time not only to work the DX on 144-430MHz, but also to complete WAC on 50MHz by working VK6PA (OG89) on March 3. Tropo conditions on January 28 were good, Steve working DB8KJ, DC6KI, ON4ANH and PA3EPA on 144MHz and PB0AHX on 430MHz. DJ9QL (JO31) was also contacted but was subsequently lost as signals faded into the noise.

VHF News

Dan Gautschi HB9CRQ, shown in **Fig.1**, is proposing to start a monthly e.m.e. newsletter catering for the 144MHz enthusiast. The bulletin would cover activity reports, station news, sked requests, technical information and anything else to do with 144MHz e.m.e. You can telephone Dan on 010 41 6471 5544 for further details.

This year's Scandinavian v.h.f./u.h.f. meeting will be held in the resort village of Seljes (KP13SR) in western Finland between June 7-9. A number of UK operators normally attend this traditional meeting comprising of lectures and discussions. You can get more information from Ari Naappa OH6CL by telephoning him on 010 358 68 29475. Finland by the way, is two hours ahead of UTC.

If you can't make Finland, than why not Italy? Following the signing of CEPT recommendation TR 61-01 by the Italian national society ARI, UK amateurs can now operate in Italy without a special reciprocal licence. Class A licensees will use the prefix IK and Class B licensees will use IW. In this latter case, operators are restricted to 10W power input. Operation is allowed on all v.h.f. bands, including mobile operation. Ideal for the Sp-E season!

The Polish v.h.f. manager SP5CCC has provided details of the SP VHF award. All contacts, even mobile or portable, made on 144MHz and above from 1 January 1962 are valid. There are no restrictions to mode or bands used and no QSL cards are required. The award is also available to s.w.l.s. To make your claim you must contact stations in the Polish districts SP1-SP9. There are 3 award classes available.

Class 1: 50 different Polish stations in six districts, where 15 contacts must be over a minimum distance of 200 km.

Class 2: 35 different Polish stations in four districts, where 10 contacts must be over a minimum distance of 100 km.

Class 3: 25 different Polish stations in two districts.

The application, together with 10 IRCs should be sent to Tomasz Ciepielowski, P.O. Box 19, 03-996 Warsaw 131, Poland.

Beacon and Repeater News

A new 50MHz beacon to listen for is ZP5AA operated by the Radio Club of Paraguay. Located in Asuncion (GG14), the 5W beacon commenced operation in January on 50.0245MHz. It was heard by a number of stations in southern England around 1330UTC on March 9.

You are more likely to hear the new

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Swedish beacon SK6SIX operating on 50.080MHz especially during the Sp-E season. Located in JO57QJ, the beacon transmits alternately at power levels of 1W and 10W into a vertical dipole.

Following the changes to the 70MHz band plan, the UK beacons are to be moved within the new beacon sub-band, 70.000-70.030MHz. The proposal is that GB3BUX will operate on 70.000MHz, GB3REB on 70.010MHz, GB3ANG on 70.020MHz and GB3CTC will change its call sign to GB3MCB and operate on 70.025MHz. It must be stressed that these are proposals, and that the moves, if they take place, will take some time as the licensing formalities have to be completed beforehand.

Is it a beacon or is it a repeater? The Bedford 1.3GHz unit GB3BW has returned to service following a rebuild. In common with all similar microwave systems, it transmits continuously as a beacon when not being used as a repeater. It operates on channel RM6, the transmit frequency being 1297.150MHz.

Until recently all UK repeater and beacon licensing, irrespective of mode or band has been administered and paid for by the Radio Society of Great Britain. A decision has been made by the RSGB Council to pass on some, but not all, of the administration charges directly to the repeater groups and have requested that such groups should contribute £25 per year towards the administrative costs of each repeater unit. Personally, I think this move is regrettable, but even so, it is probably a sound judgement based on correct financial accountability. However, I hope that this decision does not effect the technical innovations of specialist groups involved with a.t.v. or microwave repeaters, or indeed the packet radio or voice repeater network. Now, more than any other time, is the need for users of these units to contribute to their running costs. All repeaters or packet mailboxes have system operators. Find out who runs the unit that you use. Join your local repeater or DX Cluster group and contribute to its upkeep.

Meteor Scatter

Fancy a sked with Yugoslavia? Ivo YT3ET can be active on either c.w. or s.s.b. every day from 2100-0500UTC. He is located in JN65TX and runs 300W to a 16-element Yagi with an MGF1502 l.n.a. To arrange a schedule, simply pick up the telephone and dial 010 38 65 21217.

Sonny Horsfall G7DCT was kind enough to supply me with a copy of a program he has written for high speed c.w. on an IBM p.c. or compatible. It is especially tailored for the m.s. enthusiast and allows transmit speeds up to at least 2000 letters per minute. Keying of the transmitter is via the computer parallel printer port, making it cheap and easy to construct. Further details can be obtained from G7DCT, 2 Temple Walk, Halton, Leeds LS15 7SQ.

Meteor Showers

The following data, concerning meteor showers occurring during April-May, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The Lyrids meteor shower will be encountered between April 18-25, peaking on Monday 22nd. Between 0200-0400UTC beam north-east or south-west, 0400-0700UTC beam east or west, 0700-0800UTC beam south-east or north-west, 0800-1000UTC beam north or south. The shower radiant is low between the hours of 1400-0200UTC and is therefore not usable for meteor scatter.

The Eta Aquarids meteor shower will be encountered between April 21 and May 12, peaking around May 7. The actual peak is rather broad with several sub-peaks. This is a very complex meteor stream and prediction of maximum activity is difficult. However, between 0400-0600UTC you should beam south-west or north-east, 0600-1000UTC beam west or east, 1000-1200UTC beam north-west or south-east. This shower does not give very good results on the north-south path. The stream is below the horizon between 1700-0400UTC.

The Piscids meteor shower will be encountered between May 5-10, peaking on Wednesday 8th. Between 0500-0600UTC beam south or north, 0700-0900UTC beam south-west or north-east, 0900-1300UTC beam east or west, 1300-1500UTC beam north-west or south-east. The shower radiant is below the horizon from 1800-0500UTC.

The Nu Piscids shower is similar to the Piscids. It is encountered by the earth between May 6-14, peaking on Thursday 9th. The best times/directions are one hour earlier than those stated above.

DXpedition Update

Herve F1HRY will be active from IN78 between April 28 to May 9. He is primarily there for 144MHz c.w. meteor scatter during the Eta Aquarids, Piscids and Nu Piscids showers but you should be able to find him also via tropo. He will be running 250W into a 16-element Yagi.

The Brazilian Natal DX Group are planning to activate St. Peter and St. Paul Rocks (PY0S) between May 1-10, on 50MHz. Cards for the expedition will be handled by Karl Leite PS7KM.

Between May 18-27, Peter PA3BIY will be on holiday in Norway, and plans to operate from some rare squares, such as JP30,31, 32, 39 and 41. As he is uncertain of arrival times and QTH, he will not make schedules in advance. Peter hopes to have an h.f. rig with him to be able to take skeds on the v.h.f. net but if that is not possible he will operate mostly random on 144.148MHz. Speed will be 1200 l.p.m. with LAPA3BIY transmitting the first 2.5 minute period. When operating random, between 0200-0700UTC, he will announce the QRA square by calling 'CQ DW LAPA3BIY'. He will be running 300W into a 9-element Yagi.

QRZ Contest!

The REF e.m.e. contest has a different format this year. Different bands are being used on separate weekends. Unfortunately, the 50, 144 and 1296MHz leg has been and gone, but there is still time to catch the session dedicated for 430MHz, 2.3GHz and up on April 20-21.

The ARRL 50MHz Spring Sprint contest will be held on May 25-26. Although it is unlikely that signals from North America will be heard in the UK, it is always worth while knowing in case the unexpected happens!

A 24 hour 144MHz contest, commences at 1400UTC on May 18. There are entry categories for single and multi operators and for the s.w.l.

A multi-band contest, 430MHz-24GHz, will take place on May 4-5 between 1400-1400UTC. A reasonable amount of continental activity is anticipated during this event.

An RSGB 1.3GHz fixed station contest has been scheduled to run between 1600-2200UTC on Sunday April 14. Both single or multi-operator stations may enter.

A Mayday microwave ATV contest, organised by the BATC, will run between 0001-2359UTC on Monday May 12. It is intended for fast scan television on all bands from 1.3GHz and up.

Scandinavian activity contests will be held on the following dates. 50MHz activity on April 23 and May 28, 144MHz on May 7, 430MHz on May 14 and Microwaves on April 16 and May 21. All band sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

QSL Information

KE9A/DU3: via WB9YXY. Rt 1, Box 173, Endeavor, WI53930, USA.

KE0SC/DU1: K. Keehner. NSD Box 33, FPO San Francisco, CA96651.

KG6UH/DU1: Capt. L. Anciaux. USNR, USCinC PACREP-LNO, US Embassy Manila, APO San Francisco, CA96528.

KJ6WO/DU3: G. Gardner. Box 42, FPO San Francisco, CA96651. USA.

KG6DX: J. Chalmers. 93 Gardenia Ave. Latte Heights, Guam 96913.

TU2OJ: G. Piejougeat. PO Box 634, Gagnoa, Ivory Coast.

Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox @ GB7TCM.

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. These can all be returned if necessary.

Back-Scatter

Broadcast Round-up

Reports to Peter Shore via the *PW* Editorial Office

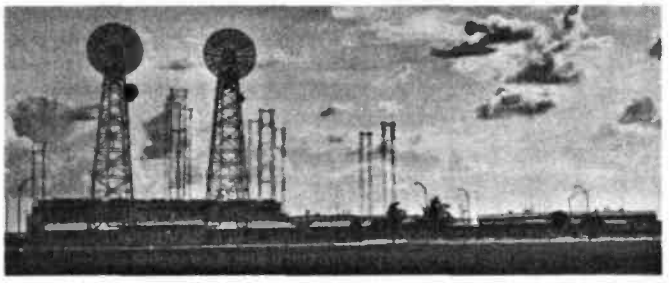
Domestic and international media are now winding down following the cessation of hostilities in the Gulf. BBC World Service, which had added many extra hours to English and a variety of language services, resumed its normal pattern of broadcasting on Saturday March 9. This enables the introduction of a new World Service in English schedule from the beginning of April. Details of some of the new programmes and times are given in the European section of this column.

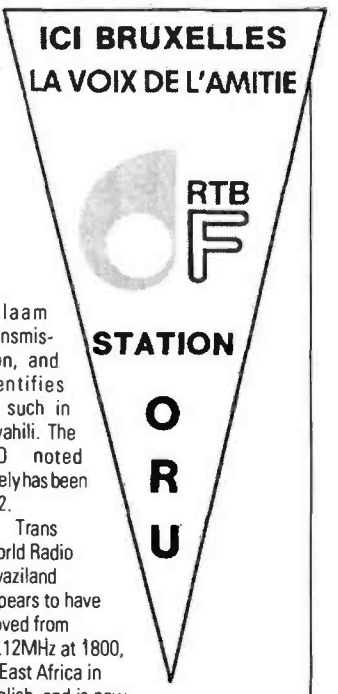
It will take some time before either Radio Kuwait or Radio Baghdad return to the air in their pre-war state. It is unclear at present what damage has been wrought in terms of transmission facilities, but it is likely that the apocryphal picture printed in the February edition of *PW*, was released during the war. The Kuwaiti authorities have asked the BBC to assist with the construction of a new television facility, but it is clear that international broadcasting is low on the list of the Emirate's priorities in relation to the restoration of basic services. Radio Baghdad's domestic service on short wave has settled down to four regular channels which have been in operation for some weeks. Details appear in the African and Middle Eastern section.

Terrorism rarely afflicts international broadcasting facilities, but the Voice of America's Philippine relay station was the target for bombers from the rebel New People's Army at the end of January. A 4.5kg bomb was discovered in the VoA compound, but did not explode. A bomb several years ago destroyed much of the building housing Radios Free Europe and Liberty in Munich. Since then security at the broadcasting centre in the English Garden has been much tightened.

Broadcasts in English are proliferating from a number of stations in the Soviet Republics. Radio Riga and Radio Alma Ata both have regular English language news bulletins, and others may follow suit. A

Back-Scatter





run-down of the newest stations and their frequencies appears in the European section.

There is still no news on Radio Canada International's future. The latest speculation is that the Department of External Affairs will foot the bill for the radio service, but not to the full Can $20 million which it costs to run at present. The station's output could be reduced to solely English and French, with all other languages dropped (even Arabic, despite the Gulf situation), or in the worst case scenario (to use a military term!) make no programmes itself, and simply relay the Canadian Broadcasting Corporation's domestic output.

In Hungary, there are worries that Radio Budapest will be cut by around a half in the summer. We first brought you news of the review of the station's output late last year, and now, it seems that Italian, Turkish and Spanish language transmissions will end. The twice weekly DX programme, which receives some 18 airings in all, may be cut. Protests can be sent to the Director of Programmes, Radio Budapest, Budapest, Hungary. Another broadcaster affected by the world-wide recession is the religious station WYFR, based in Okeechobee, Florida. Cuts of around 25% are expected, since the station is not receiving sufficient income from its listeners to allow it to keep a full schedule in operation.

Finally, anyone wishing to take a last minute Spring-time break in Spain should look no further than the European DX Council's 25th Conference which takes place from May 17 to 20 just outside Barcelona. Full details are available from the Council's UK office at PO Box 4, St. Ives, Huntingdon, Cambs PE17 4FE.

European Stations
All times GMT(=UTC)

Could the spy numbers stations be back in business? Discovered on 3.37 u.s.b. at 1845 on March 11 was the old favourite lady reading German numbers repetitively. This is the first time I've come across her for some months, and indeed I suggested in the middle of 1990 that following the reunification of Germany these transmissions were no more. Any suggestions as to where they might be coming from at the moment, and has anyone any other times and frequencies to report?

Continuing unrest in Albania, combined with the mass exodus of Albanians to Italy, means that Radio Tirana is something to keep a careful ear to. The English service is heard at 1830 on 9.48 and 7.21, and at 2230 on 9.76, 9.66, 7.215 and 1.395MHz. Radio Austria's *Short Wave Panorama* returned on Sunday March 3. It had been off the air during the Gulf War to enable extended news coverage to be broadcast. Hosted by David Hermges, it can be heard at 1130 and 1430 on 13.73 and 6.155MHz.

Transmissions from the French language international service of Belgium, run by RTBF, ended on Sunday March 10. The service, directed primarily to French-speaking Africa, was stopped as a result of budget cuts. Broadcasts from BRT continue in Dutch and other languages.

Radio Sofia in Bulgaria offers interesting listening, with much useful news about the country and its relations with neighbouring Balkan states. English is broadcast:

0730 on 17.825, 15.16, 11.765MHz
1930 on 15.33, 11.66 and 9.70MHz
2130 on 15.33, 11.66 and 9.70MHz
2230 on 15.33 and 11.68MHz

Radio Netherlands has a new listener contact programme. It started on Friday April 5, and it's called *Sounds Interesting*. Host Dorothy Weirs is looking for suggestions of what listeners want to hear in the show, and can send their suggestions to her at the station. The address is PO Box 222, 1200JG Hilversum, Holland.

Radio Norway introduced a new schedule on March 31. English from Oslo is on Saturday and Sunday at:

1200 on 21.695 and 17.82MHz
1300 on 11.86 and 9.59MHz
1500 on 17.79 and 15.305MHz
1600 on 21.705MHz
1700 on 9.655MHz
1800 on 17.755MHz
1900 on 17.73 and 15.175MHz
2000 on 15.165MHz
2200 on 21.705MHz

The new schedule brings with it two new programmes. *Scandinavian Business Report* is a monthly programme hosted by American business journalist Beverly Stephansen, whilst the *Arts Programme*, another monthly feature, will bring news of the arts in Norway and the Nordic countries.

Some new feeder channels have been appearing for Soviet domestic services. A Mayak (Moscow Second Programme) feed has been traced to 19.035 u.s.b. at 0700, whilst Moscow First Programme is heard on 16.265 in parallel with 14.41MHz at various times of the day. **Roy Merrall** in Dunstable corrects an error which crept in to one of his reports a couple of months ago. The frequency for his unidentified Moscow service should have read 3.384MHz, and he traced two parallel channels of 6.155 and 13.71MHz, both apparently active from at least 1730 until 2130 or thereabouts. All this was before the start of the M91 schedule period at the beginning of March, and although Moscow external services continue to use 6.155MHz (noted with an interval signal at 1829GMT), there is no sign of the accompanying channels in the early evening. Roy says that the identification was "something something Radiostantsa." Roy has also heard Radio Kiev's domestic output on a new channel of 9.72MHz, noted whilst he was looking for SLBC in Sri Lanka. He has checked it with the known 6.005 and 6.02MHz, and mentions that the interval signal and identification 'Govorit Kiev' were at the quarter hour. This certainly confirms that it is Kiev home programmes (it must be one of the few, if not the only, station to have news on the quarter hour).

Frequencies for Radio Vilnius changed at the beginning of March. The station's broadcast at 2300 is now on 9.71 (via the Lithuanian transmitter) and on 11.77, 11.86, 15.18, 17.69 and 17.72MHz. Meanwhile, the neighbouring Baltic state of Latvia now has English broadcasts on Radio Riga. It is heard on 5.935 at 2130 daily. Tallin Radio in Estonia has English on Mondays at 2130 on 5.925 also at 2130. There is a medium wave channel of 1.035MHz in parallel.

From Kazakhstan comes Radio Alma Ata, which has English at 0130 on Monday, Wednesday and Friday on 5.915MHz.

Yugoslavia is another country sliding towards civil war, with Serbs fighting Croats, and the police and army attempting to crush revolt. The head of Belgrade Television was dismissed on March 12 since he was according to protesters, wrapped up in the Communist past of the country. R. Yugoslavia broadcasts in English at:

1930-2000 on 6.165 and 15.165MHz
2200-2245 on 15.165, 6.10 and 5.955MHz

BBC World Service underwent some changes at the beginning of April, with a new schedule introduced, including a new edition of *News Hour* at 1300. The 2200 placing for this current affairs flagship programme has been advanced by one hour to 2100. The weekly communications programme *Waveguide* is now heard on Saturday at 0905, Monday at 0530, Tuesday at 1115 and Thursday at 0130.

African and Middle Eastern Stations

Radio Baghdad's domestic Arabic service is now using four channels for most of the time. They are 8.35, 7.35, 4.60 and 3.98MHz.

There is still no sign of Saudi Arabia on the two channels believed to be currently in use - 9.705 and 9.72. Indeed, 9.72 now has Radio Moscow World Service in English at 2000. Any offers from anyone out there?

Africa No. 1 in Gabon has a two minute English newscast at 1258 when the station is on the air on 17.63 and 9.58MHz.

R. Zanzibar has been heard on a measured frequency of 11.7343MHz, reports Roy Merrall, at around 1730 until 1815 or later. The programme at this time is a relay of the Radio Tanzania, Dar-es-Salaam transmission, and identifies as such in Swahili. The SIO noted lately has been 332.

Trans World Radio Swaziland appears to have moved from 15.12MHz at 1800, to East Africa in English, and is now using 9.60MHz to 1845.

Asia and the Pacific

Radio New Zealand International has moved from 17.675 to 17.77MHz, with a schedule currently:

1800-2111 on 15.13MHz (Sunday to Friday)
2111-0630 on 17.77MHz (not Sunday)
0630-1110 on 9.70MHz (not Sunday)
0000-0630 on 17.77MHz (Sunday only)

During the evening 15.13 has Moscow in English, from what sounds like a Far Eastern transmitter - it's very watery! There's no trace of New Zealand at 2000, for example.

A test transmission comes from KFBS Saipan on 9.475MHz with a request for reception reports. The station is best heard around sign-off at 2059.

The Sri Lankan Broadcasting Corporation in English at 2000 until 2130 is heard after 2030 on 15.12 with a strong signal, but suffers from adjacent channel QRM. There is no sign of the alternative channel of 9.72MHz which is now used by Moscow in English.

North, South and Central America

Radio For Peace International has been heard weakly on 7.3745MHz u.s.b. at 0545 Sundays with programmes from Radio New York International. It is also heard on 13.630MHz between 2010 and 2200 with poor overall reception, and occasionally on 21.564MHz at around 1900.

Radio Diffusora Nacional da Columbia from Bogota, on both 11.8216 and 17.8631MHz can be heard from as early as 2145 with relative clarity, although the 25m outlet is cluttered. Programmes are a mixture of studio dialogues, news and music, and the station identifies as 'Aqui Colombia' or 'La Radio Diffusora Nacional da Colombia'.

RAE Buenos Aires in English to North America at 0100, is on 11.71MHz, heard in the UK although somewhat watery.

Radio Nacional de Chile in Santiago on measured 15.1392MHz in Spanish, weak and fluttery from 2108, but improves steadily to a peak around 2200.

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Book Reviews

Transmission Line Transformers
Jerry Sevick W2FMI
American Radio Relay League (publishers) ISBN 0-87259-296-0
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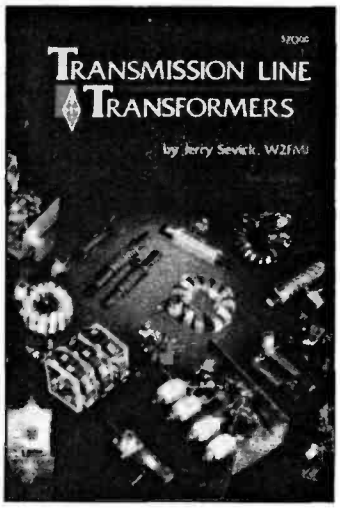
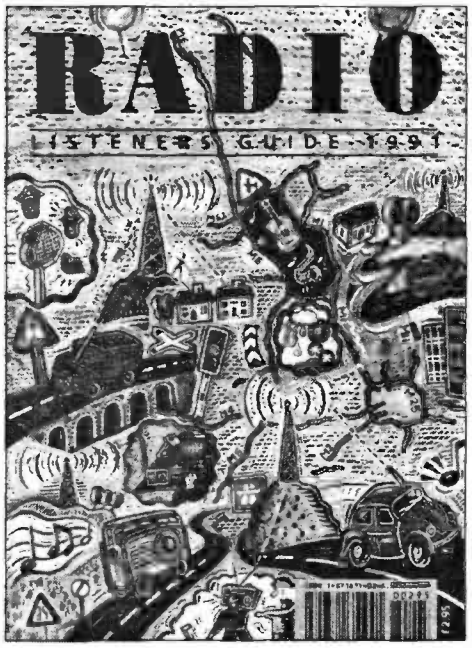


This is the second edition of Jerry Sevick's book. The book covers a most intriguing and confusing (to many of us) area of our hobby. It does so in a way that will enable anyone with a modicum of skill to make a balun, and be able to make the most of that precious radio frequency energy. On the other hand, and despite the practical approach, even the most proficient r.f. engineer will find much to help and guide him. The only criticism that can be laid against this book is the title, as the contents are far more comprehensive than it conveys. A good buy for your workshop and library.

The Satellite Book - A Complete Guide To Satellite TV Theory And Practice
John Breeds (Editor)
Swift Television Publications ISBN 1-872567-01-0
300 pages, £27
Available from *PW* Book Service, 85p post and packing

This book must be one of the most comprehensive manuals on offer for professional and enthusiast alike. In format, it's a large softbound book, packed with information ranging from satellite 'footprints' (coverage and service areas) to the mathematics and practicalities involved with the super-high frequencies used in satellite broadcasting. For the intending practicioner in the techniques, the section on SMATV (satellite master antenna Television) is also very useful. An excellent textbook with some useful practical advice.

Radio Listeners Guide 1991
Clive Woodyear (Editor)
PDQ Publishing, ISBN 1-871611-02-4
56 pages, £2.95



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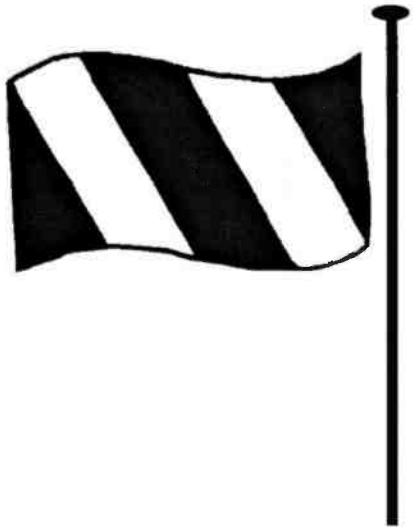
This handy little guide is useful for the technical enthusiast and the listener seeking entertainment from their radio. For the v.h.f. Band II DX enthusiast, the v.h.f. maps and frequency guides are simple and uncluttered. The *Radio Listeners Guide* should be sold with every new radio bought, as it will help anyone find a great deal more to listen out for. Handy, useful and a definite aid to getting the most out of your radio in the UK.



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Trade Stand enquiries welcome to ERC Chairman, Norman Miller, G3MVV, 178 Warley Hill, Brentwood, Essex, CM14 5HF (tel: 0277 225563).

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If you have a subscription then you will know about the *Practical Wireless* Subscribers' Club. If you do not have a subscription then doubtless you will be wondering just what this new page is all about. Membership of the *PW* Subscriber's Club is free and automatic for all Subscribers and is our way of saying thank you to all those who have enough faith in their favourite magazine to pay for it 'up front'. Each month there will be Special Offers and occasional competitions with some really useful prizes to be won.

This month we have two special offers for *Practical Wireless* Subscribers' Club members. The radio hobby and an interest in aircraft history and technology often go hand-in-hand. It's with this in mind that this month we offer club members a different, but very interesting choice of video programmes. They are *Wings at War,* capturing the story of military air power from World War 1 to Vietnam, and *Wings: The Jet Age,* the story of the jet aeroplane using a unique blend of archive and original material to trace the path of progress to the modern supersonic aircraft.

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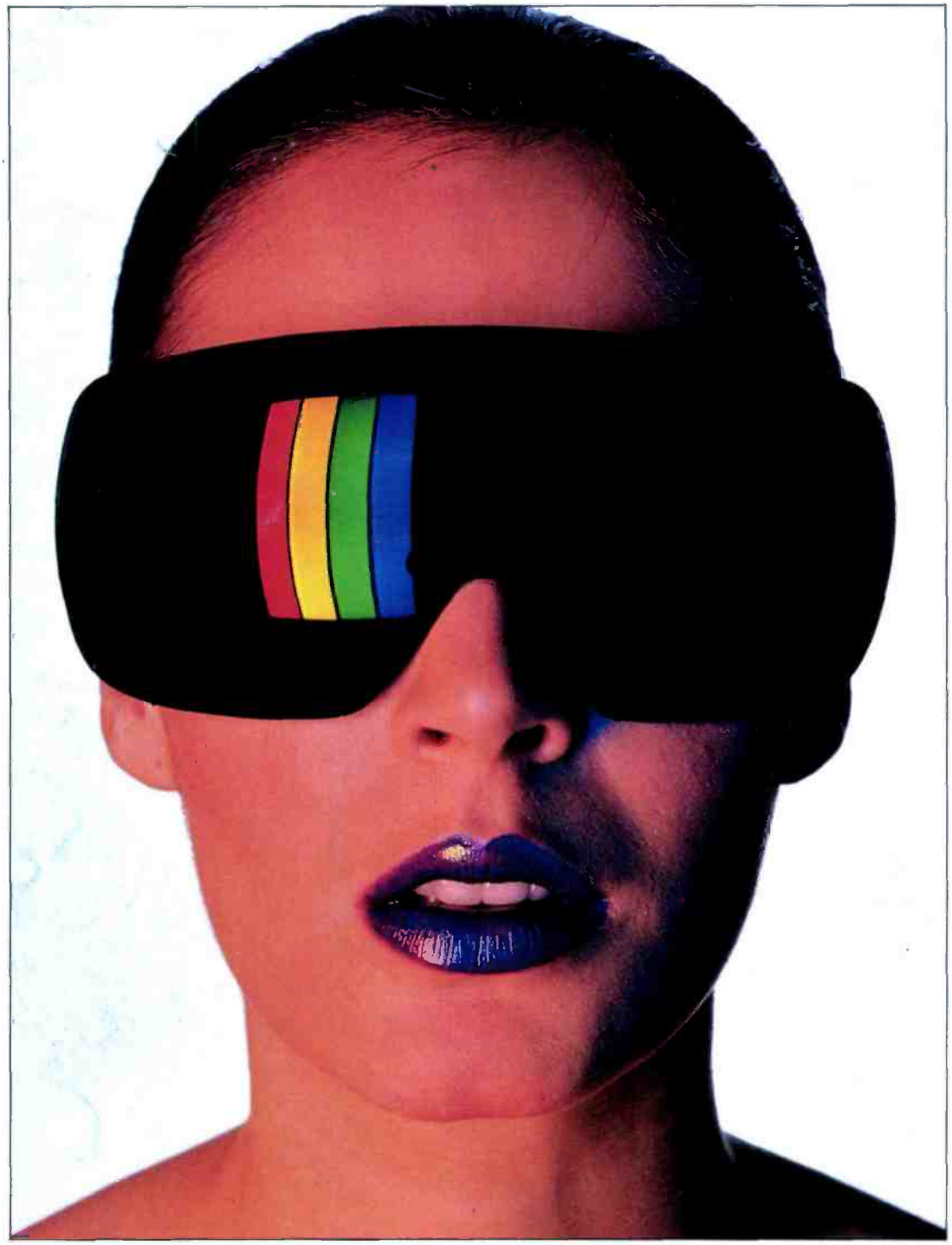

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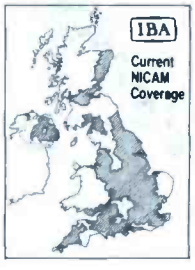

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