PRACTICAL WIRELESS

PW

INSIDE THIS RADIO MAGAZINE THIS MONTH

BUILD

THE PW PEANUT TRANSCEIVER
Amateur Radio In A Nutshell

A LOW VOLTAGE ALARM

FEATURES

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JUNE 1990
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Editor
Rob Mannion G3XFD
Assistant Editor
Dick Ganderton C.Eng MIEE G8VFH
Art Editor
Steve Hunt
Technical Features Editor
Elaine Richards G4LFM
Technical Projects Sub-Editor
NG ("Tex") Swann G1TEX
Technical Artist
Rob Mackie
Editorial Assistant
Sharon George
Administration Manager
Kathy Moore
Accounts Manager
Alan Burgess
Clerical Assistant
Rachel Parkes

Advertisement Manager
Roger Hall G4TNT
PO Box 948
London SW6 2DS
☎ 071-731 6222
Cellphone 0860 511382
FAX 071-384 1031

Advert Copy and Make-up (Poole Office)
Marcia Brogan
☎ Poole (0202) 678033
FAX Poole (0202) 666244

Editorial and Advertisement Offices:
Practical Wireless
Enefco House
The Quay
Poole
Dorset BH15 1PP
☎ Poole (0202) 678558
(Out-of-hours service by answering machine)
FAX Poole (0202) 666244
Prestel 202671191

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FRONT COVER

The Rutland 'Windcharger' kindly loaned by Marlec Engineering of Corby, Northamptonshire.

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Regular Features

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SP767	External speaker	69.95

YAESU VHF

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FNB10	600mAh pack	34.50
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FRG9600M	60-950 MHz scanner	499.00
PA4C	PSU for FRG9600	25.00
FC965DX	Conv. 0.15-30 MHz	89.00

YAESU ACCESSORIES

Most mics and filters from stock.
Please phone or write.

ICOM HF

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IC765	HF transceiver	2499.00
IC751A	HF transceiver	1500.00
IC726	Compact HF tcvr.	989.00
IC735	HF transceiver	979.00
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ICOM RECEIVERS

ICR71E	100 KHz-30 MHz Rx	855.00
R7000	Rx. 25 MHz-2 GHz	989.00

ICOM VHF

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IC2SE	2m handportable	275.00
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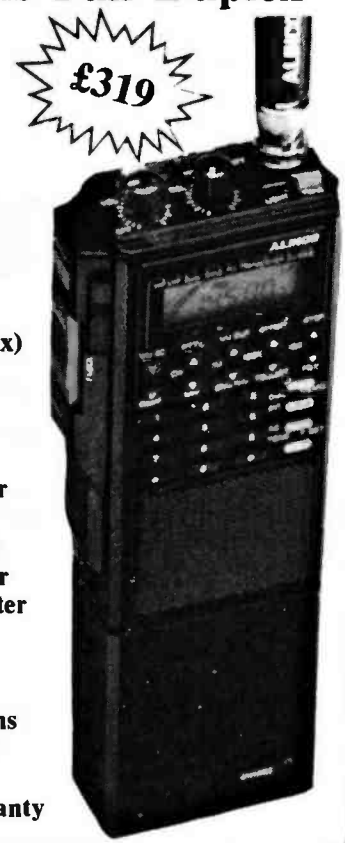

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IC-725	£759.00
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20 Amp PSU	£129.99
G5RV ½-sized antenna	£14.95
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G5RV ½-sized antenna	£14.95
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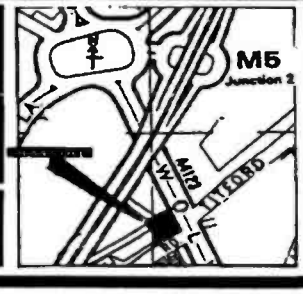

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DISCONE ANTENNA

RAYCOM
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ROYAL 1300 DISCONE
STAINLESS STEEL CONSTRUCTION

A quality unit manufactured in Britain, the Royal 1300 is ideal for wideband scanners & scanning receivers.

Specifications:
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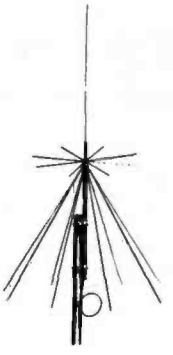
Transmit **50, 144, 430, 900, 1200 MHz**
Power **200 watts**
Connector type **'N'**
Cable supplied **RA519**
Type **Discone 8+8**
Length **1.7 metres**
Weight **1 Kg**



HR1300 discone £59.50

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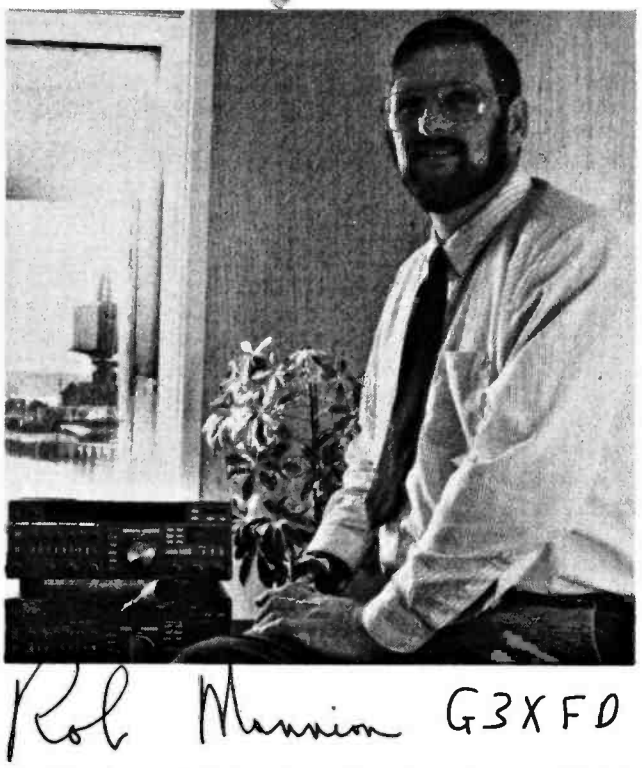


One of the great pleasures that comes my way when attending rallies or junk sales, is the chance of finding a bargain. At this time of year it is possible to have an enjoyable day out, purchase all those 'difficult to find' components and also buy that 'value for money' piece of equipment.

No doubt, you've also found that your particular 'best buy' is often put to one side on arrival in the shack, awaiting the time it will become useful. Unfortunately there's also no doubt that some of today's 'bargains' will be a best buy for someone else at a rally next year and so on!

In the past I hoarded items for 'rainy days' that never arrived, but nowadays I keep a look-out for gear that I particularly need. In fact I've just attended a very good 'junk' sale and have come away with some very useful 'goody bags' of components for a school radio club. At the same sale I bought an excellent home-brew transceiver chassis with all the metal work (which I was never very good at anyway) completed. With some re-thinking and adjustment to the chassis, the school club will eventually have an attractive c.w. transceiver for a very small outlay.

This aspect of amateur radio is an important one to my mind. To purchase - at a very reasonable price - the necessary parts for equipment, meet friends and see what's on offer from the various dealers' stands - all in one day - must be one of the most valuable assets we have in our hobby.

Bring & Buy

Apart from the dealers' stands that keep me going on components until next year, the main attraction for me is the essential 'Bring & Buy' stall. Here, for a small commission, equipment is sold on your behalf. My first oscilloscope was purchased in this way and I'm pleased to say that it is still going strong - albeit in someone else's shack.

Unfortunately, the main rally season is limited for many of us by our time and pockets. The era has long since passed when I could afford to travel for pleasure to as many as 20 events a year, and there must be many others in the same situation.

Many attractions offered by rallies, such as the bargain stalls, can only be partly off-set by the various small display advertisements in the magazine. Still, if we can't get to the various bring and buy sales - they could perhaps come to us via *PW* as a page devoted to reader's 'for sale' and 'wanted' advertisements.

The 'Wanna Swap?' page, which already caters for part of the need, would be absorbed into the new 'Bargain Basement' section. Here, reader's prepaid, strictly limited lineage advertisements would be displayed. Still, I must stress at this point that the idea is only a suggestion open for your comment. Whether we do offer this facility will depend entirely on the response from you, the reader, and I look forward to hearing from you on this matter.

Going Green

As our front cover suggests, radio enthusiasts can truthfully claim to be among the pioneers with regards to alternative technology. For many years lone enthusiasts, clubs and groups have operated amateur radio stations from many varied and interesting locations without the benefit of 'mains' electricity. Indeed it has always been a challenge for some radio amateurs, to operate under the most difficult conditions possible. Despite tremendous difficulties they've often achieved excellent DX results from small islands, reefs and even remote pinnacles of rock.

To operate from sites like those already mentioned requires a variety of alternative energy sources. Often, the power required will be supplied from a petrol-driven alternator which, over the years, has evolved into a reliable, although expensive stand-by system. But some sites demand that other, more 'neighbour friendly' methods of obtaining power be utilised so that operations can continue with the minimum disturbance to other users.

In particular I'm thinking of portable operation from the many caravan and camping sites, hilltop and off-road picnic and beauty spots that abound in the British countryside. Despite being a long-time radio enthusiast, I am not keen to find myself on a beautiful hill-top site occupied by someone using a petrol-driven alternator set. Unfortunately this is becoming a very common occurrence as many caravans and motor-caravans require an external source of 250V a.c. to power air-conditioning systems when the vehicle is stationary. So, you can easily imagine a popular location on an otherwise quiet and peaceful day, being spoilt by the sound (albeit subdued on modern machines) of these generators and their inevitable exhaust fumes.

Fortunately the 'Green' lobby has had a head start in the caravan, camping and yachting fraternity. For many years, alternative energy sources have been available from the appropriate specialist shops and chandleries. Very often the core of these alternative electrical power systems are based on the familiar workhorse of the vehicle world - 12V accumulators. In yachting circles (especially in craft not equipped with auxiliary engines) the battery will often be charged by various professionally-made wind 'turbines'. Further 'back up', for the rare windless days at sea, can be provided by small solar panels. Although having a low output, they have the advantage that they can be left to 'trickle charge' the battery during the long periods when the craft is unattended.

Ecologically Friendly

Many radio amateurs and users other than yachtsmen, caravanners and campers have found a need for these simple and ecologically friendly systems. There are many remote locations in Britain where 'the mains' is not available and sometimes not wanted by the local inhabitants. They are perfectly able - unlike most of us - to live their lives without the aid of the local electricity board. For most radio enthusiasts, the only time an alternative power source is required is when we're on holiday, spending a day on the local 'Beacon Hill' or needing to work in an electricity-less garage.

Living in a remote corner of north-west Scotland made me very aware of the different methods of getting power to remote sites for drills and other portable equipment. Actually, because I find it difficult to use an ordinary wheel-brace, I've used a 12V d.c. battery-powered drill for many years. These cheap units, which you can get from any car-accessory shop, have an added advantage for anyone needing to work in confined spaces. By being much smaller they can 'reach the parts other drills can't' ...to borrow a phrase!

When you consider that most modern amateur radio equipment is designed for operation directly from 12V d.c., most of our problems are solved and the rest can be overcome by the innovative approach that abounds in the radio enthusiast.

So, why not go green this year, rig your self up with a stand-by power system consisting of a small (if you do make your own, don't forget to tell *PW* about it) windmill-driven generator and solar-panel cell system to 'float charge' your battery. You could do it in time for the *PW* QRP Contest! But, be warned, don't be tempted to operate without the battery or you could disappear in mid-QSO when the wind drops or clouds screen the sun. You could then suffer QSB of your own making!

73s DE G3XFD

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*.

★★★★★STAR LETTER★★★★★

Dear Sir

I must respond and take issue with Sandy Dick GM0IRZ's letter, published in *PW* May 1990.

I have been a very active c.w. operator on all h.f. bands for twenty years and I do enjoy the mode. So quite obviously I am biased in favour of c.w.

I do feel however, that the requirement to confirm your ability to receive and send Morse at a rate of approximately one character a second, should not deter radio enthusiasts from operating on the h.f. bands. I do not feel the ability to send and receive Morse at twelve words a minute (or thereabouts!) can be seriously considered as an imposition, neither does the ability confer elitism.

However, I am sure that serious radio enthusiasts should actually press for the maintenance of the Morse requirement nowadays more than ever. I say this because I'm sure that the average radio operator can build a very simple station for transmitting and receiving. The use of Morse is the only practical method of conveying intelligence on such simple equipment.

Following this line of thought, we must consider what justification ordinary members of the public can give to us holding a transmitting and receiving licence. Especially if we are just communicating on highly sophisticated equipment ...which most would own up to as 'not daring to even take the covers off'.

I believe radio amateurs should not rock the Morse boat for the eventual possibility of the 'Establishment' reviewing the whole Radio Amateur situation. They could possibly decide that Amateur Radio today is nothing but a bunch of guys with outdated technical qualifications, using the r.f. spectrum for their own amazement and amusement like an extension to the telephone.

So please don't keep knocking the Morse requirement - it is some justification that Radio Amateurs are Radio AMATEURS and they are still capable of setting up very simple stations which work, are home-made, and can convey intelligent signals in a simple form which is understood globally.

Bernard Whitford G3ZNF
Shepshed
Leicester

Dear Sir

I am most impressed with the new format of *Practical Wireless* , which caters for all abilities. May I suggest that you put a page aside for small circuit ideas and hints accompanied also by a short description, of say 20 to 30 words? Each item published could be awarded a £5 voucher.

This would allow readers to publish ideas that they have found useful, and think that others might benefit from them.

C. G. Baillie-Searle
GD4EIP
Foxdale
Isle of Man

Editor's reply: This has been done before in *PW*, but GD4EIP's idea is an interesting one. The major problem as we see it from the *PW* standpoint, is that very few (if any) of the suggestions will have been tested by ourselves. Other projects in the magazine will have been tried, tested and a prototype either built here, or sent to us by the author.(We endeavour to see the prototype and build our own) If readers are interested in an occasional page such as this (we'll publish it whenever space permits) they will no doubt let me know.

RM.

Dear Sirs

I suspect the main advocates of abolishing the Morse test are: The elitists who wish to have the bands to themselves, this end being achieved by a very stiff RAE type test. The packet crowd wanting the c.w. allocations and the can't-be-bothered lot who do not want to persevere.

M. Charlton G0MDF
Huthwaite
Notts

Dear Sirs

With much talk now regarding the potential demise of amateur radio, perhaps the following ideas may be worth airing....

The heyday of amateur radio was, I suspect, the time when we could all build a transmitter in our own shack for a few pounds and get it on the air with a signal that was indistinguishable from ready-built equipment costing a month's salary or more. This was say, thirty years or so ago when the modes most commonly used were c.w. and a.m.

Today an average month's salary will still buy a reasonable h.f. rig and is in most ways far superior to those available in the 1950s. But for the home constructor to compete on the bands with today's black boxes at any cost - let alone a fraction of the price - is very much more difficult, unless of course you stick to c.w. or have a shack brimming with test gear!

Although a c.w. transmitter can be one of the easiest projects to build, its use doesn't necessarily instil enthusiasm in someone newly licensed for h.f.! But whether using solid

Dear Sir

I have just returned from a visit to India (again!) where I met James Kalassery VU2ARL, who runs a radio club in Cochin - The Society for the promotion of Amateur Radio, which I joined. They have considerable difficulty in obtaining technical books and magazines for teaching beginners and for more experienced Hams too. They would be most grateful if any of your readers who have redundant books, magazines, etc., would send them (by sea is cheaper) to:

The Hon Editor
Zero-Beat
PO Box 2437
Kannanthanam Chambers
Cochin 682 016
INDIA

Zero-Beat is the half-monthly magazine of the Society (to which you can of course subscribe).

There are some 600-700 active amateurs in India out of about 5000 licences issued. The examinations are much like those in this country and the regulations are very obviously based on our own. I understand it is quite easy to obtain a reciprocal licence, but it is very time consuming. Two metres is popular and a start is being made with packet. Large towns have repeaters, but as yet none for 432MHz. I was made to feel extremely welcome, and can thoroughly recommend a visit.

Peter Dolphin G3ELH
Petersfield
Hants

It seems a good idea to help in this way, and I hope the Indian club receives as much help as was achieved by the recent appeal on behalf of radio amateurs in Eastern Europe. But please send any donation **direct** and not to the *PW* office! Editor.

Receiving You...

state or valves, only a few extra components are needed for the world of phone to be opened up using the mode of amplitude modulation.

The kind of circuit in November 1989 *PW* (an experimental a.m. transmitter for 1.8MHz is a fine example of what is needed in the amateur radio press. Why the RSGB hasn't given this mode more prominence for the Novice licensee I can't imagine! Using it on the crowded bands probably isn't a good idea, but a transmitter of a few watts on 160 metres (even with only 30 feet of wire as an antenna) can be easily constructed with a range of a considerable number of miles - at least enough to take part in local a.m. nets. Ten metres is also an excellent place for a.m. As little as ten watts into a dipole will achieve very reasonable results during sunspot maxima, and this mode is becoming popular between 29 and 29.7MHz. Additionally, when the band is closed ten metres is ideal for local 'ragchewing', when only a few watts would suffice.

Is there enough interest here to form a group to encourage the use of a.m., as is the case in the USA? I would be very interested to read others' views on this subject. Perhaps a rekindling of the true amateur radio spirit is not far off!

I. L. Liston-Smith G4JQT
Reading

G3XFD's reply: Despite the chance of being told I'm old fashioned, I too miss good quality a.m. - especially on 28MHz and v.h.f. G1TEX and I have recently been talking about the possibility of using simple a.m. rigs on 6 metres. We're both aware that there's a lot of room up there - and not much activity out of the contest and DX season. Twenty years ago, 4 metres was a joy to use with converted a.m. former p.m.r. equipment. Surely, there's no real reason why we can't use QRP a.m. rigs on both the lower v.h.f. bands? If anyone is interested in a revival of a.m., on 1.8, 28, 51 and 70MHz, we could soon give you suitable ideas for simple rigs!

RM

Dear Sirs

Further to your editorial in the April issue on Amateur Radio in Eastern Europe, your readers may like to correspond with a Russian Radio Amateur. He is 25 years old, likes tourism, hard rock and classical music, detective stories and science fiction. His name is Andrew S. Maluta and his address:

PO Box 13
424028
Yoshkar-Ola
USSR

I hope that your can print this information, good luck with the magazine.

O. W. Williams G7CTM
Biggleswade

Services

Queries
We will always try to help readers having dificulties 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 £1.80 each including post and packing.
Binders, each holding one volume of *PW*, are available price £3.50 each (£1 P&P for one, £2 for two or more).
Send all orders to the Post Sales Department.

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

Constructional Projects
Each constructional project is given a rating to guide readers as to its complexity.
Beginner: A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.
Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.
Advanced: A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.
Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP kits, both of who advertise in the magazine.
The printed circuit boards are available, mail order, from the Post Sales Department.

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

Wireless Line
This is an information service for the radio enthusiast, updated each Friday. Calls cost 38p per minutes peak time and 25p per minute off-peak. The number to ring is: (0898) 654632.

Newsdesk '90

New from Yaesu

South Midlands Communications Ltd unveiled the new FT-650 multimode base/mobile station for 24, 28 and 50MHz operation at the National Amateur Radio Convention in Birmingham.

The Preliminary specification for this rig looks interesting:

Receiving range: 24.5 to 56MHz
Transmitting range: 24.5 to 25MHz, 28 to 29.7MHz & 50 to 54MHz
Emission type: l.s.b., u.s.b.(J3E), c.w. (A1A), a.m. (A3E) and f.m. (F3E)
Tuning steps (selectable): s.s.b., c.w. & a.m. - 10Hz, f.m. - 100Hz main dial; 2.5, 5, 10, 12.5, 20 & 25kHz (all mode) using mem/ch
Voltage requirements: 117, 220V a.c. ±10% 50/60Hz, 13.8V d.c. ±10%
Dimensions: 285 (w) x 110 (h) x 262mm (d)
Weight (approx): 7kg (d.c. type), 8kg (a.c. type)
TX output: s.s.b., c.w. & f.m. - 100W p.e.p./d.c. and a.m. - 25W carrier
Modulation: s.s.b. - balanced filtered carrier, a.m. - low level, f.m. - variable reactance
Maximum f.m. deviation: ±5kHz
s.s.b. carrier suppression: better than 40dB below peak output
Unwanted sideband suppression: better than 40dB below peak output
Audio response: less than -6dB from 400 to 2600Hz
3rd order intermodulation distortion: less than -31dB
RX i.f: 13.69MHz, 455kHz, 8.215MHz
Sensitivity (r.f. amp on): s.s.b./c.w. - less than -12dBμ for 10dB S/N, a.m. - less than 0dBμ for 10dB S/N, f.m. - less than -10dBμ for 12dB SINAD
Squelch sensitivity: s.s.b., c.w., a.m. - less than -10dBμ; f.m. - less than -15dB
IF rejection: better than 70dB
Image rejection: better than 60dB (24.5 to 28MHz), better than 70dB (50 to 56MHz)
Selectivity (-6/-60dB): s.s.b., c.w., a.m.-n - better than 2.4kHz/less than 4.5kHz; c.w.-n (optional) - better than 600Hz/less than 1.2kHz; a.m. better than 6kHz/less than 18kHz (-50dB); f.m. - better than 15kHz/less than 30kHz (-40dB); f.m.-n - better than 8kHz/less than 30kHz (-40dB)
Notch filter rejection: better than -40dB

For more details, contact:
SMC Ltd. SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY Tel: (0703) 255111.

Samson Keys

Samson electronic keyers with integral paddles have been in production for over 24 years. They have a world-wide reputation for quality and reliability. They have been one of the most widely used keyers on ships and coast stations because being battery operated and having integral paddles they are completely portable and thus very convenient for Radio Officers to carry from ship to ship.

Of course, amateur radio is the main market for keyers, but because many of the new transceivers have electronic keying circuitry built into them, Samsons decided there would be an expanding market for a high quality twin-paddle key at a reasonable price. The result is the new ETM-SQ key.

The key assembly is mounted on a heavy plated steel base giving a total weight of slightly more than 700g. This means it doesn't slide about the operating desk in normal use. It is fully adjustable for both spring pressure and contacts gap. Steel point pivot and cup bearings result in extremely low friction giving a very light 'touch'. In addition, the steel bearing cups are adjustable to take up possible wear after a few years operation. The contacts are made of solid silver.

The price of the ETM-SQ Twin Paddle Key is £36 plus £2.70 post and packing (including full insurance).

G5BM. Woodland View, Birches Lane, Newent, Glos. Tel: (0531) 820960.

Gale Warnings

We have all seen the images of havoc caused by the recent storms. Are you ready for the next gale, whenever that may be?

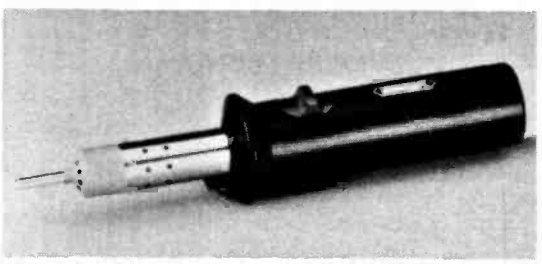
The Holtwood ground Anchor is a device which can provide a strong anchorage point in almost any location in a matter of a couple of minutes. The anchor comprises a hardened steel tube which is knocked into the ground with a hammer. Inside this tube are three steel rods which are then driven out into the ground, curling like a pig's tail as they take a firm grip of the subsoil. All that is left showing above the ground is the anchorage ring which is an integral part of the anchor.

Holtwood Engineering Ltd. 11 Brassey Drive, Holtwood, Aylesford, Kent ME20 7QL. Tel: (0622) 710921.

Cordless Soldering

Black and Decker are adding a new Cordless Soldering Iron to their Minicraft range. The new Cordless Soldering Iron (MB650) is lightweight and has a built-in stand for ease of handling and extra convenience. Powered by a screw-in butane cartridge with simple ignition, the Cordless Soldering Iron enables the user to solder anywhere. The cartridges give a minimum of three hours continuous use.

The Cordless Soldering Iron, which comes complete with a ready-to-use butane cartridge and two soldering bits, is priced at £24.99 including VAT. It is available from most hobby and craft shops.



RAE Courses

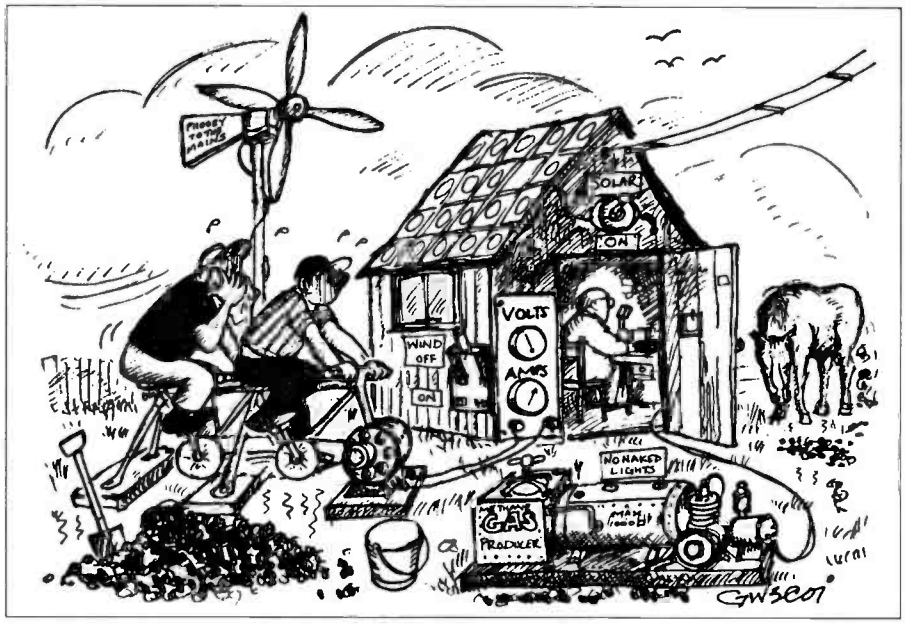
Fareham: The Fareham Morse Workshop at the Neville Lovett Community School starts on Monday September 24 from 7 - 9pm. Enquiries either to the school (0329) 823471 or with the tutor G3CCB on (0329) 288139.

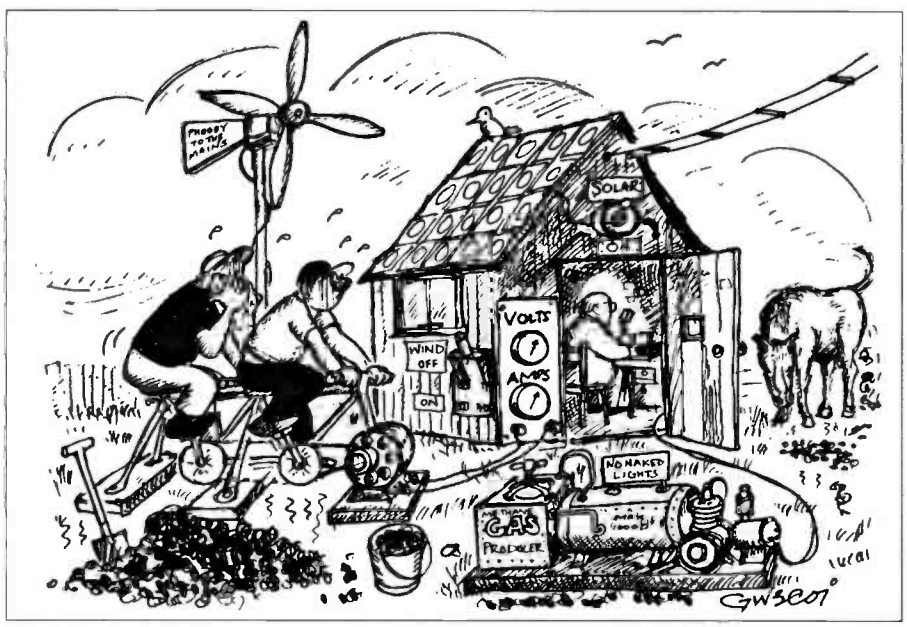
Competition Corner

PRIZES...PRIZES...PRIZES

First prize winner can choose either a one year *PW* subscription or £20 in vouchers for the book service.

The **two runners-up** can choose from either a six month *PW* subscription or £10 in book vouchers.





Circle the 12 differences, fill in the form below and send your entry to PW Publishing Ltd., June 1990 Spot The Difference Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP.
Closing Date 14 June 1990.
The Editor's decision on the winner is final, no correspondence will be entered into.

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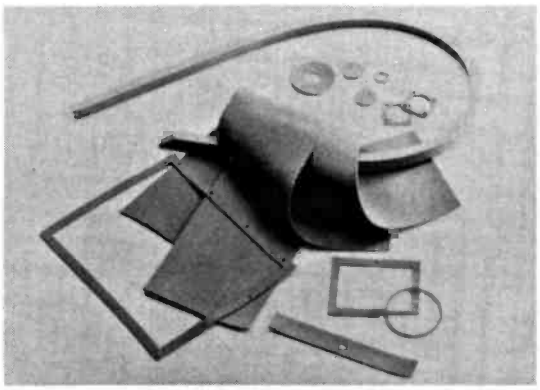
Newsdesk '90



Radiation Screening

An extensive range of pre-formed and general purpose materials for efficient screening against radiated interference is now available from Anglia Microwaves Ltd.

The material provides both electrostatic shielding and a weather-proof seal and gives a complete solution to securing access panels in sensitive equipment. Both self-adhesive strips and ready-made gaskets can be supplied to customer's specifications.

As with the other materials, there is a choice of either a knitted mesh or a resilient cored mesh strip. The elastomer may be fitted with a self-adhesive backing for simple bonding to metal surfaces. There is a choice of silicone and neoprene elastomers, the former being preferred for longer lifetimes (10 years) and for a wide temperature range (-50 to +260°C). The knitted mesh may be manufactured from monel, tin-plated copper-clad steel, aluminium or stainless steel.

Anglia Microwaves Ltd.
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Tel: (0277) 630000

Low Profile Microswitches

ITW Switches has developed a new, low profile microswitch called the Series 45, which is half the thickness of the Series 20 that it is designed to replace. Originally produced for use in the new generations of slim telephones, the Series 45 has many other uses such as instrumentation, security equipment, lift controls, high current keypads and similar applications where its low profile of only 9.2mm gives designers more scope to be creative in product styling and construction.

The Series 45 is available in either a single- or double-pole version with a range of operating forces. The snap-action switch mechanism has silver contacts rated at 2A at mains voltages. A wide selection of different operating forces are available and there is a choice of auxiliary actuators available as standard such as 18mm straight lever and roller lever.

ITW Switches. Norway Road,
Portsmouth, Hants PO3 5HT. Tel: (0705) 694971.

Special Event Stations

GB2SEM: On May 19 and 20, this station will be running from the Old Power Station, Bargates, Christchurch, Dorset. Running on h.f. and v.h.f. bands. Colour QSL cards via the bureau or direct from G6DUN, QTHR on receipt of an s.a.e. The Old Power Station will be open to the public from 10am to 4pm both days with talk-in on S22. Also on show will be the Journeaux Vintage Wireless collection.

ON4WAR: May 19. The radio club of Binche (Belgium) will pay tribute to all radio operators who, during World War II, have operated at the hazard of their life. They will be on the 7MHz band, alternately 'phone and c.w. all day. A special QSL card will be sent to each correspondent. **Radio club be Binche (Belgium), Hotel de Ville de et á, B-7130 Binche, Belgium.**

GB2RBC: A return visit to Balmoral Castle by Royal permission will mean this station is on the air over the weekend of June 9/10. **Paddy GM3MTH. PO Box 59, Hamilton, Lanarkshire ML3 6QB.**

GB2SSD, GB2OBD, EI7M & EI2WW: Are all on the air May 12/13 for the Heritage of Whisky Four Distillery Event. The locations will be, Scotland's smallest distillery, Pitlochry, Perthshire; the Old Bushmills Distillery, Bushmills, Co. Antrim, Midleton Distillery, Midleton, Co. Cork & John Jamieson's Distillery, Dublin respectively. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations (the cost for the certificate is 50p, 1 dollar or equivalent). **Robbie GM4UQG, PO Box 59, Hamilton, Lanarkshire ML3 6QB.**

GB2STB: This station will be on the air on the final day of Beith Civic Week, Ayrshire, that's June 16. **Paddy GM3MTH. PO Box 59, Hamilton, Lanarkshire ML3 6QB.**

GB2NTS: This station will be on the air over the week July 15-22 for the Castle Country Four Castles Event. The castles will be Grampian Region Drum Castle, Castle Fraser, Craigievar Castle and Leith Hall. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations (the cost for the certificate is 50p, 1 dollar or equivalent). **Robbie GM4UQG, PO Box 59, Hamilton, Lanarkshire ML3 6QB.**

GB70SIG: To celebrate the 70th Anniversary of the formation of the Royal Corps of Signals, the Scarborough Special Events Group, with members from RSARS, RNARS and RAFARS propose to run a special event station from the Royal Signals Training Centre, Burniston Barracks, Scarborough during the period June 10 to July 7.

Operation will be around 3.725 and 7.055MHz on the h.f. bands, plus 144MHz s.s.b. operation and f.m., in addition to activity on the RSARS nets. Special QSL cards will be available and further details can be obtained from: **Roy Clayton G4SSH, QTHR.**

GB5SN: This station will be operating from the summit of Snowdon on either June 1 or 2, weather conditions permitting. The operators, G3XWH, G3YHC and G4KCR will be using a Mizuho 7MHz 2W hand-held transceiver into an end-fed Zepp antenna, all supplied by Waters and Stanton. This group of Harrogate Radio Amateurs operated GB5BN from the summit of Ben Nevis on June 1 last year in arctic conditions!

GB8FC: This station will be on the air from the Science Museum, Wroughton on May 13.

GB8FC: This time the station will be operated from RAF Cranwell from May 18 to 21.

GB2RAF: The station will be operating from RAF Henlow on June 2.

GB8FC: Now it's the turn of the Science Museum, Wroughton on June 3.

GB4RAF: This station will be operating on June 10 from RAF Cosford.

GB0RAF: From June 16 to 21 this station will be on the air from RAF Coningsby.

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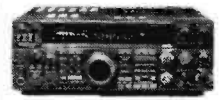

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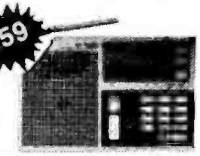


PW Peanut Transceiver

Gus Montgomery GM0ATI and Bill Holt G7DHM designed the PW 'Peanut' – a transceiver with surprising capabilities.

Over the last few decades in the post-valve era there has been a continued trend away from building radio equipment and a shift towards using expensive commercially manufactured 'black boxes'. Many of which cost more than the price of a good second-hand car.

Although most people do not know much about amateur radio it is generally thought to be an expensive hobby, most likely because of the perceived price of the equipment. Recently in *PW* there has been a move towards putting the d.i.y. back into amateur radio.

This project is the result of deciding to have a shot at designing a 3.5MHz c.w. transceiver with the main objectives being....

a: It should be as simple and therefore as inexpensive as we could possibly achieve.

b: The component list should contain no obscure parts (e.g no strange Venezuelan imperial thread toriods, etc.)

c: The builder can purchase ALL the necessary bits from the local electronics shop, and is able to 'get stuck into' the construction rapidly.

The result was the Peanut transmitter shown in the diagram Fig. 1.2 which was built for the enormous expenditure of £2.76. On connecting to an antenna the signal was heard at 599, two miles away across Leeds. A modest start, but a phone call to an Edinburgh station resulted in the same report from that location five minutes later.

The Receiver

Encouraged by this start, we attacked the design of the receive side ending up with the circuit shown in Fig. 1.3. The approach is along the lines of the 'optimist', a design used as a very simple QRP rig.

The previous design utilised a diode as mixer with limitations of being 'a little bit deaf'. Our latter-day approach uses an f.e.t. mixer, TR2 in Fig.

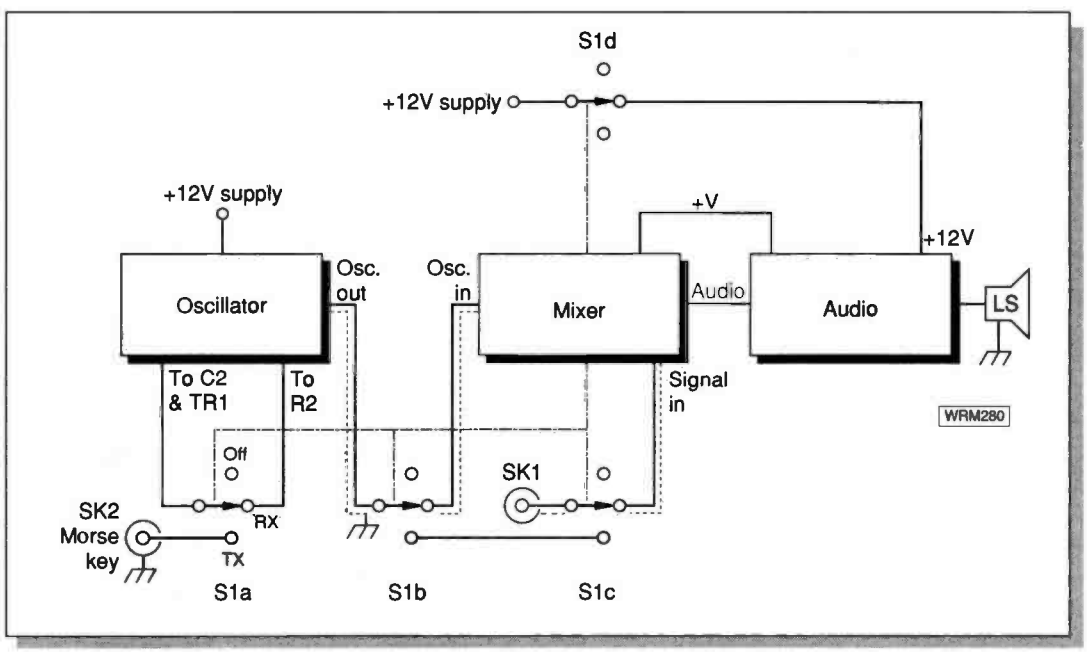


Fig. 1.1: This is the block diagram of the *PW* Peanut in all its simplicity

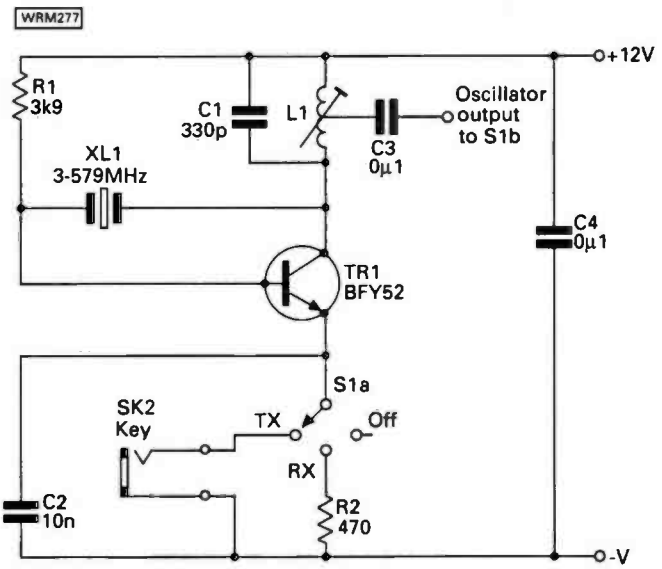


Fig. 1.2: Circuit diagram of the oscillator that is both power output on transmit and local oscillator on receive

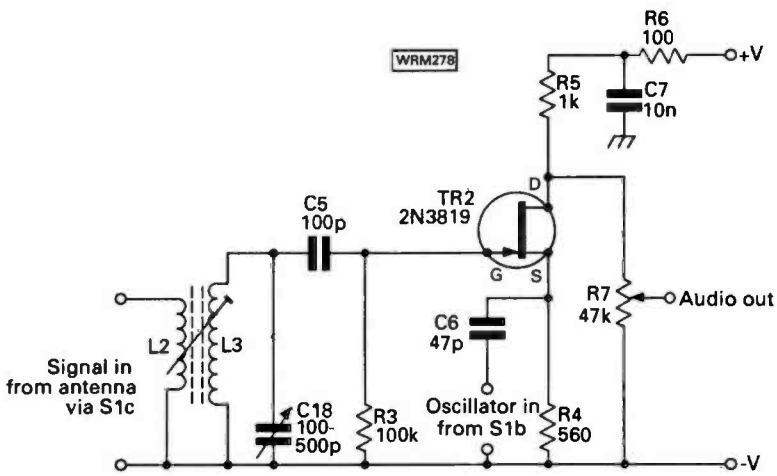
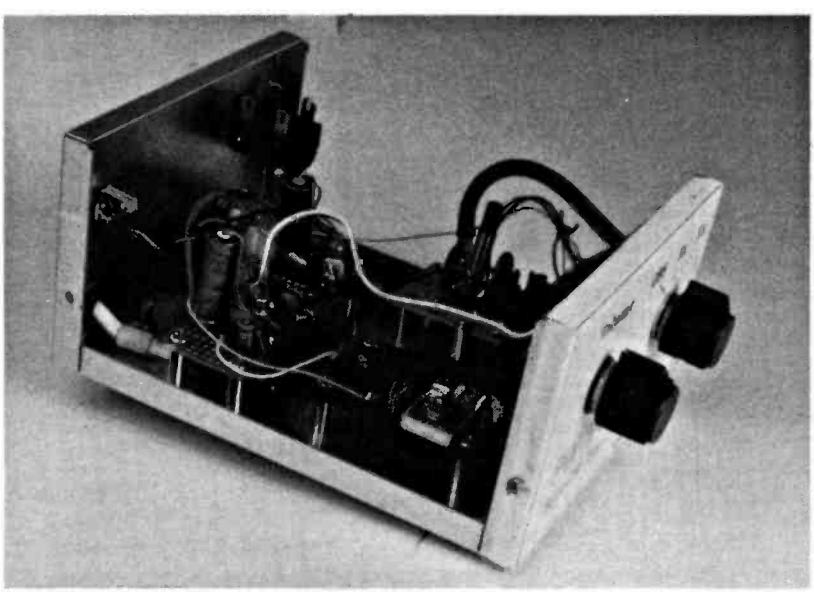


Fig. 1.3: The mixer consists of a single f.e.t. (TR2) the local oscillator is 'injected' into the source of TR2



1.3. Several circuits were designed and tested but were not as simple or as effective as the version shown here. To boost the overall audio level, a simple audio amplifier (Fig. 1.4) was constructed from a BC108 (TR3) and a cheap low power amplifier (IC1). This provides adequate output for either 'phones' or a loud speaker.

By rescuing bits and pieces from defunct radios the completed prototype has still to exceed a gross budget expenditure of £5.00. An aluminium box was purchased to house the unit, that did take it marginally over that limit.

Eager to carry out further tests the unit was quickly assembled and within the hour we had log entries from Belgium, Denmark and France, with stations in Russia, Poland and Norway being clearly heard on the band.

The enjoyment of making these contacts was only exceeded by the sheer satisfaction of having built the station. As many a QRP operator will agree, to construct as well as use your own equipment is a most rewarding experience. It is most certainly in the original spirit of experimentation associated with amateur radio.

Circuit Description

The circuit conveniently falls into three sections as outlined in the block diagram Fig. 1.1. The oscillator board (Fig. 1.2), the mixer board (Fig. 1.3) and the audio board (Fig. 1.4). The oscillator is crystal controlled, with L1 and C1 forming the tuned collector load for TR1. Inductor L1 consists of 50 turns, is tapped 20 turns from the collector of TR1, to provide impedance matching for the antenna circuit.

Key clicks are suppressed adequately, by the inclusion of capacitor C2 across the keying contacts. The output power available from the oscillator is in the order of 1W of r.f. when the emitter of TR1 is taken to the negative line. On receive resistor R2 allows the oscillator to run, but at a very much reduced power.

The addition of a mixer board and audio board completes the receive side of the transceiver. The mixer shown in Fig. 1.3, is of the direct conversion type. The antenna input, tuned by L3 and C18, is fed to the gate of the mixer f.e.t. TR2. The reduced output from the oscillator is fed via C6 to the source of the same f.e.t.

The resulting audio frequencies appear at the collector of TR2 and across R7 (the audio level control). The audio circuit consists simply of a pre-amplifier (TR3) followed by the power amplifier IC1 (an LM380).

An unusual volume control (R11) has been included in the circuit. This is connected between the inverting and the non-inverting inputs of the integrated power amplifier. Output may be either to headphones or an 8-16Ω loudspeaker.

The simplicity of the whole station is shown in the switching diagram Fig. 1.1, where it may be seen to revolve around a single three pole four-way switch.

...Continued on page 27

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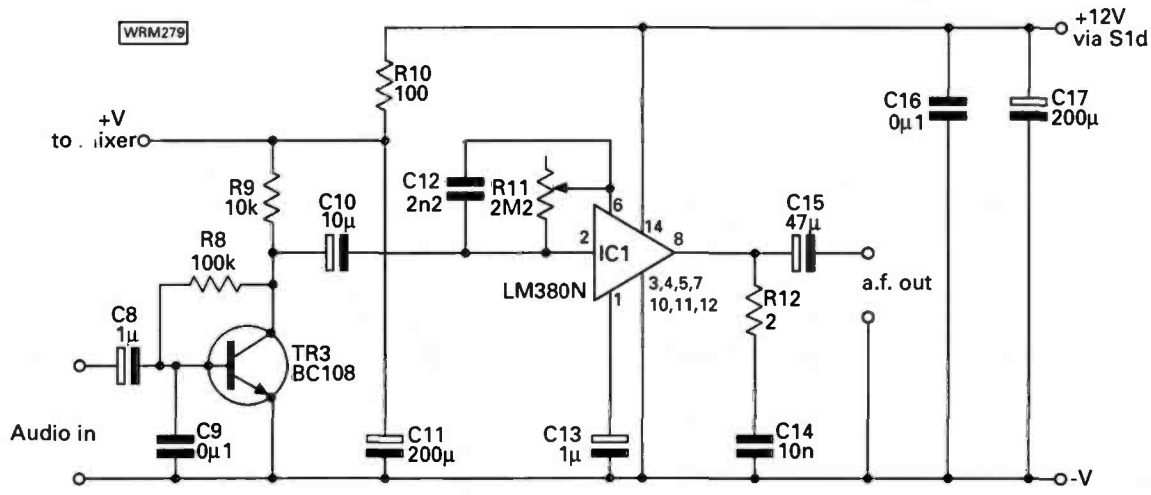

Fig. 1.4: The audio board utilising a single pre-amp (TR3) and the familiar LM380N IC for audio output.

Shopping List

Resistors

5% 0.4W Carbon film

2Ω	1	R12
100Ω	2	R6, 10
470Ω	1	R2
560Ω	1	R4
1kΩ	1	R5
3.9kΩ	1	R1
10kΩ	1	R9
100kΩ	2	R3, 8

Rotary Preset (horizontal mounting)

47kΩ	1	R7

Potentiometer (panel mounting)

2.2MΩ	1	R11

Capacitors

Ceramic

47pF	1	C6
330pF	1	C1
100pF	1	C5
2.2nF	1	C12
10nF	3	C2, 7, 14
0.1µF	4	C3, 4, 9, 16

Electrolytic 16V working

1µF	2	C8, 13
10µF	1	C10
47µF	1	C15
200µF	2	C11, 17

Compression Trimmer

500pF	1	C18

Maplin part No.WL73Q (Trimmer 500pF)

Coil Data

L1 50 turns of 0.25mm (32 s.w.g.) enamelled copper wire, tapped at 30 turns (20 turns from collector of TR1)

L3 80 turns of 0.25mm (32 s.w.g.) enamelled copper wire.

L2 5 turns of 0.25mm (32 s.w.g.) enamelled wire, wound over 'earthy' end of L3

Coils L1 and L2/3 are wound on a 4.8mm coil formers (Maplin order No. LB22Y) with a ferrite tuning slug (Maplin order No. LB41U). Both coils are fitted with the bases (Maplin order No LB44X)

Crystal

3.579MHz

This is a semi-standard colour crystal suitable for the American TV colour system and is available from a variety of suppliers in this country (Cirkit, Gollege, Maplin, etc.)

Semiconductors

BC108	1	TR3
BFY52	1	TR1
2N3819	1	TR2

Integrated Circuits

LM380N	1	IC1

Miscellaneous

Three pieces of Veroboard (0.1in), a suitable box to house the project, 4-pole 3-way switch, phono plugs and sockets (for the key and antenna), 3.5mm plug and socket for the loudspeaker (or headphones), interconnecting wire, both single core and miniature coaxial, nuts, screws, washes and spacers to suit.

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Herts EN10 7NQ

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Maplin Electronics, PO Box 3, Rayleigh,
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Radio Personality

Feature

It's difficult to forecast where you're going to live and work when you've chosen a very specialist career, but Anglia Television weatherman Jim Bacon G3YLA was lucky. He's returned to Norfolk, and the outlook's good for his family and hobbies.
Jim took up amateur radio when his twin brother, Richard G3WRJ, was studying for his RAE. When he got his call, the new G3YLA was already heading for a career in meteorology, having taken the conscious decision of keeping hobby and work apart.

During the early 1970s amateur radio activities lessened while Jim worked at the Met. Office Headquarters in Bracknell and studied Meteorology at Reading University. He was posted to the London Weather Centre in the late 70s. It was there that Jim had his first taste of professional broadcasting. The years of 'chatting' on the amateur bands did help. Although he found the short, two and a half minute, television broadcast 'overs' a bit difficult at first!

After a spell on nationwide BBC TV as part of a regular weather forecasting team, Jim headed back to Norfolk to join Anglia Television in 1986. As one of the major Independent Television contractors, Anglia TV's weather service plays an important role in regional forecasting. Because of this, Jim and his two colleagues have a busy working schedule. Their day starts at 0730 with overnight charts analysis for the first broadcast at 1000. The chart analysis, followed by computer graphics preparation and the broadcast, sets the pattern for the lunchtime 1325 and main evening bulletin at 1825.

Home-Brew Equipment

Jim counts himself fortunate in starting amateur radio in the era of home-brewing the first rig. "My first rig was a design by G3OGR from *Short Wave Magazine*, using a 6BW6 in the p.a. stage giving about 10 watts output. The antenna was a 66 foot 'short wire'. We had quite a net in those days." Jim went on to say " there was nothing to equal the thrill of your first contact using home-brew equipment. Standards had to be met in West Norfolk. Amplitude modulation audio quality demanded that birds in your garden, and even the stirring of a cup of tea in the shack had to be clearly heard!"

As you might expect with a 'weatherman', Jim developed an interest in propagation. It started with the study of 'tropo' and that drew his attention to Sporadic-E and v.h.f. Eventually he became 'hooked' on this fascinating aspect of amateur radio and it's now one of G3YLA's principal activities. Taking the opportunity provided by the interview, Jim reminds us that amateur propagation studies have been invaluable to both enthusiasts and professionals alike.

A member of the Royal Meteorological Society, Jim is also active in supporting the RSGB, and firmly believes in a strong national society. He is the Programme Secretary for the thriving Norfolk Amateur Radio Club and supports the G-QRP Club, RIG and FISTS and enjoys reading *Practical Wireless* and *DUBUS*, the latter publication being very useful for propagation reports on v.h.f.

Somewhat less formal transmission.

Our thanks to Anglia Television for both photographs on this page.

Anglia TV Weatherman Jim Bacon G3YLA in front of a blank screen, which appears as his weather chart with the aid of chroma-key technology.

Projects And Plants

Activity from G3YLA nowadays is mainly centred on c.w. and 144MHz using a home-brew synthesised rig. He'd like more time to build, but with three half-built ideas on the shelves there's plenty to do. The next job is likely to be a home-brew c.w. transceiver - when he has completed yet another unfinished project. This task will be the placing of temperature probes into the garden soil and compost heap, to enable the shack computer to evaluate the data.

Louise, Jim's wife, has yet to be converted to amateur radio but her brother is now G4JGL! Their children (they're twins of course!), four and a half year-old Richard and Holly, have already shown interest but are discouraged from trying c.w. after jamming dad's keyer paddle.

A hectic social calendar that includes talks and visits to radio clubs around the UK, doesn't leave much time, but Jim enjoys his garden. He rounds off the busy Bacon life by providing the family with vegetables grown the 'organic' way. Mind you . . he points out that 'organic' is really a euphemism for much more digging! **PW**

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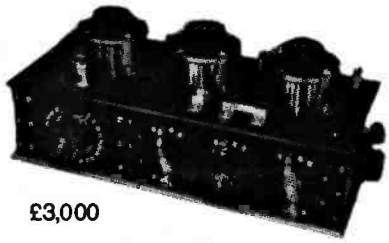

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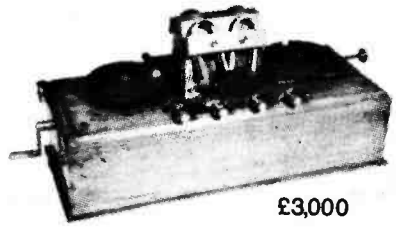

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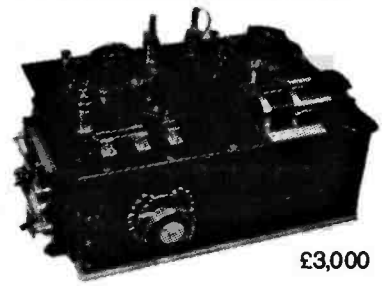

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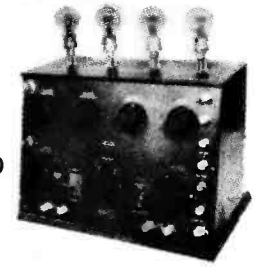

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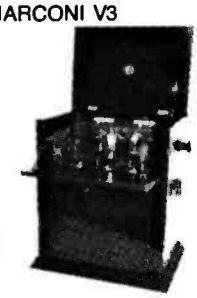

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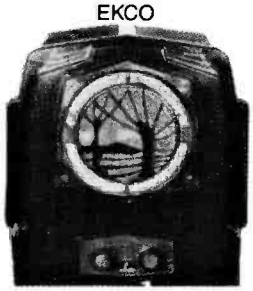

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CB CORNER

Rick Maybury ponders the state of Citizens' Band Radio in the United Kingdom. How did the ideals of free access to radio for the non-technical fare in the 1980s and what promise does it hold for the future?

There was a time, back in the mid 1980s when I was ready to concede defeat. Several thousand very determined people had lobbied, protested and petitioned the Government to get an archaic law changed. Against all the odds, and much to everyone's surprise, they succeeded. The net result was that Joe Public at last enjoyed the same basic rights of 'free speech' as people in many other countries, and could talk with their fellows using cheap, low powered two-way radios.

It wasn't precisely the system that the die-hard a.m. devotees wanted. Still, despite the grumbles and complaints, CB 27/81 wasn't half bad. Inexpensive and for the most part, well-built equipment soon became available. The fears that the range and usability of the f.m. system would be limited by technical shortcomings of the specifications were soon dispelled.

In the event, range and usability were limited by different, but not wholly unexpected, factors. The problem was that a small but vociferous minority took it upon themselves to spoil it for everyone else. Some days all 40 channels would be rendered unusable by foul-mouthed individuals, many of whom seemed convinced that they sounded more interesting through a reverberation unit. Worst, were the dangerous fools who persisted in using ridiculously high-powered, and frequently badly designed or aligned linear amplifiers or 'burners'. They were the most destructive element and came close to wrecking the service for ever. They were responsible for wiping out huge chunks of the band and alienating everyone from air-traffic controllers to TV viewers.

Now it has to be said that for obvious reasons that these problems were most noticeable in cities and large towns. Still, London is where I live and work, and the lack of anyone sensible to talk with meant that my interest waned in direct proportion to the number of 'bucket-mouths' and 'burners' abusing the system.

After spending some time living in East Anglia, my faith was eventually restored about three years ago. There, the flat terrain, coupled with a small and widely-dispersed population meant that CB really stood a chance; centre-loaded antennas on tractors and home-base masts on nearby farmhouses showed that not only was CB alive and well but was doing a worthwhile job! The service was, and I believe still is, used by some cab firms in the area as well as by delivery drivers, truckers, emergency-monitoring teams and of course for leisure and pleasure purposes.

Widespread Pattern

This pattern of use extends across the whole country, but there have been changes in the last couple of years. The reduction in misuse has been widespread, and in some places has been dramatic. Perhaps the idiots became bored talking to each other - their conversations, when intelligible, were hardly inspiring. Maybe additional channel allocations in 1987 diluted their influence. It could just be that they have all bought themselves cellular telephones. Whatever the reasons, CB has again become a usable communications facility, even in densely-populated areas. So, what does this portend for the future?

It probably won't mean a sudden upsurge in interest amongst commercial users, which is probably just as well as there is limited channel space. The on-going limitations of range and lack of privacy haven't changed either, but it does mean that those who want to use the service for legitimate purposes can do so again.

Leisure Pursuits

In particular there are the growing number of leisure pursuits where CB has a real role to play. Boating springs immediately to mind as marine radio equipment is expensive. Specialised marine radio is often inappropriate for small craft or vessels used exclusively on inland waterways. CB is the ideal alternative. Walkers and climbers go missing, or get lost with monotonous regularity - portable CB rigs take up little space and could be real life savers in an emergency.

Motor-sports enthusiasts have long recognised the need for efficient two-way communications. A growing number of rally, stock and formula racing teams now rely on CB systems to provide a link between the driver and the pits. Marshalls at outdoor events, fete organisers and rallies, all use CB and the list goes on - but the common thread is the need for cheap and simple two-way voice communications. The dark days of CB are now behind us, the future looks promising - let's hope it stays that way.

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REVIEW

A good frequency counter is a valuable asset to any shack, and attractively priced equipment such as the MF-1000 counter from Maplin makes this possible for many amateurs, says John Bird

Maplin MF-1000 Multi-Function Counter

Before operating any piece of test equipment, it's a good idea to read the manual. With the MF-1000, this is a ten-page booklet measuring about 185 x 240mm. The manual is fairly basic in its content with just three chapters covering Specification, Operation and Calibration.

The most important section is, of course, the operation and this is well covered. There are examples of how to use each main function and I found the standard of English better than many other Oriental imported products. The calibration section of the manual is obviously very useful, but should be used with great caution.

The whole accuracy of the counter is controlled by the crystal oscillators. These should only be calibrated if you have access to a suitably accurate measurement system. Other than the reference frequencies, the only other adjustment described is the trigger level. This only requires a 10MHz, 25mV r.m.s. signal.

Connecting-Up

As with most counters there are very few external connections on the MF-1000. The mains is fed via a 3-pin IEC connector that is mounted immediately below the voltage selector. This allows the selection of 115V or 230V supplies. The main measurement inputs are located on the front panel and these are standard 50Ω BNC sockets. The conflicting design requirements for the large frequency range covered by the MF-1000 mean that it isn't practical to use just one input socket for all frequencies.

The solution is to use one socket for the lower frequencies of 10Hz through to 100MHz and a separate socket for the 100MHz to 1GHz range. The final external connection is another BNC socket on the rear panel that is fed by the internal 10MHz time-base oscillator. This is useful as a signal source for checking other counters or the calibration of other equipment such as receivers, oscilloscopes, etc.

Operation

The designers of the MF-1000 have included a good range of options, making the counter very versatile. One basic requirement of a counter is a clear and well-placed display. The MF-1000 provides this by using a full eight-digit l.e.d. display with 7mm high-brightness devices. This display dominates the front panel and is covered by a plastics protective cover. The choice of measurement mode is selected by a row of fourteen push buttons immediately below the front panel.

The most obvious use of the MF-1000 is as a straightforward frequency counter. This is done by connecting the signal to the appropriate input, according to whether the signal is above or below 100MHz. There is another selection to be made, the appropriate range. There are just two ranges for the l.f. input - 10Hz to 10MHz and 10MHz to 100MHz and these are selected using push buttons on the front panel. This selection may seem a little odd but it is necessary to switch in a divide by 10 prescaler as the main counter module is a 10MHz unit.

The next option is the gate time, this sets the period that the counter operates over and so effectively sets the resolution of the instrument. The gate time options are 1 second, 0.1 second and 0.01 second. That gives resolutions of 1Hz, 10Hz and 100Hz on the 10MHz range and 10Hz, 100Hz and 1kHz on the 100MHz range. The 1GHz range is also selected from the front panel push buttons, though on this range the gate times give a resolution of 100Hz, 1kHz and 10kHz.

Besides the frequency counting options, the MF-1000 can be used to measure the period of a signal. This is particularly useful for accurately measuring low frequency signals. You will have noticed that the maximum resolution on the low frequency range is 1Hz and this uses a gate time of 1 second. In practice this means that the display is only updated every second. Although this may seem fast, this isn't the case when you're using the counter to aid the adjustment of a variable oscillator.

The solution, however, is to select the period measurement option. This works by reversing the connections of the internal clock and the signal to be measured resulting in the gate being opened by the measuring signal. When used in this way, the MF-1000 shows the period of the signal in us and so allows very accurate measurement of low frequency signals. The resolution in this mode is 10^{-7}, 10^{-8} or 10^{-9} depending on the range selected.

REVIEW

Specification

Channel A	
Range	10Hz to 10MHz direct; 10MHz to 100MHz prescaled
Resolution	1Hz, 10Hz and 100Hz direct; 10Hz, 100Hz and 1kHz prescaled
Gate Time	0.01s, 0.1s and 1s
Input Sensitivity	25mV r.m.s. 10Hz to 8MHz 50mV r.m.s. 8MHz to 10MHz
Input Impedance	1MΩ and 35pF
Channel B	
Range	100MHz to 1GHz
Resolution	100Hz, 1kHz and 10kHz
Gate Time	0.027s, 0.27s, 2.7s
Input Sensitivity	20mV r.m.s.
Input Impedance	50Ω
Period (Chan A)	
Range	10Hz to 2.5MHz
Resolution	10-7s, 10-8s, 10-9s
Accuracy	+-1 count +-time-base error x frequency
Dimensions	205mm wide, 78mm high, 267mm deep
Weight 2.15kg	

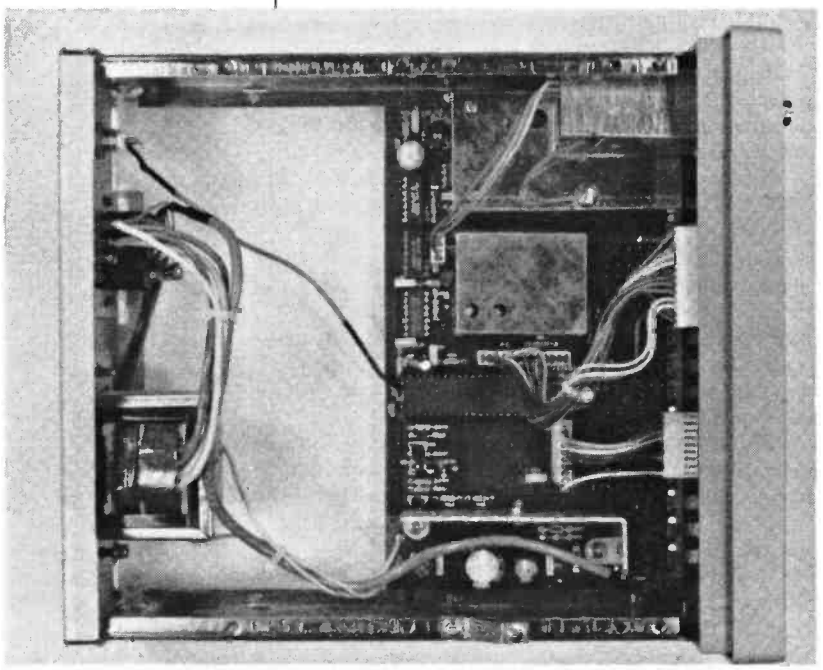
I should stress at this point that this use of a counter is not specific to the MF-1000 but used by many other units.

Another mode that can prove helpful is the totalise mode. This, as the name suggests, simply counts the number of input cycles and is useful as a simple event counter. As with the period measurement, this is only available on the 10MHz input range. This isn't really a limitation as this option would normally be used to count comparatively slow events.

One problem with digital instruments is that they tend to encourage the user to believe the readout, simply because it seems so precise. Still, these instruments sometimes lie and the reason is often a problem with the input signal.

The MF-1000 has two features coupled with the low frequency input designed to process the incoming signal. The first is an attenuator that provides a x20 reduction of the input signal and helps prevent overload of the input stages. The second is a low pass filter with a cut-off frequency of 100kHz. This is ideal for eliminating high frequency garbage from audio signals that can affect the accuracy of the measurement.

When using the MF-1000 as an event counter, there are a couple of useful display options. The first is a reset button that resets the display to zero, as you would at the start of a count. The second is called hold, and this freezes the display reading. The important point is that the count continues during the hold operation although the display reading is held. This option is useful for checking the total during a count operation. Both of the display options could be started during any of the MF-1000's operation, but they are only normally of use when using the MF-1000 as an event timer.



Under the Bonnet

As the supplied manual contained very little detail on the circuit configuration used by the MF-1000, I looked inside for myself. The main functional block comprised an Intel large scale integration i.c. This device handles all the main counting and display driving functions up to 10MHz. All the higher frequency ranges are handled by switching in prescalers.

The most crucial area of any counter is the clock accuracy and the MF-1000 uses two crystal oscillators running at 10.0MHz and 3.90625MHz. I was pleasantly surprised to find that both oscillators are ovened, that is a great help in improving the immunity to external temperature variations. The mains power unit is mounted on the rear panel, well away from the counter electronics.

In The Shack

The proof of the pudding is in the eating, so I used the MF-1000 in the shack to see how it performed under typical amateur operating conditions. The first and important point is that the display is clear and easy to read from a wide range of viewing angles. Performance as a frequency counter is very good, and the input sensitivity is excellent.

I found that the MF-1000 could be used to monitor the transmit frequency of my station off-air with just a 150mm wire from the input socket. This worked both on h.f. and v.h.f. with no problems. As the input impedance of the 10Hz to 100MHz range is 1M/36pF, standard oscilloscope probes could be used, and that made connections a little simpler.

The event counter facility can be useful. I found that the high sensitivity, combined with the fast response of the counter, meant if there is a dirty contact in the counting chain, large erroneous counts can be generated. The solution is simple and involves making sure that the count signal is well damped electrically, so minimising any switching problems.

Summary

I found the MF-1000 to be a very effective and easy to use instrument. With its wide range of 10Hz through to 1GHz and its versatile measurement options, it covered all the frequency measurement requirements of the shack.

Overall then, a very useful item of test equipment that I'm sure will be in great demand. The MF-1000 is available from **Maplin Electronics, PO Box 3, Rayleigh, Essex. Tel: (0702) 554161** and costs £174.95. Thanks to Maplin for the loan of the review model.

PW

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The problem with omni-directional wide-band antennas is their lack of gain.
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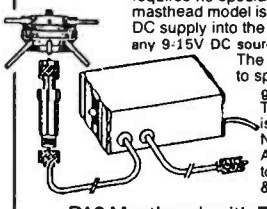
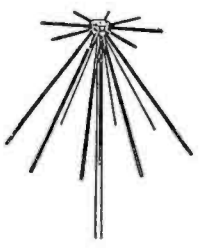
The basic specification of the products is similar: coverage 20MHz-1GHz, at 1GHz: minimum gain 13dB, noise factor 5.5dB. Choose from a mast-head version (PA3) or a standard die-cast box style (PA3I). Best results are normally obtained from the masthead model which gives a boost to weak signals which would otherwise have been lost in the feeder cable. Also feeder cable noise is not amplified which is the case if the amplifier is mounted at the base of the feeder. On the other hand, the die-cast box version requires no special installation and is readily taken out of circuit. The masthead model is supplied with a special power unit which feeds the DC supply into the antenna feeder. No psu is provided for the PA3I as any 9-15V DC source is suitable (current requirement about 25mA).



The PA3I finds application in instrument work, e.g. input to spectrum analysers, boosting the output from signal generators to give a low-power TX.
The standard version of the PA3I has BNC sockets and is designated "PA3I/B"; available to special order N-type sockets ("PA3I/N") or SO239 ("PA3I/S").
A special feature of the PA3 series is a high-pass filter to attenuate frequencies below 20MHz; high-power HF & MF broadcast stations can be very troublesome!

PA3 Masthead, with PSU		PA31/B	BNC	**£35.50**
PL259	**£49.95**	PA31/N	N-type	**£38.95**
N-type	**£53.95**	PA31/S	SO239	**£35.50**

REVCONE



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Construction

The G4XBY Six-Element Yagi for 430MHz

This experimental six-element Yagi antenna for the 430MHz band from Tony Martin G4XBY uses common items and is easy to build.

All the parts for this experimental antenna are easy to source and the finished article is designed to be used in the attic, or if varnished will be suitable for short periods outside.

Construction

The overall dimensions are shown in Fig. 1. Start by cutting the boom to length, 15mm square is recommended but 12mm square will do almost as well. Cut the various elements to length as shown in the diagram. Hard drawn copper wire is preferable as the softer 8 s.w.g. wire is more prone to bending and sagging.

Starting 20mm from one end mark the position of Director 4, then backwards at 165mm interval the positions of Ds 1-3 and the driven element. A further 140mm behind this last mark is the position of the reflector.

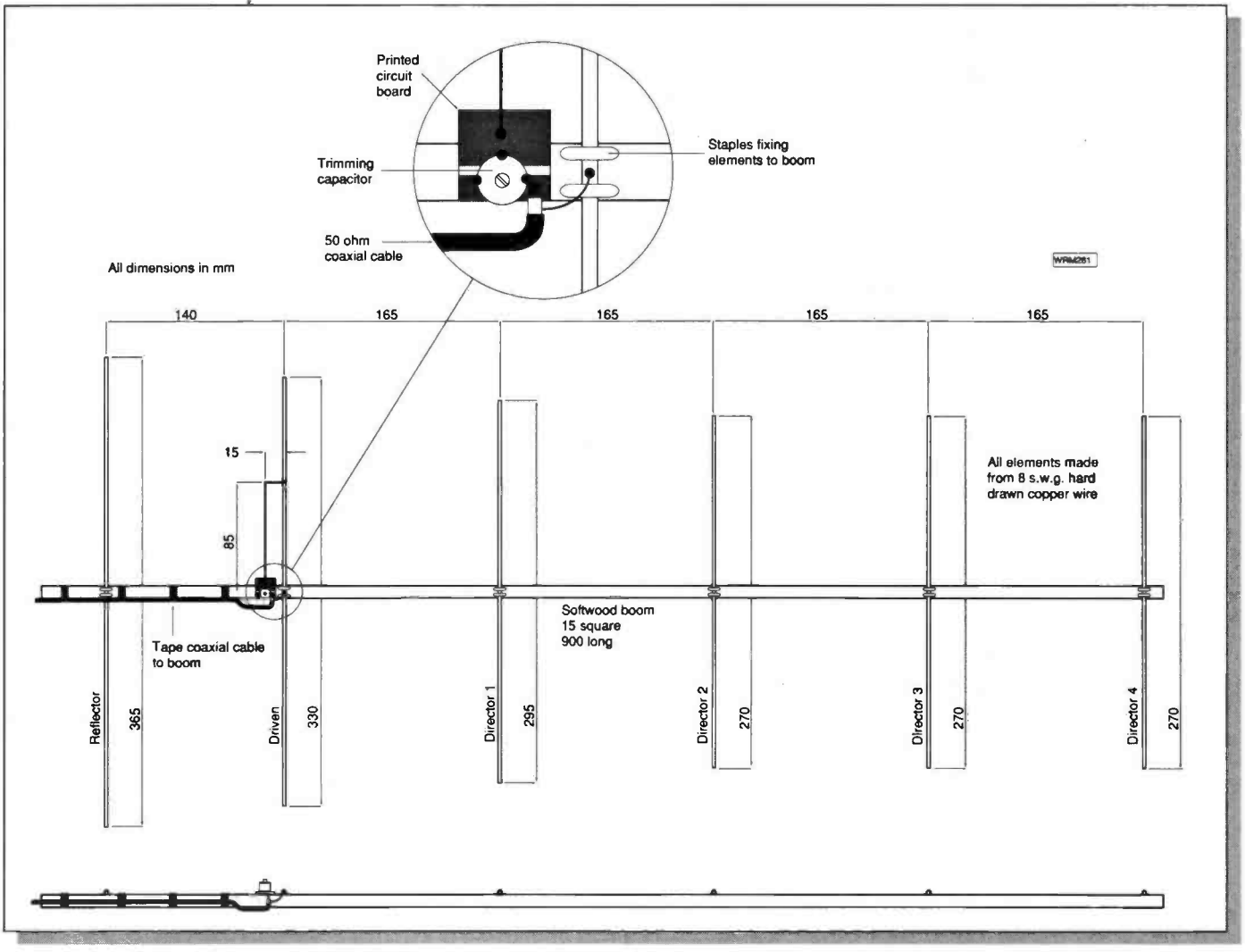
Taking each element of the antenna in turn, indicate its exact centre with an indelible mark. A fine saw or file is probably the best way of achieving this mark, if using the preferred wire. Carefully, using a protractor to ensure squareness of each element, mount the wires on the correct places on the boom. On the prototype small saddle staples were used, these being cheap and easy to find in hardware shops. Take great care to ensure that each element is square to, centred on, and in the correct place on the boom.

When this has been done, look along the length of the boom to make sure that all the elements are central and in their correct places, and that the are all in the same plane. If this is not the case then gently bend them until they all line up.

Gamma Match

The Gamma match can now be added behind the driven element. A small piece of single sided p.c.b. material forms the most convenient mounting method for the trimmer capacitor C1. An off-cut of 40 x 20mm should be ideal. Make a small cut in the copper to produce two lands, then fix the board to the boom using a small wood screw so that the Gamma match wire may be attached to it about 15-20mm spaced from the driven element. Bend the 100mm length of wire at right angles some 20mm from one end. Solder the right angled section onto the driven element 85mm from the mid point, and keeping the wire parallel to the element, solder it to the board.

Bare back about 20mm of the coaxial cable and arrange that the screening copper is rolled into a



tight twist. This end of the coaxial connects to the centre point. The driven element and the inner wire should be soldered to the other land of the copper board. Finally tape the coaxial wire to the boom with a loop as shown in Fig. 1, the antenna is now ready to adjust.

Tune Up

Connect a 430MHz transmitter to the coaxial cable via an s.w.r. meter capable of accurate indications at these frequencies. Apply low power and check forward and reflected power readings. Adjust C1 to give the lowest v.s.w.r. and then apply a little more power and re-adjust as necessary for the lowest reflected power reading (lowest v.s.w.r.).

Note that a 4-20pF capacitor is OK, but sometimes 2-16pF variables are sometimes to be found at 'junk' stands at rallies.

Comments

The antenna is not designed as an all-weather job, although I have had one outside for a week or two without undue problems. A plastics surround for the p.c.b. and one or two good coats of yacht varnish are advisable in this case though.

The antenna in this article is experimental and no claims are made for it, other than it works in my case and a novice constructor should have few problems making it. As it is experimental more directors could be added, each one 10% shorter than its predecessor and the spacing kept at 165mm. Construction and tune-up are as before. Those having difficulties obtaining hard drawn copper wire should ask in their local amateur radio emporium as it is normally used to make wire antennas. **PW**

Shopping list

C1	4-16pF variable capacitor
10mm	8 s.w.g. copper wire

2m of hard drawn copper wire cut into various lengths as shown below:

Reflector	365mm
Driven	330mm
Director 1	295mm
Directors 2-4	270mm

About 1m of 15mm square softwood
A piece 20 x 400mm single sided copper board

HOW MUCH ?
£ 4.00
HOW DIFFICULT
Beginner

Radio Diary

*** Practical Wireless and Short Wave Magazine in attendance.**

***May 12**: The VHF Convention will take place at Sandown Park Racecourse, Esher, Surrey.

***May 13**: The Yeovil Amateur Radio Club will be holding its 6th QRP Convention in the Preston Centre, Monks Dale, Yeovil. **D.J. Bailey G1MNM, 7 Thatcham Close, Yeovil, Somerset BA21 3BS**.

May 19: The Swindon Radio Rally will be held in the Oasis Centre, Swindon. **J Broadfoot. Tel: (0793) 611859**.

***May 20**: The 33rd Northern Mobile Rally will be held at the Great Yorkshire Show Ground, Harrogate. **Mike G0MKK. Tel: (0423) 564353/ 507653**.

May 20: The 7th National Amateur Radio Car Boot Sale will be held at the new venue of Stockwood Park, Luton. This is easier to get to (not far from junction 10 on the M1). Private sellers £7 in advance or £9 on the day, traders £20. The group would like to thank all those who have supported the Sales for the past six years when they were held at the Shuttleworth collection during September. **Clive G4ENB. Tel: Luton 27907**.

May 20: The Parkanaur Amateur Radio Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open at 12 noon and the entrance fee is £1. There will be the usual trade stands, Bring & Buy, bookstand, QSL bureau, etc., Talk-in on S22. The proceeds of this rally go to the Stanley Eakins Memorial Fund at Parkanaur near Dungannon. **Jim Lappin GI1YGS. Tel :(0762) 851179**.

May 20: The Cambridge & District ARC are holding their 5th Annual Rally & Radio Car Boot Sale at Coleridge Community Centre, Radegund Road, Cambridge. Doors open at 10.30pm. **Brian G4TRO. Tel: (0223) 353664**.

May 27: The 14th annual East Suffolk Wireless Revival will be held at the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. There will be a Bring & Buy, Car Boot Sale, a transceiver clinic, 50MHz demo station, all the usual traders and lots more including a children's play area. **Paul Whiting G4YQC. Tel: (0473) 642595**.

May 27: The Plymouth Radio Club are holding their annual Radio & Electronics Fair in Plymstock School, Church Street, Plymstock, Plymouth. The doors open at 10am with all the usual attractions - traders, Bring & Buy, raffle and a licenced bar and refreshments. There will also be an RSGB Zonal meeting and lecture along with Morse tests. **Jan Fisher. Tel: (0752) 340946**.

May 28: The 1990 Bircotes Radio Rally will be held near Bawtry, Doncaster. Doors open at 11am (10.30am for the disabled). Talk-in on S22. Details and or booking forms from: **Pat Smith, 23 Florence Avenue, Balby, Doncaster. Tel: (0302) 857526**.

June 2: The first Belfast Amateur Radio Convention, organised by the RAIBC (Northern Ireland Area), is being held in the Ormeau Park Recreation Centre, Ormeau Embankment, Belfast. All the usual convention attractions will be there plus demonstrations and talks on the hobby by local well-known amateurs. They are also trying to cater for the XYLs by having demonstrations on microwave cookery, crafts and first aid. The special event station operating on the day will be GB2BRC. **David Caldwell GI0HOW. Tel: (0232) 471370**.

June 3: The Southend & District Radio Rally and Boot Sale will be held at the Rocheway Centre, Rocheway, Rochford, Essex. There will be the usual trade stands plus a Bring & Buy, licensed bar and coffee bar. Doors open 10am with talk-in on S22. **John Stone G0OFE. Tel: (0702) 202216**.

June 10: The Mid Lanark ARS Annual Open Day will be held at Newarthill CE Centre, High Street, Newarthill Doors open 11am. There will be the usual traders, a Bring & Buy, demonstrations of packet radio, a talk by John Branegan GM4IHJ on his experiences with satellites, demonstrations of equipment and the annual award of their EHI Trophy. Catering will be provided. **David Williams. Tel: (0698) 732403**.

Feature

What is Propagation?

Continuing on from last month, Ron Ham now discusses the tropsphere and the effects of weather on radio signals.

The diagram of the atmosphere which I produced for our May issue showed that the first 8km above the earth's surface is called the troposphere and it is this region which has a great influence over the line-of-sight paths of v.h.f., u.h.f. and microwave signals.

Weather

The troposphere is the home of the earth's weather and for many years most of the world's inhabitants have been kept well informed about the complex movements of weather fronts by the media's numerous outlets. This subject effects our daily lives so much that, in the UK for example, weather reports and forecasts, immediate and long range, appear in the national and local press and almost hourly via the nationwide radio and television networks of the BBC and the IBA. These broadcasters achieve this in conjunction with the Meteorological Office and by transmitting regular bulletins, emergency flashes, special items for the farmers and shipping and updating CEEFAX and ORACLE their respective TELETEXT services. Although we have the benefit of all this information promptly to hand, it's more fun, as scientifically minded people, to have a few instruments ourselves and keep our own weather records. This certainly applies to the radio enthusiast whose particular interest lies with one or more of the dedicated wavebands above 80MHz.

Instruments

The basic requirements for a home weather station are a rain gauge and an outdoor minimum/maximum thermometer, both of which can be purchased from a good ironmonger or garden supplier for less than £20. In my case the rain gauge, Fig. 1, mounted on a waist-high pole in the middle of our garden cost about £5 and the thermometer, Fig. 2, housed on a tree and away from direct sunlight, was £8.95. These are read daily by Joan or myself and the recorded information is available for our own work and anyone else who needs it. Both instruments were photographed after the overnight period of 6/7 January 1990 when the rain fall was 0.78in and the temperature ranged between 38 and 50° Fahrenheit. Obviously other measuring devices such as a hygrometer and a wind speed and direction indicators are fine additions to the observatory but, high on the list must come a good barometer or a recording barograph, especially if the changes in atmospheric pressure are to be linked with tropospheric DXing.

Most of my readers know that I have used a Short and Mason Barograph continually since 1962, Fig. 3 and several years ago I installed an ex-RAF altimeter in my car, Fig. 4. The former provides a permanent and sometimes dramatic record of the prevailing pressure and the latter gives the height above sea level on the outer dial and a pressure reading on the lower scale. The altimeter in Fig. 4 is showing 994mb (29.4in) at 200ft a.s.l.

The Vulnerable Bands

Whatever your particular interest, be it amateur radio, broadcast DXing or CB operating a disturbance in the troposphere will, in some way, effect you. The amateurs use their 144, 432 and 1296MHz bands, the broadcast enthusiasts can listen and look in Bands II (87.5 to 108MHz), III (175 to 230MHz), IV (471 to 608MHz) and V (615 to 856MHz) and the citizen band operators have an allocation at 934MHz. Under normal conditions radio signals in this part of the spectrum have a limited range which means that frequency sharing, relay stations and repeaters can be employed to increase the number of stations on the air and get greater coverage in both the amateur and broadcast bands. However, when the atmospheric pressure is high and about to fall and the prevailing weather conditions are right the range of these signals is greatly enhanced resulting in continental and UK DX for the enthusiasts and misery for the domestic viewers whose normal crisp picture is covered in lines and patterns or totally disappears. Next time I plan to tell you about some of the big tropo-openings of the past. **PW**

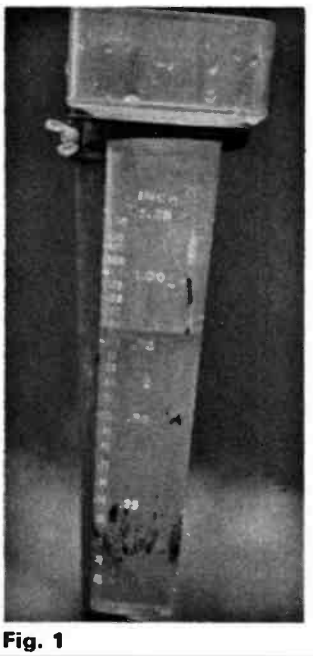


Fig. 1

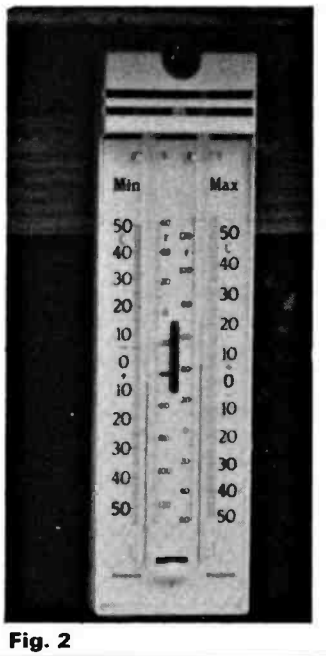


Fig. 2

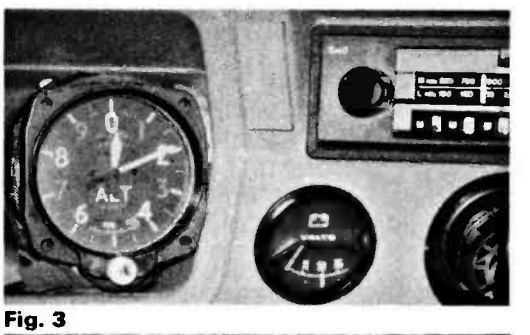


Fig. 3

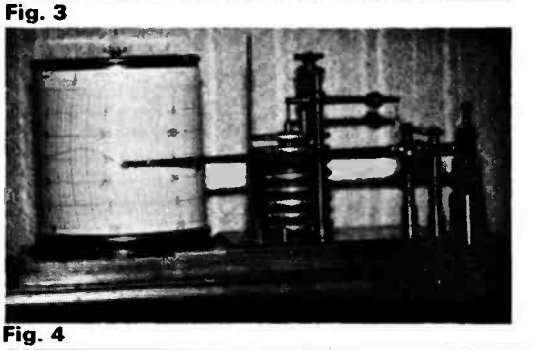


Fig. 4

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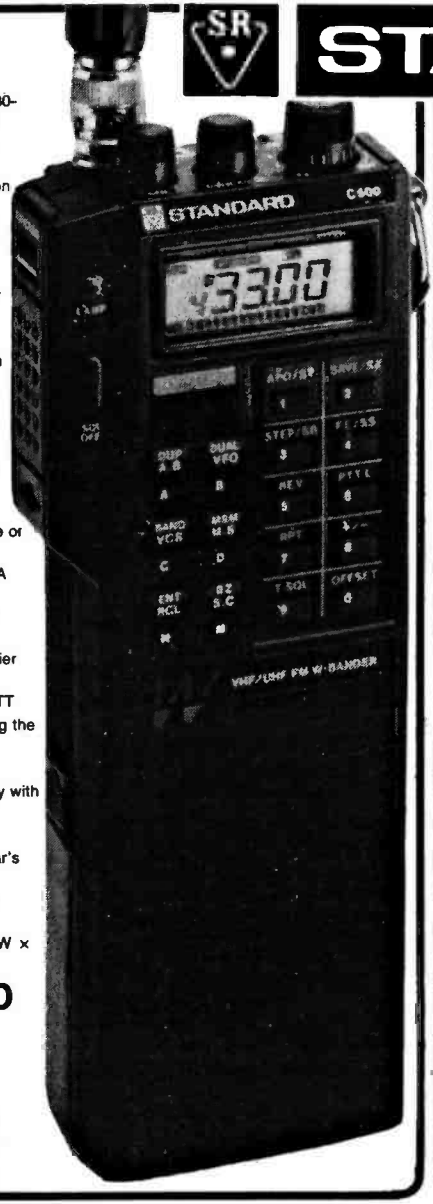

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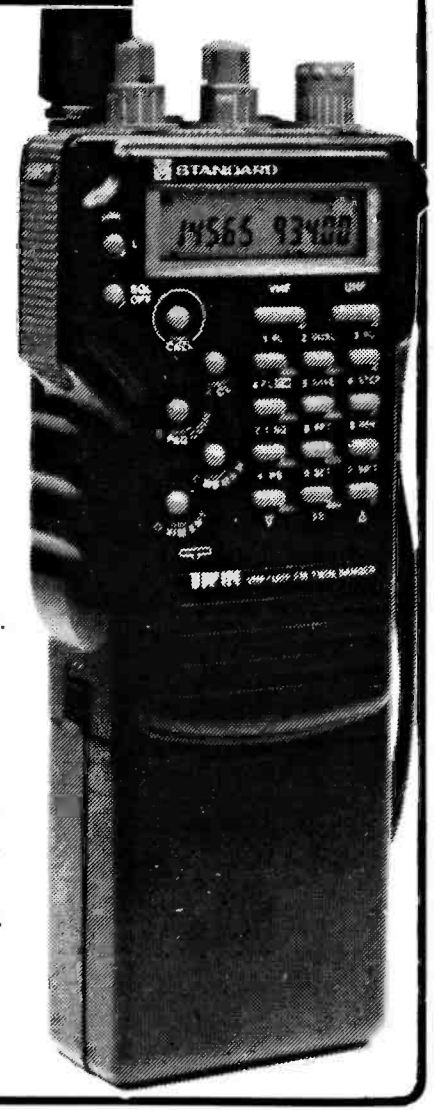

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NORMAN G4THJ

Feature

Packet Update 11

This month Roger Cooke G3LDI describes two interesting software packages from the USA.

PacketCluster. This software is not common in the UK as yet, in fact I think there is only one station running Cluster software and that is Ian G4LJF. It can be a very useful addition to the packet network, especially for the contester or avid DX-chaser. A write-up of this has been prepared for me by Peter Smith N4ZR.

The Packet Cluster Advantage by Peter G. Smith N4ZR, 2003 Sarazen Place, Reston, Virginia 22091, USA.

Have you noticed recently how quickly the US pileups on rare DX stations form these days? Did you wonder how many stations got the word on when a new one shows up, and where?

Secret Weapon

Well, the Americans have a secret weapon - or at least one that has not yet reached the UK. (It has now!!!) It is the first application of packet radio technology to really enhance other aspects of amateur radio - specifically DXing and contesting. It's called PacketCluster. To be precise (and legally correct) PacketCluster is really the name of a software package that is the brainchild of Dick Newell AK1A, and is marketed by his company, Pavillion Software. I think the first PacketCluster system was set up in 1986 and belonged to the famous Yankee Clipper Contest Club. In its simplest form, a PacketCluster system can be a single packet station, running the software, in lieu of the more usual terminal or BBS program, on an IBM or compatible computer. It provides most of the usual packet bulletin-board capabilities, but the difference lies in its DX and contest-related services. First, and most important, any station connected to the station running PacketCluster can report a DX 'spot' (Callsign, frequency and miscellaneous information, such as QSL manager) to the host station or 'node', which then automatically relays it to all other connected stations. The node also maintains a database of past 'spots', so that one does not have to be connected continually. Information can be recalled by band, prefix or specific callsign, for a number of days in the past.

In addition, the PacketCluster software provides for the posting of propagation information from the U.S. WWV and WWVH stations, with the same facility for recall of recent historical data. The propagation data is also used by a routine that will calculate the m.u.f. (Maximum Usable Frequency) and l.u.f. (Lowest Usable Frequency) from the users' station to any other place (identified by prefix). Similarly, you can look up the beam heading to, and the sunrise and sunset times at, any DX location (the latter for the low-banders among us).

The reason for the PacketCluster name is that the software is really designed not to be used by a single stand-alone packet system, but by a 'cluster', covering a wide geographic area. Let's take a practical example. The PacketCluster to which I belong (a yearly subscription helps defray the cost of equipment, software upgrades and maintenance) is run by members of the Potomac Valley Radio Club and the National Capital DX Association. It currently has 105 members from Maryland, Virginia and the district of Columbia. There are five geographically-separated stations operating as 'nodes' of the cluster on four different two-meter frequencies chosen to avoid the busy packet frequencies, as well as interference with traditional repeater operation. Each of these nodes is cross-connected with each other one, so that a DX 'spot' reported to one is relayed to all stations connected to all six of them. All nodes used to be on one frequency, and inter-node relays were handled on the same frequency, but as acitivty increased it became too congested, throughput fell dramatically, and it was necessary to move the inter-node links to 440MHz. The nodes are distributed to cover a wide area, so that each individual station can find a node to connect to that he can hear well, without for the most part requiring elaborate two-meter equipment - in fact, many stations are using 'dumb' RS-232 terminals and old crystal-controlled transceivers with omni-directional antennas to link to the nearest cluster node.

The PacketCluster advantage is obvious - instead of relying on ones' own ears alone, or even a two-meter voice repeater, everyone connected to the cluster can listen for everyone else. To date, we have had a maximum of 62 users connected to our cluster at one time, and 35-45 is more usual for an average week- end. And ours, believe it or not, is only a medium-sized cluster. The Southeast PacketCluster Network consists of seven nodes in six States, also linked to other locations by NETROM/THENET relays - this network has had as many as 135 stations connected simultaneously! To make things worse for the non-networked, local clusters are beginning to link to one another, so, for example, I now see DX 'spots' on our system from as far away as the Tri-State cluster in southern New England.

The PacketCluster is transforming DXing and contesting in the United States. Modest stations like mine, with limited time on the air, can benefit just as much as the most formidable. I typically connect to my nearby node as soon as I sit down for an operating session. If there is an active DXpedition or a rare staion that I want to work, I can check quickly to find out the times and frequencies where the station has been operating over the last few days, and whether it is on now. Propagation information tells me whether to look to the high bands or stay on 40 and 80. I can check my BBS mail at the same time, all the while being alerted to each new DX 'spot' that comes along.

Rule Changes

In contests, of course, use of spotting assistance usually puts you into a multi-operator category. This year, though, the CQWW contest will have a Single-Operator Unlimited (SOU) category, a specific response to the rise of PacketCluster poularity, and the ARRL is considering a similar change for its DX contest. For many like me, SOU is a great way to add to my country total and contribute points to my club at the same time.

As in the case of any fundamental improvement, PacketCluster has spun off additional advances. K1EA's excellent IBM PC contest logging software, CT, is integrally designed to work with PacketCluster, including reporting of DX 'spots' to the cluster by pressing a single function key and

moving to the frequency of a 'spotted' station (with one of the newer transceivers) by another one-key command. K1GW has developed an everyday logging and DX award tracking program called EASYDX, that works with PacketCluster in a diabolically clever way. Connect to your local node through EASYDX, and every 'spot' is cross-checked with your personal DX database. A message appears on the screen to advise you if you still need either to work or to confirm the 'spotted' country on that band or mode, and it can be told optionally to flag new countries by sending a ringing 'DX' in Morse from your computers' speaker, so that you don't even have to be at the rig when a spot comes in.

I hope this has whetted your appetite. Who will be next in the UK to join the PacketCluster revolution?

For further information on the PacketCluster software itself, write Pavillion Software, Box 803, Hudson, Massachusetts 01749, USA.

K1EA's CT can be obtained from Bill McGowan, KC1EO,33 Truell Road, Hollis, New Hampshire 03049, USA. When I last checked, the price of a registered copy was US$25, including one free upgrade.

K1GW's EASYDX is now distributed by MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762, USA.

The second program is written by Joe Kasser G3ZCZ, Editor of *The Amsat Journal*, resident in the USA.

LAN-LINK

LAN-LINK is a packet-radio and AMTOR terminal program that runs on IBM PCs or clones and provides a window into the Local Area Network (LAN) for the AEA PK-232s, Kantronics KAMs, TNC 1s and TNC 2s. It uses menus and function keys that allow the user to communicate, rather than play with TNC parameters which he doesn't understand. Some of its features follow:

(i) Recognises your call sign in a PBBS mail beacon, then automatically connects and downloads your messages.

(ii) Automatically requests bulletins from the PBBS on subjects that interest you.

(iii) Provides a conference mode for multiconnect situations.

(iv) Provides split-screen operation for incoming and outgoing text, as well as for terminal status information.

(v) Alerts you when a predetermined callsign shows up in a packet header on frequency.

(vi) Automatically captures to disk a recording of all connections. Indicates number of packet radio connections.

(vii) Provides 'smart' packet mode printer control that turns off upon disconnection.

(viii) Indicates that a specified station has connected while you were away.

(ix) Automatically sets NET/ROM and KA-Node paths from its call/path file.

(x) Stores and forwards LAN messages.

(xi) Automatically connects and downloads messages from other LAN-LINK stations.

(xii) Determines paths to DX stations.

(xiii) Provides AMTOR/packet-radio MSO and Selective Automatic Answering Machine function that displays a message or calls CQ repetitively and alerts you when a reply is received.

(xiv) Provides RTTY SELCAL mode.

(xv) Supports RTTY Navy MARS File Transfer Protocols (PK-232 only).

(xvi) Contest mode sends standard message and automatically increments QSO count.

(xvii) Provides single keystroke set-up to receive UoSAT-OSCAR 9 and Phase III RTTY telemetry (PK-232 only).

LAN-LINK is distributed as shareware, ie, the user can try the program and, if he wishes to keep it, he registers his copy by sending $35 to its author. Registration entitles the owner to upgrades and full support. Users of earlier versions of LAN-LINK and of PK3223COM Version 1.48 may upgrade by sending the author a blank, formatted diskette and s.a.s.e.

LAN-LINK is written, maintained and upgraded by Joe Kasser G3ZCZ, POB 3419, Silver Spring, MD 20901, Tel: 301-593-6236 from Joe Kasser G3ZCZ

The SAREX part of Lan-link was designed for both the space segment and the ground segment. The ground segment part is also useful in copying the MicroSats.

LAN-LINK has a number of features specially designed for SAREX, the MicroSats and other special activities as described below.

The Attack or 'go for it' Mode. If the Attack Mode is set, LAN-LINK will issue a connect request to the SAREX Call whenever a packet sent to or from it is heard. Be careful using this feature, as it has the potential to cause a great deal of QRM. It can also be cleared by another station connecting to you and telling you to ':QRT:'.

Blind Connect Scheduler

In case you think that the Robot may be turned on in the beginning of a pass before you hear a packet, you can give LAN-LINK the start time and the end time of the pass and the time interval between the connect/call attempts. At the given time, LAN-LINK will issue a connect request, and keep trying till either it succeeds or the pass ends. The first connect that goes through will inhibit the scheduler.

Telemetry Capture

You can also configure LAN-LINK for telemtry reception so as to capture-to-disk any packets addressed to or from the SAREX callsign. The capture-to-disk file is opened by a packet header containing the SAREX call, and closed by another packet header not containing the call. Packet headers are considered to be lines with a '>' character in them. LAN-LINK thus considers both of the lines below as packet headers.

N4QQ*>G3ZCZ
N4QQ BBS>

You may also use these features for copying telemetry from the MicroSats.

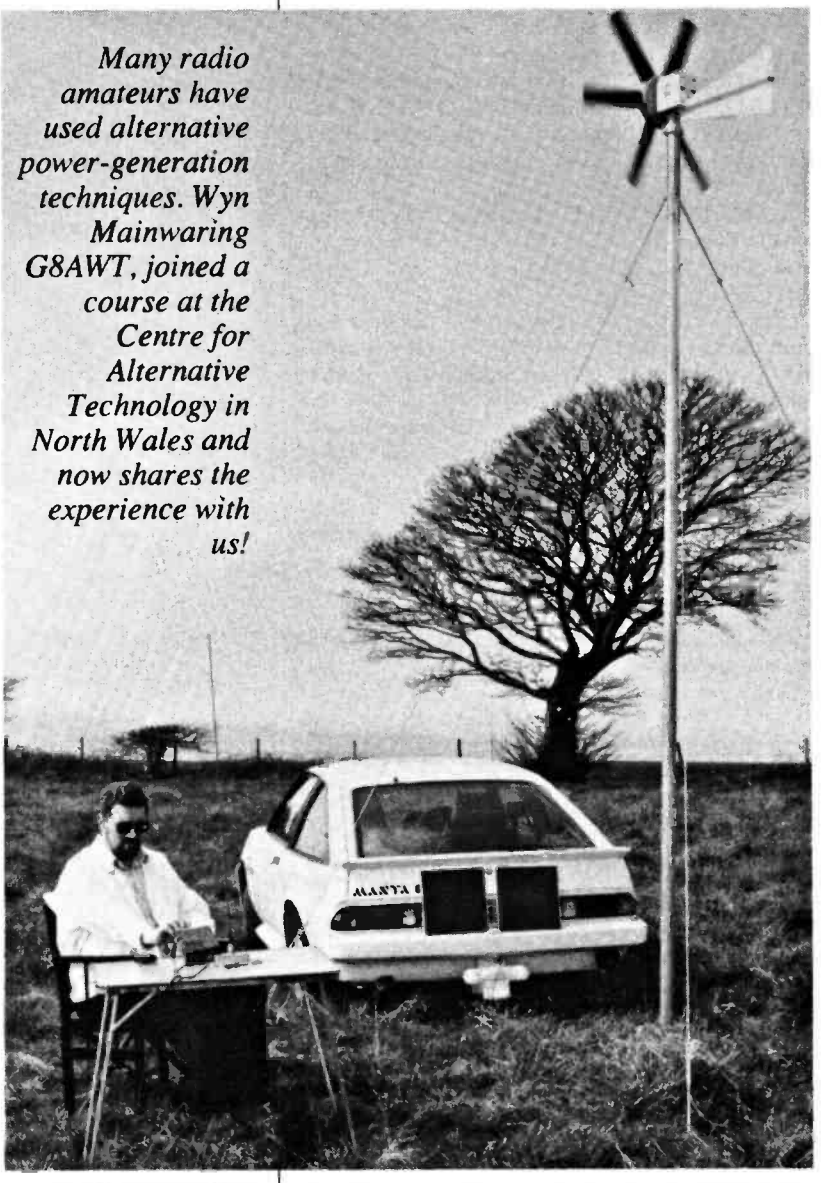
Just enough space left to mention that by the time you read this, Sir Ranulph Fiennes should be on his way to the North Pole, walking in aid of Multiple Sclerosis. At this time, callsigns of the packet stations have not been decided, but GB4MSS is one that will be used with a UA0 suffix. This is too long for packet though! Communications back to the UK are being routed via my HF port, GB7LDI. Hopefully propagation will be favourable.

That's about it again, news, comments, etc., to G3LDI @ GB7LDI or Tel: (0508) 70278, or snail-mail-QTHR. 73 and happy packeting.

Feature

Alternative Technology-*The Power Supply*

Many radio amateurs have used alternative power-generation techniques. Wyn Mainwaring G8AWT, joined a course at the Centre for Alternative Technology in North Wales and now shares the experience with us!



G1TEX, from *PW*, operating 144MHz 'Portable' while a 'Rutland Windcharger' keeps the batteries topped-up.
Note the two large solar panels on the car – in case the wind drops and the sun shines!

Thanks to excellent navigation by the XYL (who had enthusiastically practised the Celtic place-names) plus the willingness and reliability of a 21-year-old air-cooled engine, we arrived at the final incline of non-metalled slate-waste - the gateway into the Centre for Alternative Technology. This Centre is in a dis-used slate quarry up a mid-Wales mountain near Machynlleth, Powys.

The expected desolation of a defunct 'open-cast mine' style of operation, did not materialise. Indeed, it was difficult to believe that the place was a forty-acre bowl in the bowels of the earth, so plentiful was the vegetation. There were trees of all kinds and much more, as we were to discover.

In the sixteen years of occupancy by a group of ecologically-sensitive technologists and their families, the scarred remains of a product of the Industrial Revolution had become revitalised. Through long-sighted husbandry, it has become truly 'green', in umpteen shades of vegetation and in the accepted ecological sense of the word.

On Course

A four-day course on 'wind power-generation' lay before us, with a broad hint that 'camp-followers' could enjoy the scenery and even allay boredom by giving a hand with some chores. As obligations, arising from the increasing numbers of day visitors and school/college groups were stretching the 'facilities', help was needed in the reception kiosk, the shop and the vegetarian restaurant. Even a casual walk along the maze of paths and narrow gauge railway, watchful for lost or 'malfunctioning' personnel, gave a sense of purpose to casual sight-seeing.

During the initial welcome given by the Centre's Director, a *cri de coer* for an 'early bird' willing to tackle technological problems to the accompaniment of the noisy 'dawn chorus', was made. I - ever ready for an early cuppa - willingly volunteered. My duties were to start the electronically controlled and automatically topped-up boiling water installation in the restaurant. I also had to switch off the few night lights, thus saving the batteries as the whole site was electrically powered by 24 volt batteries!

As recycling is an important aspect of ecological thinking, ex-GPO telephone exchange lead-acid batteries have been given a new duty, by becoming part of the energy cycle in a locally generated electricity system

The other methods of generating the power were provided by water turbines, windmills, solar panels, wood-gas-plant fired engine-driven dynamo, or a vertical-boiled steam-powered dynamo. A last resort was an ancient Morris Minor engine-powered generator, fuelled by the same 'bottled' liquid gas that cooked the first-class food in the kitchen.

Power Control

All the various power sources fed their coulombs into a small wooden shed packed with several 'strings' of deep-cycling lead-acid accumulators. The individual cells were carefully labelled in dozens, with the electrolytic levels and state of charge being carefully checked in an almost loving way to maintain their reserve capacity of 2000Ah. Only once have I come across a larger battery capacity, and that was in a 50 year-old transmitting station.

Although not part of the syllabus of our course, the Centre's upper water turbine was still of interest. It received water from a mountain-stream fed reservoir water at a 'head' of 30m to produce 2kW, then the water fell a further 35m to produce another 3kW before joining a stream lower down the valley.

We were also given a little information on the arrays of solar panels. Most were statically mounted on roof tops at the optimum angle and bearing to catch the sunlight, but one group of panels were mounted on a sun-seeking tracking frame. The various engine-driven generators on the site were reserved for those who were equally happy wielding spanner or shovel! All those power sources had the common ability to be controlled or even stopped.

When the Wind Blows

Wind-free days are comparively rare in Britain, but it frequently blows with variability of strength and direction. Wind-driven generator designs are needed that will make use of light airs, with the ability to direct the machine to the best direction from whichever way the wind is blowing. As the energy level in wind rises with the cube of the velocity, gusts and gales call for very secure construction. 'Feathering' or wind spilling arrangements need to be fool-proof, otherwise blades that break off overspeeding 'windmills' are likely to scythe through anything within reach.

There is a wonderous selection of windmills arranged both around the perimeter of the quarry, and more conveniently within the centre for the visitor and student alike. Most have propellers and rudders, but a few were mounted on a vertical axis. This particular design suffers from problems caused by the considerable lateral forces of winds.

Third World

Some of the 'windmills' were traditional designs, using locally available materials. The traditional approach is particularly suitable for 'third world' situations where there is a real 'life and death' need for water, and pumping action has to be guaranteed.

The pumps must work well, despite the gritty nature of the water to be drawn to the surface from considerable depths. Such machines need to have high starting torques to move heavy wooden rods against the large static loads of long water columns. As a matter of fact, tribute is paid to one such design - the ancient 12-spoke wood and canvas Cretan windmill - in the Centre's impressive logo.

Batteries

Modern requirements favour the generation of electricity, with the generated d.c. being chemically stored in accumulators. Lead-acid accumulators have advantages over the nickel-cadmium-iron-alkali types in terms of both electro-chemical efficiency, and the required minimum potential for initial charging currents.

The considerable weight of large capacity lead-acid cells, calls for appreciable civil-engineering to ensure safe use. They need to be regularly inspected under natural lighting conditions, and need reasonably pure (distilled or de-ionised) water to be available for 'topping up'. This is particularly important in hot climates. Batteries must also be housed in well ventilated, rain and dust proof buildings away from any source of spark or flames.

Supervision

Moderately powered installations are likely to have users on hand, and can have daily supervision, but remote units would need to be self-caring for considerable periods of heat, drought or even extreme cold.

An impressive display of solar panels on show at the C.A.T. The panels shown here are mainly for water heating purposes.

Part of the on-going commitment of the Machynlleth Centre concerns evaluation of potential sites by year-long observations of winds, in terms of strength and duration. To help in this work the Centre's resident experts have evolved an unsleeping 'laboratory assistant' in the form of an automatic recording system. It's capable of 'living' on some lonely, inhospitable and wind-swept site, carefully noting and storing all the data on the forces of the wind. The modest power requirement for such faithful service is provided by a large, self-maintaining, battery which is trickle-charged by solar panels.

Wind-Driven Generators

Manufacturers of various designs of wind-driven power generators have entrusted the staff of the Centre with the care and evaluation of their products. These include a 0.25kW rotating permanent-magnet unit (used to charge batteries); 1, 2 and 3kW dynamos that are turned by two or three-bladed, horizontal-axis propellers on lattice towers; and one 15kW a.c. machine on a hefty steel tube that looked like a lighthouse to me.

Ensuring a permanent load for such an alternator, meant installing a bank of 3kW immersion-heater elements in a large water tank. This not only prevented runaway revolutions by the three-bladed propeller, but provided a useful store of hot water for the residents to use in windy weather, or shortly after!

Stationary 'windmill' propellers need to 'catch' the slightest breath of air. They should be able to turn into the wind by means of a rudder or fan-tail to produce a justifiable output at moderate wind speeds. They must also be able to cope with wind speeds up to the rated power limits of the generator and structure. Quite a tall order!

Material Choice

The choice of material for such a wide ranging task came back to the age-old choice...wood. The material is carefully selected for uniformity from wood known to be weather and stress resistant and able to accept preservatives and protective coatings. Modern materials, although capable of being moulded, seem to be liable to creep at high revolutions or distort in high winds. One-piece, two-bladed, propellers seemed to be favoured, giving higher speeds than multi-bladed designs. Another

Climbing the tower to check that all is well with the three bladed generator.

advantage of wooden blades is that they are more economical to transport. A six foot type has proved to be a good size to send out to isolated farms and cottages, for installation or replacement.

Electrics

Among the various discoveries made from the studies undertaken at the Centre, has been the revelation of how little electrical power is really needed! Surprising perhaps to the young graduate and 'hi-tech' folk from big cities, but it serves as a reminder to us 'old timers' who have lit (and broken) a few gas mantles.

All the electrics on the site were wired through a tiny (and well packed) control room, enabling monitoring of every outlet and isolation if needed. The control-room doubled as a projection facility into the adjacent lecture-theatre, which also had a video display unit. There's also a library stocked with books covering ecologically appropriate topics, and an overhead projector, obviously constructed from re-cycled parts.

All the lighting on the site is provided by 24V bulbs. Experience, backed up by observations and enquiries have proved how efficient - in terms best described as physiological rather than lumens - this method is for practical purposes.

Saving Energy

Obviously, if energy is saved, stored, and used more efficiently then less would be needed in the first place. As the energy required for heating purposes is becoming a heavy burden in temperate regions, staff at the Centre are studying a wide range of alternatives. Many of the ideas could be seen undergoing evaluation in terms of £/kWyear. There were d.i.y. water storage tanks and exotic tubes with alternating silvered and blackened surfaces, mounted in evacuated glass tubes on combined shock and thermal collars. All were mounted in suitable situations for visitors and students to see for themselves.

Solar Success

In early summer 1989, the rainfall had been almost zero for several weeks, this severely limited the water power available. There was very little wind, even up on the ridge of the mountain. The brilliant sunshine not only made it possible to have lessons out in the shade of the trees, but enabled the solar panels to generate a kilowatt directly into the batteries, making it necessary to run an engine only occasionally to re-charge batteries.

Most lectures over-ran with both enthusiasm and because of the many questions from the floor. Nominated lecturers were readily helped by visiting experts in the ever widening field of ecological engineering.

So keen were we that after the evening sessions and films had finished, many pots of tea were brewed as we chatted into the early hours. It was so warm that we were able to stay out on the terrace between the students' common room and the dormitories and enjoy our conversation to the full.

Services

I soon realised that the place had none of the 'local authority style' services that are taken for granted these days, even in remote hamlets. Such things as drains, piped, treated and purity-guaranteed water at a pressure that fills cisterns, flushes 'loos', fills kettles, baths and showers weren't available. At this 'Green Oasis' these services need to be continually provided by the labour from a rota of the residents!

Occasionally we were reminded of the limitations of the system. It brought home to us the high reliability level of the national electricity grid with its careful frequency control and steady voltage and associated benefits.

Being no more that an enthusiastic amateur at gardening or civil engineering, I could only look in awe at the vegetable plots, growing prolifically from beds of slate waste. This miracle was provided by the effluent, discharged from the modern flush

toilets. This material was recycled in carefully controlled stages, to yield odourless compost that could have been bagged and sold, at garden centres or in general stores.

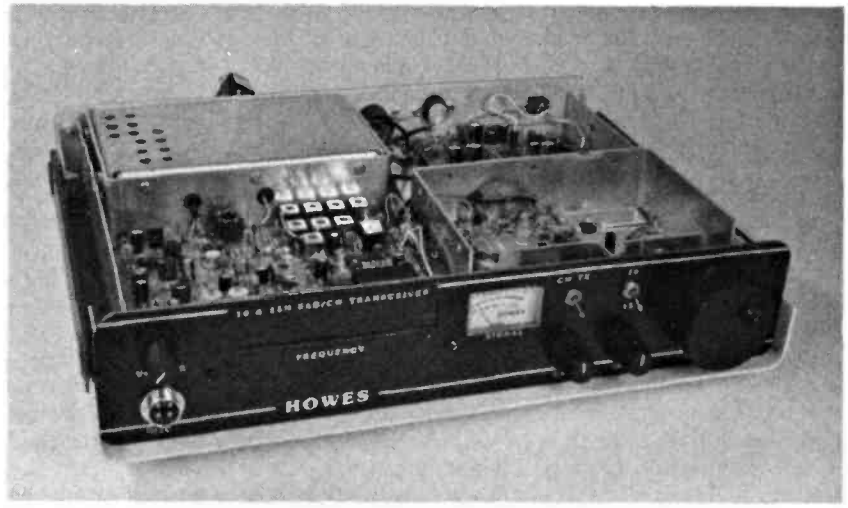
Scenic Environment

Water had been used to create scenic areas that yielded a different food chain. Birds and animals (wild and domesticated) were finding the environment to their liking. So do fifty thousand folk each year, who often try to return, over-subscribing the wide variety of residential course that the Centre offers.

The course we attended was so well time-tabled, that only early in the morning was it really possible to explore. We browsed in the bookshop, followed the narrow gauge railway track, and peered down the pit of the 'third-world' type wooden water wheel. We also 'played' with the many exhibits (intended for the thousands of day visitors) and chatted to the goats!

Only once was it possible (in daylight) to negotiate the steep incline down to the former narrow gauge railway station and on to the main road and mingle with local people. After the course finished, only those who really had to rush off to Machynlleth Station to catch a train actually did so. Others lingered, browsing amid the books or searching for elusive staff members to say goodbye, but not really wanting to leave the place. **PW**

Power direct from solar energy. Students see for themselves the generation of electricity



The HTX-10 s.s.b./c.w. exciter is the latest product to be released from C. M Howes and represents a significant development for those with an interest in home construction. Mike Richards G4WNC built the kit and put it through its paces.

REVIEW

Anyone interested in home construction of amateur radio equipment will soon discover that the vast majority of kits on the market only support c.w., a.m. and double sideband operational modes. That has now changed with the release of the HTX-10 s.s.b. and c.w. exciter. In fact the HTX-10 is the vital ingredient in a line of kits from Howes, which form the essential elements of a complete 21MHz and 28MHz transceiver. So let's take a closer look at the HTX-10 kit.

Instructions

Kits can make a great introduction to home construction and are often very cost effective, but a poor kit can be a nightmare. Probably the most important item in any kit, at least as far as newcomers are concerned, is the instructions. Howes have had plenty of experience in the kit business and as a result can produce detailed but simple to follow instructions. One useful offer they do make is that if, after receiving the kit, you think it's beyond your capabilities you can send it back and on payment of the difference they will exchange the kit for an assembled p.c.b.

One point to note about the HTX-10 kit is that it is NOT for beginners, you need to be comfortable working with high density p.c.b.s and integrated circuits. The instructions supplied with the HTX-10 comprised 11 A4 sheets. The first three sheets covered the construction order of the kit, and also included some useful diagrams illustrating how the components should be mounted on the p.c.b.

The following section was a detailed parts list which included the full component marking details. An example of this was where the appropriate colour code was printed next to each resistor, so making identification as easy as possible.

This same technique was used for all the other components. The remaining sections covered the alignment, interconnections and circuit diagrams. I thought the level of detail provided was just about right for this type of kit.

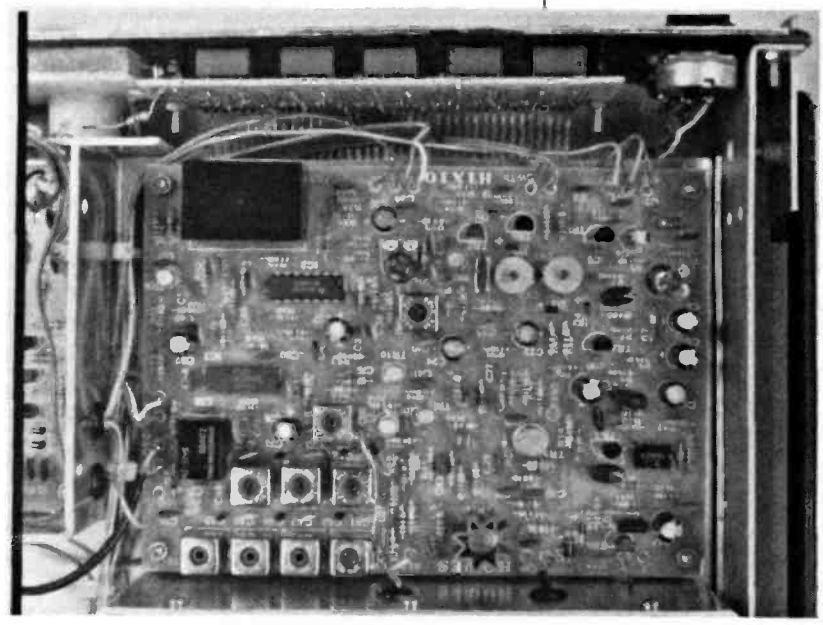
Construction

The HTX-10 was assembled on one p.c.b. and was of good quality glass fibre and screen printed with the component overlay. With any kit of this complexity it's important to keep to the recommended assembly order which in this case started with the resistors. I don't expect I'm alone in having difficulty with resistor colour codes, so I usually set up a digital multimeter on the bench and use it to check resistor values during construction. This simple precaution can save a lot of time later on.

There were approximately 80 resistors in the kit, so checking them was quite a time consuming task. I completed fitting the resistors in two sessions with a total time of about 1.5 hours. The next step was to fit the diodes followed by the fixed capacitors.

The total assembly time for the review p.c.b. was approximately 2.5 hours. Although the kit could be constructed in one session, I would strongly recommend that this is broken up into at least two parts, for the sake of accuracy! The supplied instructions were issue 1, and I only found one mistake which was that a 100µF capacitor, C17 was missing from the components list.

I have contacted Howes regarding the error, and



The assembled exciter viewed from above.

REVIEW

they will no doubt put things right with the next issue. With the p.c.b. complete, the next stage was to mount it in its proposed enclosure, check that all was basically ok and carry out the alignment procedure.

Alignment

The first part of the alignment procedure was to set all the variable components close to their expected final position. This procedure was clearly covered in the instructions. This method helps, and goes a long way to overcoming many of the problems traditionally associated with the alignment of a complex module such as the HTX-10.

Howes had obviously put a lot of thought into the alignment procedure to make it as practical as possible, bearing in mind the type of test equipment available to the average amateur. It's very easy to write alignment instructions if a full range of test equipment is available, but Howes have managed to limit the requirements to a general coverage receiver and a frequency counter!

In addition to the counter and receiver, you will also need to have a working v.f.o. for 21MHz and 28MHz. The first stage in the process was to set up the carrier oscillator. This was achieved by tuning the receiver to 11.995MHz and adjusting an inductor for maximum received signal on the receiver. It was at this point that the frequency counter was required, to accurately set the carrier frequency for s.s.b. and c.w.

The next stage was to align the 21MHz and 28MHz band pass filters, which again was achieved by using the receiver to monitor the output signal. The final adjustments covered the carrier suppression and microphone gain settings. As you can see from this description, the alignment really has been made extremely simple and is well within the capabilities of most amateurs.

With the alignment complete, I was able to confirm that the suggested starting point for the adjustments was very close indeed to the final settings. This of course meant that the alignment was very quick - about 20 minutes in the case of the review model!

Circuit Description

I'll give an outline description of the circuit rather than full details as that would warrant an article in itself! Starting with the microphone input. This signal is first amplified by a two transistor amplifier before being applied to an integrated circuit and subsequent active low-pass filter.

The resultant filtered signal is applied to an MC1496 double balanced modulator. Here, a double sideband signal is produced by combining the audio signal and the 11.9957MHz crystal controlled local oscillator. The next process is to convert the d.s.b. signal into a s.s.b. signal using filter technique.

Rather than use a standard commercial filter, Howes have produced their own crystal filter which has the advantage of precisely matching their requirements. The resultant s.s.b. signal is fed to a SL6440C double balanced mixer where it is combined with a v.f.o for conversion to the final operational frequency.

The next stage comprised two banks of relay switched band pass filters - one for 21MHz the other for 28MHz. These provided a significant reduction in out-of-band signals. The final, broad band, stages were required to bring the signal up to 50mW p.e.p. It was at this point that provision for automatic level control (a.l.c.) was provided. One notable point about these power amplification stages is that they all run in Class A to minimise harmonic distortion.

Transceiver

As you can see from the description so far, the HTX-10 is the heart of an s.s.b. transceiver, but cannot be used on its own. So for the 'on air' tests it was necessary to interface the HTX-10 with a number of other modules to form a working unit. This job was made somewhat easier as Howes supplied a complete transceiver for me to evaluate.

Before I cover the on-air performance of the unit I ought to describe the modules used in the transceiver. The heart of the unit was the HTX-10 exciter, but this was interconnected with a v.f.o., receiver and frequency display. The receiver module used was the DXR-10 direct conversion unit with a coverage from 21MHz to 28MHz. This receiver normally operates using its internal v.f.o. but in this case the VF-10 dual band v.f.o. is used.

The v.f.o. was also used for the HTX-10 exciter, thus ensuring that the transmit and receive frequencies were the same. The VF-10 included a few useful refinements such as a clarifier (r.i.t.) which could be disabled by the p.t.t. line. The final module was the DFD5 digital frequency display which was fed from the HTX-10 to give a readout of the operating frequency.

There was one other module mounted in the review transceiver, and that was a final r.f. power amplifier. However, the details of this module have yet to be finalised and it was not connected in circuit. The housing used for the transceiver review model, comprised a very smart two section steel case which provided excellent r.f. screening in addition to the mechanical protection.

On Air

For the acid test I set the Howes transceiver up in the shack in place of my own equipment. My first impressions were very favourable indeed and it was difficult to believe I was listening to a comparitively simple direct conversion receiver. The audio quality of the receiver was also good, and there was plenty of power to drive the shack speaker.

Frequency stability of the v.f.o. is obviously an important point in any receiver, and is often an area where performance is lacking in home

HTX-10 Specification

Frequency Range	21.0MHz to 21.45MHz 28.0MHz to 29.0MHz
V.F.O. Input	0dBm (1mW)
Microphone	Dynamic 300Ω - 1kΩ
Key Input	Earth keying
Carrier Suppression	40dB or better
Output Level	50mW p.e.p on s.s.b.
Spurious Output	Better than 40dB below full power
Harmonic Output	At least 40dB down at all power levels
Power Supply	12V to 14V at 250mA

constructed units. The VF-10 did very well here and once past the initial warm-up period proved to be perfectly satisfactory for its intended s.s.b. and c.w. operation.

Being keen on data communications myself, I connected up my packet and RTTY equipment to see how it performed. I was again delighted to find that it proved very successful with no problems at all. In fact, the continuous tuning of the v.f.o. meant that it was better that some synthesised receivers.

If you intend to use the receiver for packet operation on one frequency for long periods of time, you will however, find that the v.f.o. needs adjustment from time to time. I found the frequency display to be very clear and there were no signs of any interference breaking through into the receiver. The ability to set the counter resolution to 100Hz was also very useful.

Moving on to the HTX-10 exciter itself, it seemed obvious that with only 50mW of r.f. output available, it was going to be difficult to make any real contacts. I overcame this problem by carrying out my tests between the HTX-10 and my Icom transceiver. The main object being to evaluate the signal quality, so the use of a receiver of known quality was essential.

The overall quality of any transmitter is greatly affected by the microphone, and in this case I used a low impedance Trio model which was supplied by Howes. This microphone produced excellent results on the Icom with a very well balanced audio quality. I would have liked to have put the transceiver through its paces in the lab, but unfortunately there just wasn't time.

PW

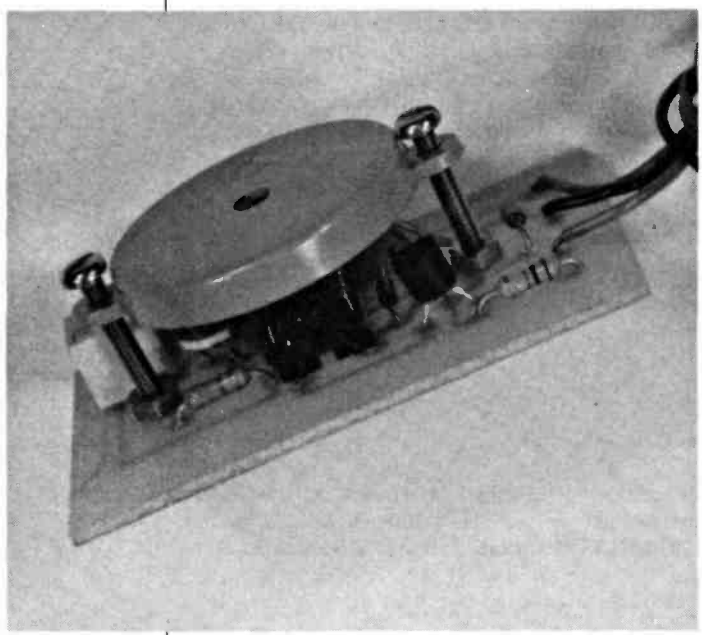
Conclusion

The HTX-10 is a very welcome addition to a well established range of high quality kits from C. M. Howes. The performance of the HTX-10 was well up to the expected standard and provides the foundation for a fine transceiver when combined with the other Howes modules. The HTX-10 is available from C. M. Howes price £49.90 in kit form or £74.90 ready assembled, add £1 p&p. My thanks to C. M. Howes Communications, Eydon, Daventry, Northants NN11 6PT. Tel: (0327) 60178 for the loan of the review kit and transceiver.

READER ADVERT

Construction

Low Voltage Warning Alarm



After fitting this alarm, designed by Mike Rowe G8JVE, to your p.s.u., you can sit back and relax knowing it has that little 'extra' in protection.

Have you ever 'cooked' or damaged a power supply because the output has been accidentally short circuited without you realising it? This handy little gadget is very easy to make and gives an audible warning when the voltage falls below 3V. Another plus is that it's so small that you can fit it into a variety of amateur radio gear.

The alarm can also help where the loading on the power supply is not enough to blow fuses, but can still overheat transformers and other expensive components. In this age of fully rated equipment there's often not much of a margin for overloads and any extra form of protection could save you money.

The circuit for the low-voltage warning unit is shown in Fig. 1, and is based on a 4093 device. In operation the alarm is very simple to install and is connected either side of the existing regulator in the power supply to be protected. The alarm is shown connected this way in the block diagram in Fig. 2, where it can obtain its power supply from point A and most effectively monitor any dramatic drop in voltage at point B.

How It Works

The supply for the low voltage warning alarm, obtained from point A, is regulated down to 5V to supply the 4093. Transistor TR1 has a base reference voltage set by the 5.6V Zener diode, D1.

Providing the sensing input to the alarm from the equipment to be protected is simplicity itself. The sensing voltage is applied to IC1a via R2. This input is connected to the output of the p.s.u. at point B in Fig. 2. The -V connection of the alarm is then connected to the -V supply of the p.s.u. as shown.

To prevent the gate input voltage exceeding both supply rails and possibly causing damage to IC1, the input voltage from the p.s.u. is applied via R2. It is then clamped by the Zener diode, D2.

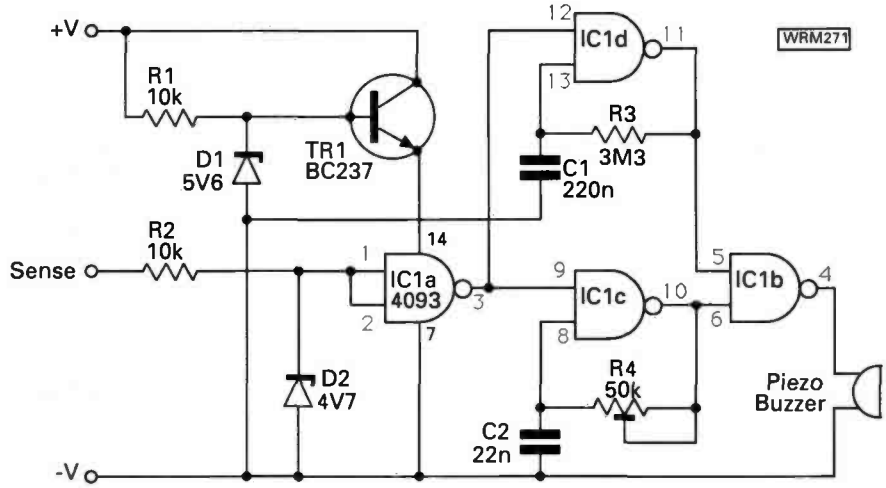
When the alarm is working and the p.s.u. is 'healthy', pins 1 and 2 on IC1a are high and pin 3 is low. A low frequency oscillator, operating at about 3Hz, is provided by IC1d and another oscillator is provided by IC1c. The IC1c oscillator runs at a higher frequency than IC1d, and can be adjusted by R4. Both oscillators are inhibited by a low state on pins 12 and 9.

When the input to pins 1 and 2 goes low (when a short circuit of the p.s.u. occurs) pin 3 goes high, starting both the oscillators. The outputs of the oscillators are added in IC1b, which then provides the necessary drive for the piezoelectric buzzer.

Construction and Setting Up

The alarm can be built to best advantage on a small p.c.b., the layout of which is shown in Fig. 3. You should first mount all the components on the

Fig. 1 The low voltage wiring circuit diagram.



p.c.b, taking care to place IC1, TR1, D1 and D2 correctly before soldering them into position.

It's a good idea to mount the piezoelectric buzzer on stand-off bolts on the p.c.b. track side. This will make it easier to check and replace other components should the unit goes wrong.

Checking

After completing the board and carrying out the usual checks for solder-bridging and other potential problems, the alarm can be connected into circuit as shown in Fig. 2. Once you've done this, temporarily connect the sensing lead (this connection leaves the p.c.b. from the unconnected end of R2) to the -Ve line and adjust R4 for maximum output from the piezoelectric buzzer. As R4 is adjusted, you should notice a significant increase in the audio output as the oscillator drive approaches the buzzer's resonant frequency.

Finally

After this final test, the sense connection can be soldered onto the output terminal of the p.s.u. to be protected, as shown in Fig. 2. You can then sit back and relax in the knowledge that your p.s.u. is that much better protected than before and has that hidden extra! **PW**

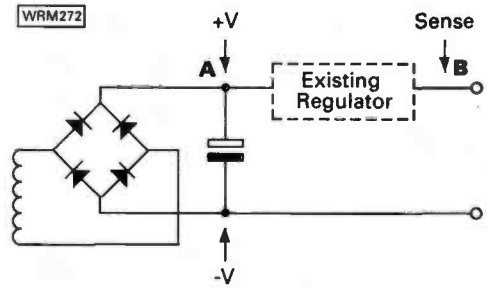
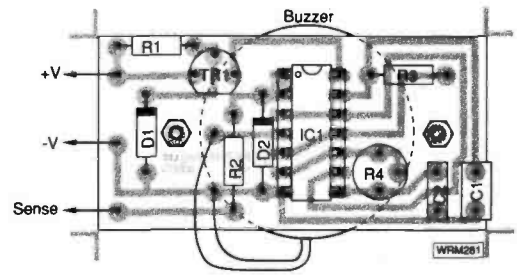


Fig. 2. Showing the supply and sense points for the unit.



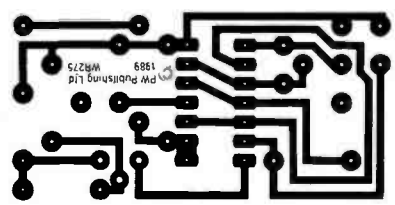


Fig. 3

Component layout and track pattern for thr printed circuit board available from the *PW* p.c.b. service.

Shopping List

Resistors
0.25W 5% Carbon film

10kΩ	2	R1, R2
3.3MΩ	1	R3

Potentiometer rotary p.c.b. mounting

50kΩ	1	R4

Capacitors
Plastics cased miniature metallised polyester film

22nF	1	C2
220nF	1	C1

Semiconductors

Integrated Circuits

4093	1	IC1 (Maplin QW53H)

Transistors

BC237	1	TR1 (Cirkit 58-00237)

Diodes

BZY88C	1	D1	5.6V (Maplin QH08J)
BZY88C	1	D2	4.7V (Maplin QH06G)

Buzzer

piezoelectric	1	9V encased element (Cirkit PKM29-3AO)

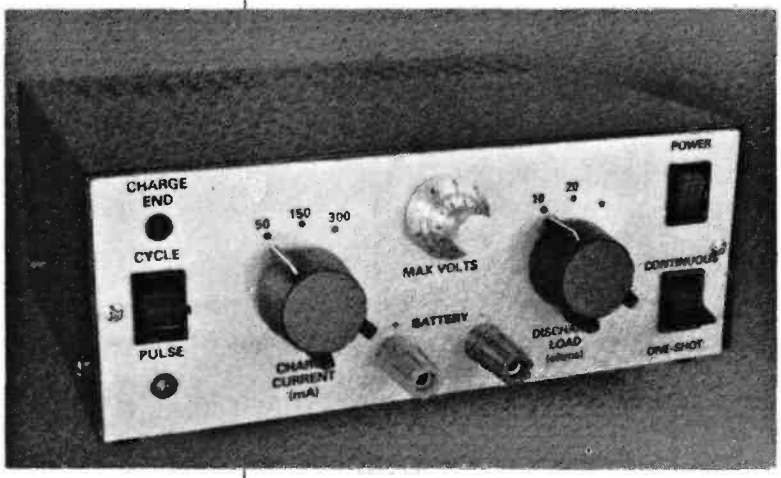
Miscellaneous

Connecting wire, p.c.b., stand-off bolts and nuts for buzzer mounting, double-sided adhesive pads for attaching alarm in p.s.u.

HOW MUCH ?
£ 8.00
HOW DIFFICULT
Intermediate

Construction

NiCad Recycler Part 2



In this second part of the NiCad Recycler, Peter A. Lovelock looks at building and setting the unit up for everyday use

The unit is built on a p.c.b. that holds most of the main components. The case that houses the NiCad Recycler should be provided with adequate ventilation holes to ensure a good air-flow.

By allowing a good flow of air over the transformer and other components you should get a long and trouble-free life from the Recycler. The importance of this factor should not be overlooked, especially when you consider the long cycle times needed for some larger capacity batteries.

A suitable enclosure for the project is a steel case, such as the Maplin type 2108. This case provides a sturdy enclosure and has the advantages that the front and back panels are detachable. Also more than adequate ventilation holes are provided in the design.

Layout

With the recommended lay-out, the mains transformer and the p.c.b. are arranged so that there are gaps between them. This will aid cooling and will also allow the large computer-type electrolytic capacitor for the 'Zapper' facility to be suitably placed. The suggested front panel layout is shown in Fig. 2.1. I recommend that you stick to this layout, as it seems to work well in practice. Power for the Recyler is provided from a 24V secondary transformer with a 1A rating. Again, in practice this rating has proved to be perfectly acceptable. The transformer fitted into the *PW* prototype only became barely warm to the touch after many hours of use.

In the prototype this electrolytic capacitor was held in place by double-sided adhesive tape. A spring-clip type of holder is perfectly acceptable if you don't mind the extra drilling required for the necessary fixing bolts.

Heat Dissipation

The case has ventilation holes provided in the bottom plate and a further series along the top cover. These inbuilt holes should be more than adequate and no further holes will be needed for the unit in normal use.

Heat sinks for IC1 and IC2 are essential for reliable operation. For the most efficient transfer of heat, silicone grease may be applied between each i.c. and its heat sink. The rear panel provides an excellent heat sink for the only other high-dissipation components. These are 15W wire-wound 10Ω resistors R20 and R21. Neither of these resistors require heat-sinking compound as they bolt directly onto the rear panel, which provides a large heat dissipating area.

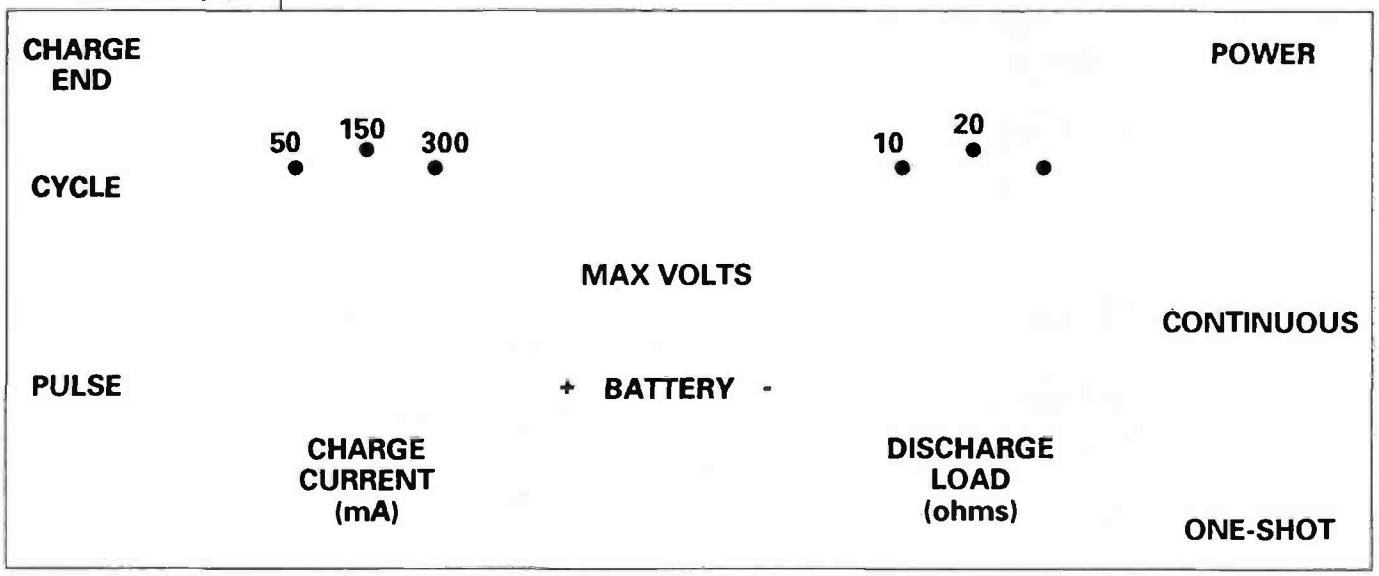
The p.c.b., track and component overlay are shown in Fig. 2.2. The heaviest gauge wire possible should be used for the of-board connections to C3+ and S5b. A short thick wire should also be connected from the negative of the capacitor C3, to socket SK2. High current pulses are carried in this area of the circuit and its efficiency depends on the lowest series resistance in circuit.

To build the unit, follow the layout shown, there's no special order of fitting components to the board. You should also examine the p.c.b. for solder-bridges and poor connections or wrong component placing.

Calibration and Adjustment

If everything is okay the Recycler will be ready for initial calibration. To calibrate the charge voltage limit, connect an accurate voltmeter (preferably a digital type) between the wiper of R1 and ground. Adjust R1 for each end charge voltages (while logging the potentiometer dial setting). Table 1 shows the ideal end charge voltage for one to ten cells. If using the switch option as outlined in the last part then check that

Fig. 2.1: The front panel layout of the NiCad Recycler



the correct voltages are as shown for the appropriate cell count (see Table 1).

To calibrate the deep discharge limit, set the charge maximum to 8.4V (6-cells). Connect the voltmeter to the wiper of R3 and ground. Adjust the level, using R3, to 6.0V (1V per cell). No further adjustment of R3 is required since it automatically tracks the setting of R1.

The discharge load resistor in the prototype is made up from two 10Ω 15W resistors (mounted on rear panel) that suits the requirements of recycling 12V transceiver battery packs. A 10-cell, 12.5V

Table 1. End charge voltage for battery packs

1.4V (1 cell)	2.8V (2 cells)	4.2V (3 cells)
5.6V (4 cells)	7.0V (5 cells)	
8.4V (6 cells)	9.8V (7 cells)	11.2V (8 cells)
12.6V (9 cells)	14.0V (10 cells)	

500mAh pack discharges at 625mA in about an hour. However, a single 1.25V 500mAh size AA cell will discharge 62.5mA in about 8 hours. The extreme case,

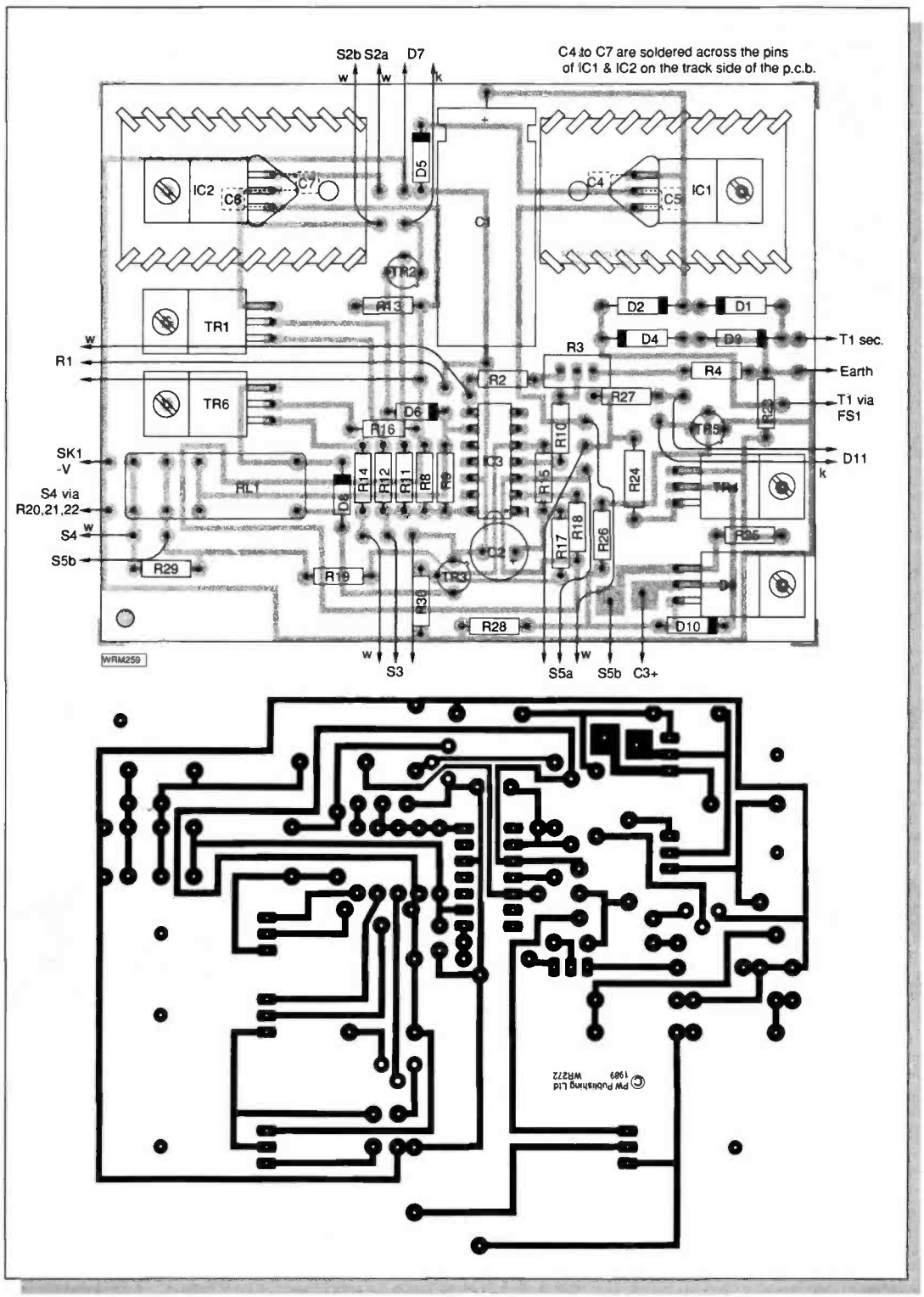
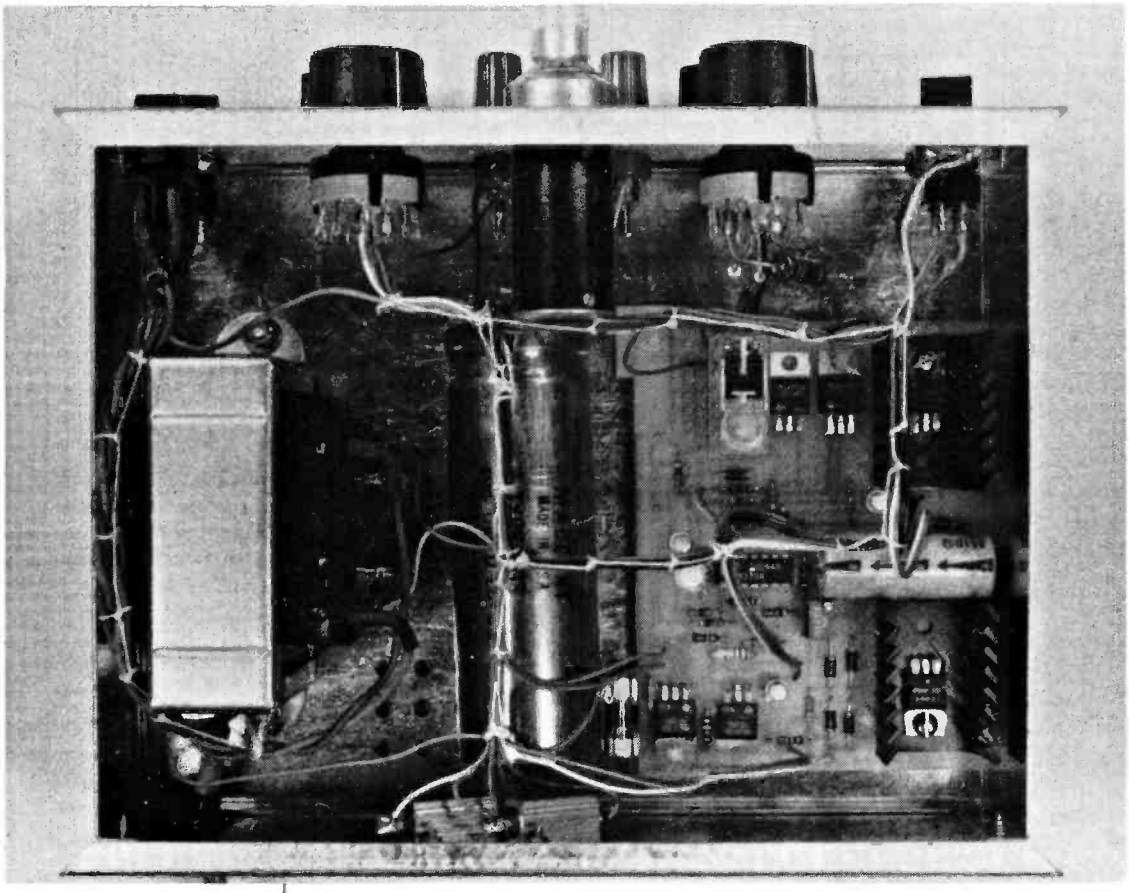


Fig. 2.2: Component overlay and track pattern for the project. The p.c.b. will be available from the *PW* services



The completed NiCad Recycler

a single 4000 mAh D cell will take 64 hours to discharge fully, which is time consuming for recycling.

If you expect to recycle high capacity cells, you will need to select appropriate loads for maximum permissible discharge rates to speed up the process. Maximum discharge current should not discharge a cell in under one hour. Load resistor values may be calculated using Ohm's law (R =V÷I) for the total voltage and maximum discharge current for each combination.

DO NOT FORGET that high levels of heat can be generated during discharge.

General

When first recycling a 'memorised' battery best results are obtained by using a low charge rate of one tenth of the ampere hour rate (e.g. 50mA for 500mAh AA cells). Remember that charge and discharge values may be altered to suit your requirements. Don't forget that low capacity battery packs should not be subjected to heavy discharge current. This could lead to a state of insufficient discharge and cause the cycling to be less effective than it might be.

Individual Cell Records

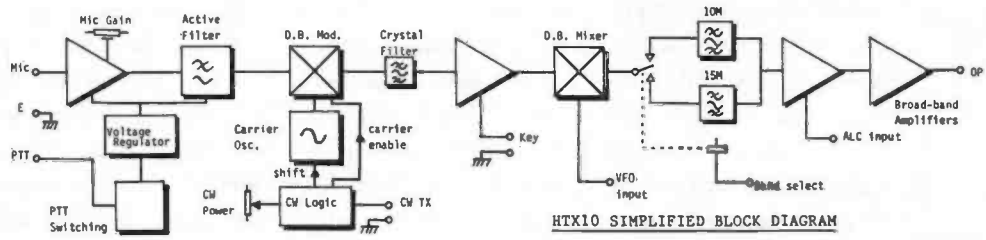
Many NiCad users will have a multiplicity of cells. In fact, it is very easy to lose track of each individual cell. How about keeping tags on them? One method is to give each cell a number and keep a record on each. You could then have a very useful record as to how individual cells have faired. More importantly perhaps, it may show if one brand of cell is proving to be more reliable than others. Together your NiCad Recycler and cell-log could save you a great deal of money and time!

PW

C.M.HOWES COMMUNICATIONS

Mail order to: EYDON, DAVENTRY
NORTHANTS NN11 6PT
Tel: 0327 60178

NEW SSB EXCITER KIT!



HTX10 SIMPLIFIED BLOCK DIAGRAM

The new *HOWES HTX10* is an SSB and CW exciter for the 10 and 15M bands. It has been designed to be the heart of a transceiver for these bands, or as part of a "tunable I.F." for driving transverters.

SSB generation is by the filter method using a double balanced modulator and crystal filter. The onbaord microphone amplifier is designed for low impedance microphones, and the key input accepts straight or electronic keyers. Relay switched band filters, PTT switching, and ALC input facilities are amongst the technical features provided.

Perhaps the most important feature of the *HTX10* is that it is a *HOWES KIT*. This means that the module has been designed specifically for home construction, with ease of building and set-up in mind. Our high grade signal generators, spectrum analyzer etc. are used in the development to produce a level of cost effective, repeatable performance, that frankly we doubt could be achieved by the amateur designer lacking these professional facilities. However, no fancy equipment is needed to get your kit up and running.

There is an expanding range of interlinking, companion kits for you to use with the HTX10 if you wish. The *DXR10* receiver and *VF10* VFO kits are available now, and there are matching transverter and PA kits under development. Our other accessory kits such as the *DFD5* Digital Frequency Readout, *AP3* Automatic Speech Processor etc. can also be used in conjunction with the other kits to help build yourself a really super rig with excellent performance and features.

SOME TECHNICAL DETAILS

- ★ 2.8kHz SSB crystal filter with 80dB stopband
- ★ 8 pole band filters
- ★ All carrier, spurious and harmonics at least 40dB down
- ★ MC1496 double balanced modulator
- ★ SL6440 double balanced mixer
- ★ Broad-band, class A output stages designed for exceptional linearity
- ★ Variable CW power control, full key click suppression
- ★ 50mW PEP output to drive transverter or PA board

If you fancy the challenge of building something a little more "upmarket" than a simple QRP CW rig, then the HTX10 may well prove of interest.

HTX10 Kit: £49.90 **Assembled PCB: £74.90**

VF10 DUAL BAND VFO TO SUIT HTX10

The new VF10 has been designed to provide the VFO input to the HTX10 for operation on 10 and 15M. It has all the features normally found on our well regarded, stable VFOs: IRT (clarifier), FET oscillators, voltage regulation and separate buffered outputs for TX and RX use. Used with a 50pF tuning capacitor, the VF10 will tune the HTX10 over 28 to 28.6 and 21 to 21.45MHz. A larger capacitor can be used for wider tuning range on 10M if you wish. Circuitry includes 16 transistors (5 FETs) and 14 diodes.

VF10 Kit: £16.50 **Assembled PCB: £28.80**

HOWES RECEIVER KITS

The HOWES DcRx series of direct conversion receiver kits was launched on the amateur market at the start of 1983. They quickly established themselves as a new and low cost route to home construction of a communications receiver.

The success of these little kits did not go unnoticed, and since their introduction, the direct conversion concept has been taken up by many others in numerous constructional articles and the inevitable imitations. Traditionally DC receivers have been limited to the lower frequency bands, but the launch early last year of the *DXR10* giving coverage of 10, 12 and 15M bands demonstrated our continued ability to innovate. No doubt you'll be seeing 10, 12 and 15M direct conversion receivers from others in due course! In the meantime they are available from us and our many stockists around the country — you can even see one at the Science Museum in London!

		KIT	ASSEMBLED PCB
DXR10	10, 12 & 15M SSB/CW Receiver	£24.90	£36.90
DcRx	Single band RX for 80, 40, or 20/30M	£15.60	£21.50
MBRX	HF Marine band SSB/CW receiver	£29.90	£44.90

Hardware packages (case, slow-motion dial, tuning capacitor(s), knobs, sockets etc) are available to go with the receiver kits to make life easier for the less experienced constructor.

DXR10 hardware: £14.00. DcRx hardware: £15.50. MBRX hardware: £26.00.

SOME INTERLINKING HOWES ACCESSORY KITS

		KIT	ASSEMBLED PCB
AP3	Automatic Speech Processor	£15.90	£22.80
CM2	Quality Mic with "VOGAD"	£11.90	£15.90
CTU30	All Band 160 to 6M ATU 30W	£27.90	£33.90
DCS2	"S meter" to suit receiver	£7.90	£11.90
CSL4	Narrow SSB & CW filter for RX	£9.90	£15.90
DFD5	Digital Frequency Counter	£39.90	£59.90
ST2	Side-tone oscillator	£8.80	£13.50
SWB30	SWR/Power indicator/load	£12.50	£17.30

Please add £1.00 P&P to your total order value.

All **HDWES** kits include full, clear instructions, a good quality PCB with screen printed parts locations, and all board mounted components (yes, this does include the crystal filter on the HTX10!). Delivery is normally within 7 days. Credit card sales and technical help are available by 'phone during office hours, but please send an SAE for a copy of our catalogue or data sheets on specific products.

73 from Dave G4KQH, Technical Manager.

Practical Wireless 144MHz QRP Conte

Once again, the PW QRP Contest will be held and Neill Taylor

PW 144MHz QRP CONTEST 1990

The eighth annual *PW* QRP contest will again provide v.h.f. enthusiasts with a chance of some long-distance operation using low power. The 3 watt transmitter output power limit gives the user of the most simple equipment the opportunity to join in the fun and compete effectively. The high level of activity, with many groups setting up stations on the tops of hills and mountains around the UK, guarantees that the maximum DX potential of the QRP station is realised - even seasoned operators often express surprise at how far they have worked with only 3 watts.

In previous years the QRP contest has been particularly popular with newcomers, so if you have not tasted the delights of contest operation before, why not have a go? You can enter on your own, or get together with some friends to form a group. If this is your first contest, and you're not sure where to start, take a look back at the article which accompanied the rules to last year's event (*PW* June 1989) for some general advice.

The rules for 1990 are very similar to last year, but will all entrants please read through them carefully. Please be particularly careful when sending in your entry that you have provided all the information required.

The winners cup and a variety of certificates are to be awarded as usual, plus the *PW* Tennamast Trophy for the leading Scottish station. Good luck to all participants, and fingers crossed for a dose of good propagation conditions to really liven things up!

Rules

1. General

The contest is open to all licensed radio amateurs, fixed stations or portable, using s.s.b., c.w. or f.m. in the 144MHz (2m) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 0900 to 1700UTC on 17 June 1990.

All stations must operate within the terms of the licence. Entrants should observe the band plan and keep clear of normal calling frequencies (144.300MHz and 145.500MHz) and those used by GB2RS during the morning (144.250MHz and 145.525MHz). Keep clear of any other frequency that is obviously in use for non-contest purposes.

The station must use the same callsign throughout the contest and may not change its location. Special event callsigns may not be used.

2. Contacts

Contacts will consist of the exchange of the following minimum information:

(i) callsigns of both stations

(ii) signal report, standard RS(T) system

(iii) serial number: a 3-digit number incremented by one for each contact, starting at 001 for the first

(iv) locator (i.e. full 6-character IARU Universal Locator for the location of the station).

Information must be sent to, and received from, each station individually, and contact may not be established with more than one station at a time. Simultaneous operation on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send his full universal locator, his old-style QTH locator ("QRA") or his location may be logged instead. However, for a square to count as a multiplier (see rule 4), either a full 6-character IARU universal locator, or full 5-character European QTH locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power

The output power of the transmitter final stage shall not exceed 3 watts p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line, reached via the accessory socket. The output power can be accurately measured using the simple circuit of Fig. 1. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

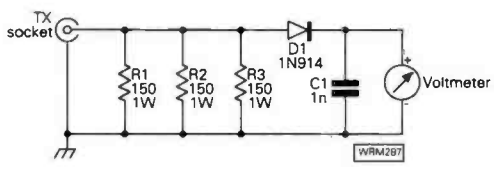


Fig. 1

4. Scoring

Each contact will score one point. The total number of points gained in the eight-hour period will then be multiplied by the number of different locator squares in which contacts were made (a "square" here is the area defined by the first four characters of a universal locator).

Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares; final score = 5 x 52 = 260.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone/M or/P. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate.

st 1990 0900-1700UTC, 17 June 1990

G4HLX lays out the rules that all competitors must follow.

PW 144MHz QRP CONTEST 1990

5. Log

The log submitted as an entry must be clearly written on one side only of A4 sized (210 x 297mm) paper (the normal way up, not sideways), ruled into columns showing:

(i) time UTC (GMT)
(ii) callsign of station worked
(iii) report and serial number sent
(iv) report and serial number received
(v) locator received (or location).

Underline or highlight the first contact in each of the locator squares worked.

At the top of each sheet, write:

(a) callsign of your station
(b) your locator as sent
(c) sheet number and total number of sheets (e.g. "sheet no. 3 of 5").

The sample shown here illustrates how each sheet should be headed.

6. Entries

Accompanying each entry must be a separate sheet of A4 sized paper bearing the following information:

(a) name of entrant (or of club, etc., in a group entry) as it is to appear in the results table
(b) callsign used during contest (including any suffix)
(c) name and address for correspondence
(d) details of location of station during contest; for portable stations, a national grid reference is preferred
(e) locator as sent
(f) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators names and callsigns
(g) total number of contacts and locator squares worked
(h) list of the locator squares worked
(i) a full description of the equipment used including TX p.e.p. output power
(j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) to measure the output power
(k) antenna used and approximate station height a.s.l.

Failure to supply the previous information may lead to loss of points or disqualification. The following declaration must then be written and signed by the entrant (by one responsible person in the case of a group entry): "I confirm that the station was operated within the rules and spirit of the event, and that the above information is correct".

This declaration concludes the entry, which should be sent, with the log sheets, to: Practical Wireless Contest, c/o Dr. N.P. Taylor, G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxon. SN7 8LX. A large s.a.e. should be enclosed if a full set of contest results is required.

Entries must be postmarked no later than **2 July 1990**. Late entries will incur a heavy points penalty.

Any other general comments about the station, the contest and conditions during it are welcome, but should be written on a separate sheet of paper. Photographs of the station are also invited (but please note that these cannot be returned); if these are not available by the time the entry is submitted they may be forwarded later, to arrive by 6 August 1990.

7. Miscellaneous

When operating portable, obtain permission from the owner of the land before using a site. Always leave the site clean and tidy, removing all litter. Observe the Country Code.

Take reasonable precautions to avoid choosing a site which another group is also planning to use. It is wise to have an alternative site available in case this problem does arise.

Make sure your transmitter is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous very strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input. The use of a high-gain RF pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it is best to be able to switch it off when necessary.

8. Adjudication

Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts will carry a heavy points penalty. Failure to supply the complete information required by rule 6 may also lead to deduction of points.

A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicators will be final.

The leading station will receive the winners' cup, and the leading Scottish station will be awarded the *PW* Tennamast trophy. Certificates will be awarded to runners-up and in many other categories, including the leading station in each locator square.

PRACTICAL WIRELESS 144MHz QRP CONTEST 1990

Date	Callsign	Locator	Sheet No Of

Time GMT	Callsign	Report & Serial No		Locator
		Sent	Received	

Back-Scatter

HF Bands

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

After a weekend of June-like weather, the view outside has reverted to normal; like a winter's day - dark dank and dirty! However, it gave me time to carry out a little experiment, and add 18m to the end-fed wire. Not only has this made a marked change to the feed impedance, and hence the ground losses, but it seems at first sight to have done what I wanted, by way of a fairly strong lobe in a different direction.

Conditions

Very definitely, a touch of the curate's egg. We seem to have had a poor period earlier on, and signs of a pick-up over the past few days. However, I am a mere observer of the scene, leaving it as always, to you to tell me what's going on.

Events

I have, of course, to look into the dim future - thank heaven for the *CQ Magazine's* 'Contest Calendar' which is ably written by John Dorr K1AR. From his listing I see the CQ WW WPX CW is over the weekend of May 26-27.

July 20-21 shows the World Radiosport Team Championship. This is a new one, part of the Goodwill Games, in which teams from the participating countries compete in all sorts of sports and activities. In Amateur Radio, the contest runs from 2100Z on July 20, to 0700Z on 21st. So far, so good. The novelty is that the teams from each country (four two-man teams and a reserve, plus a non-playing team captain) will ALL be based at existing locations in the Seattle area. Each station will be equipped with equal equipment, thanks to the sponsors, and teams will represent USA, USSR, JA, VE, EA, HA, LZ, G, SM, OH, I, F, DL, OK, PY, and LU. The contest will be either c.w. or s.s.b., and the exchange RS(T) plus serial number. For the stations representing their countries in Seattle there are some worthy awards, and for those of us who can hook a goodly number of them, in whatever mode, awards and 'memorabilia', whatever that may be.

Expeditions

The JA1UT Bangladesh effort netted some 1100 contacts and paved the way for amateur radio licensing; and between me writing this and you reading it, K5VT will be on for ten days.

At the time of writing, there are rumours of an operation from Conway Reef 3D2, but nothing firm is known; Marti Laine and Marek YJ8M are two names allied to the *buzzes*.

The new prefix for Namibia will be V51; ex-ZS3s will use V51, while ex-ZR3s will have V50, in each case followed by the suffix of their old ZS/ZR call.

The proposed CE0 operation by KB6SL and CE3BFZ seems to have been postponed *until later in the year*; October and November are now being mentioned.

By now the Jarvis Island expedition will have been and gone; this one may be a new one for DXCC purposes.

Top Band

Let's make a start with Top Band; and here it was a pleasure to receive a telephone call from **G4AKY** (Sevenoaks) and to know he is still doing his thing on the band. It sounds as though Dave is maintaining his enthusiasm at the current QTH. One wonders just how many homes G4AKY has had from which he managed all continents on Top Band.... I recall him doing one before going to Harlow, at Harlow, at Newport Essex, and now from Sevenoaks, which must be the first demonstration that it is possible from more or less anywhere only given that one is ready and willing to tackle the question of antennas and earth systems.

Another addict of this band is **G3BDQ** (Hastings) who found LZ2DF, UA3DUQ, UC2AJB, UA3ZOV, UT5ULJ, UZ9XYU and UW1ZE; while a single 30-minute bash on s.s.b. yielded OZ1ADL, UC1AWC, OY9JD, I8UZA, OK1DXS, YL1WT, I6FLD, ES5RY, SP5INQ, IO4YSS, EA3ALD, UB5LWA, Y28AL, UZ4PWA and VE1ZZ.

As for me, over the past weekend, another 18m have been added to the end of the 3.5MHz wire, and I must now see if I can persuade the a.t.u. to turn whatever it is into something a little more to the liking of the rig. But first, to finish this column!

The 3.5MHz Band

Enter, stage right, **G3NOF** (Yeovil) who complains that the columnar space isn't balanced compared with the v.h.f. boys.... to which the only answer is that it is up to *all* you out there to so deluge me with reports that I can justify more space. One snag though - after getting me some more space, you have to go on reporting in sufficient numbers to retain it! However, on Eighty, Don managed just a single DX contact, with J6LQC on s.s.b..

Turning to **ON7PQ** (Kortrijk), Pat sticks to c.w. for his radio activity; mentions are made of contacts on this band with KI1OA, J34P, 5T5CK, 6W6JK, JP1DMX/HI8, TA1AZK, EL2CX, 9H3JR, V31BB, ZC4CZ and 3A2LF. ON7PQ bewails the short list noting that his time has been taken up with the making of a rotary dipole for the WARC bands, for which the traps are all done, plus of course the inevitable curse of all radio amateurs, namely gardening; and of course after the gales a small amount of essential maintenance of the beam.

Now we turn to another c.w. addict, namely **GM3JDR** (Aukengill) who comments wryly that conditions being the way they have been, it's been hard work deciding what band to sample! Of course, up there north of Wick, the change in daylight hours can have a very marked effect on, say the 7MHz band, and in mid-summer it would be hardly usable at all with no darkness to speak of. However this time on 3.5MHz, ZM1AIZ, K8IU, K3IA and J34LTA were all booked in.

GW0HWK (Wrexham) notes that RAYNET were out at Towyn when the sea wall was first breached; and another activity was GB2BGR for the local Guides. However, still managed to get a bit of time in from home, giving him 3.5MHz contacts to N4CQC, SP9LZT, GB4HGG, GB2LDA, G6LD, G3LEV, G3AQS, G4XDK, and the following six on SSTV: G4EIK, G3GDU, GW3MEO, GW0LAL, G4IYI and GW3FXI.

For 3.5MHz, on c.w., ZL3GQ, J34LTA, W2BA and VE3BCH were entered into the log at **G2HKU**. Ted is on the Isle of Sheppey.

The 7MHz Band

G3BDQ (Hastings) says he hasn't been too active of late, as the sunspots haven't been very co-operative. Nonetheless on 7MHz there were the odd signal to put in the book: c.w. to UM8MAD, VK2KM, N4MF, W4XJ, UL7QD, UM9MZZ, UB5MAL/UA10 (Franz Josef), VK3VJ, EA9AB, HZ1HZ, RD70DX for an odd one, 4L1QRQ/9 for another and JA5RH.

There were no really good days in the period thinks **GM0DEQ** (Hurlford); nonetheless Bob found SM5BDY, GW3ITT, NZ9Z, YL2KO and W3BY, all on c.w.

Next G2HKU; c.w. again, and OY7ML, WG9U, VP2EZD, J34LTA, WQ2K, K3ZO, K1AR and K5NA.

Now to GW0HWK who also has a station at work; thus, with the help of HB9IQB, Mike was able to have a late night/early morning bash, and to raise UL7FEC, UA6HSW, CM2XZ, CO8AY, HK2LFB, HJ1OXS, HK2MCP, HJ1PNQ, YV5CYQ, CM2LM, LA4 c.w., TI2VVR, VY4FIX, TI4ZO, HK4OQI, CO5HM; and outside this session there were some Europeans and EA9IB (Ceuta).

Turning to GM3JDR, we find his keyer making two-way contacts with FY5YE, OY3SL, N7RM, W6CCP, WZ7X, VK3OX, CM3RA, KT7G, YC6JRV, 4S7WP, UA0IDM, UA0ODV, N7ET/DU7, JH1DTC, JA1NUT, ZL1AMO, ZL3ABV, 8P6AU, JA8ZO, HC5AI, KH6AT, ZL2GO, HJ6NNM, VP2EZD, PY6BG, PY3CJI, VE7BDI, JA8UBH, JW5NM, VK3OX, K7DZ, CE3OZC, ZL2VS, VP2EXX, 6Y5FS, UM9MZZ, J34LTA, TF3GBN, UZ0AM, UA0BCV, PY3LAR, GM90CC, FK8GJ, VK2EKY, K7QQ, W7IIT, UM0MO, 4L1QRQ/9, J6LSN, UH1W, UZ4HWS, VE7KDU, V31BB, UA0UB, ZL4BF and JG2CLS/JD1.

ON7PQ offers 6W1QB, RD70DX, CM3RA, CO2DC, TL8CX, VP2EZD and LU6EF; all on c.w.

WARC Bands

G3NOF has first go and a sad tale it is too: 18MHz dipole shot down by the storm and awaiting repair at the time of writing.

G3BDQ is not in much better case; he offers just the one QSO on 18MHz, with N3AYU on s.s.b., plus a c.w. 24MHz contact with SV9ADH.

GM0DEQ goes one step worse: he went on 10MHz, started a c.w. QSO with N2BJG, and then lost him!

Now to G2HKU, who says he managed c.w. to VK2BKH and VK5FE on 10MHz, W6OU and SM5DHF on 18MHz and VE7WO on 24MHz.

Turning to GW0HWK, he managed to get on 18MHz, and completed contacts with KA1PE, W1WNE, KA9AJF, WB2LKN, KS9C, KE0B, KG5CB, WY0O, K3LGC, F6FHO/M and some real DX to GW3RBM.

On 24MHz the list is a mite longer, including VE1HT, PY5ZBU, OH6YF, SM0NZZ, KU1G, VE3WA, N6EGK, K0DFO, N9DEO, K2VV, AK1L, N3GSC, KC3SI, W8IIP, YT1Z, KC4IYY, WS6E, VE1BYY, WA4NFI, KB9AA, W3IFR, K1ZFE, WA0FQK, KW2A, W3UGS, WA2PGN, W9ATU, KM4SP, K4MQL, OH5RM, W1ASB, N3ATS, KE9OL, N3HQK, W8ELY, K3YAY/M, PJ6/KV4AD (Saba), FS/G4LAJ/MM (St Maarten), PJ8DFS (St Eustatius), CT1TM, I6CSR and SM3DAL.

ON7PQ's been doing some testing, and finds he can load up his 80-metre antenna for 18 and 24MHz, while the 7MHz delta was persuaded to take power on 10MHz - Pat must have been quite firm with these antennas to let 'em know who is boss! Anyway, on 24MHz he offers J34PJ, VQ9QM and DF5WA/H44; on 18MHz KP4DX and PJ6/AA4OV, and on 10MHz JA3FYC, PJ6AA4OV, OY3QN and HL1EJ.

Finally for this band we come to GM3JDR; Don tried 18MHz, and his c.w. found UA0CY, JF7LJN, UM8MBA and JH3DJX/2.

The 14MHz Band

The band everyone loves to hate! On the other hand, it really is the mainstay of the DX world.

Let's make a start with GM3JDR, who had a few c.w. contacts, notably UA0SNY, ZK1XN, FK8DD, A51JS, FO0XXL, EK0DR, 4K4AFM, EK0DAP/4K4, ZM0AEM, UA0KBC and JR4GPA.

Turning to ON7PQ, Pat's c.w. was used to hook V73AX, FK8AH, ZD7KM, PJ6/AA4OV, VS6UW, K2NG/PJ4, UA0/GB4MSS, 3D2AG, FO0XXL, JR4ISF/CE0 and ZK1XN.

Now GW0HWK, he and his pal G0LJR have their regular sked with K1CSB, and in addition there were: WB1CAG, W1OPZ, KB2GTD, KK4WS, W2AKW/4/MM (Jasper County, S. Carolina), W2RNX, KA1TUK/4 and XE3JW.

At the G2HKU shack, the time on this band was devoted to hooking KL7HF, G3KTC/MM on the MV *Churchill*, off Santos, Brazil, and bound for London, FM5CW, PY6BG, WL7E, K5NA, PY2DKB and WA6JR.

On to GM0DEQ, and Bob seems to have given the band a right hammering! His c.w. signals connected with UW9OQ/RW9H, UA1PAU, UF6FU, CN8ST, UA0KDH, W1FW, ZL1AH, WB9UDV, VE3ZLB, UW0AJ, K0CXL, KY9L, W1UC, N6NF, AI2C, N9AL, VE4BR, VE3OXQ, UA9CM, VE3CDP/W9, VP2EC, UA9UAA, UL7LBI, UZ0AB, VE1ALZ, K8ANA, UI8IF, YL2AG, K2QAA/P, JE2PQQ, VE1VCI, VE2EXF, W8ZNH, VE3JO, PY7GJ, KK0U, VE1MOR, WA3WSJ,

A high-performance HF rig . . . with a great receiver and full-power transmitter. Light in weight and low in price.

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Multimode versatility. The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW *and* AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

Lightweight construction. Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7¼ pounds! With the loud-speaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when used with a heavy-duty power supply.

Available options. FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic, Solid-State Linear Amplifier. TCXO-747 Temperature-Compensated Crystal Oscillator. FAS 1 4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket. MH-1B8 & MD-1B8 Microphones.

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Back-Scatter

UA0SEW, 4K4QQ, UA9SP, UI9AWX, plus a raft of small fry.

On 14MHz, John G3BDQ, stuck to his key, so as to be in good voice for other bands or things.... so we note his contacts in that mode with VE1BXD, CR2UW, ZL4JD, UA0BCA/UA1O (Fran Josef Land), LU4HLN, PY7GJ, 7S4IL, UA0AG, UA9CAD, JK1IIH, UA0KGL, UA0QBO/A (Yakutsk) and ZM2GS.

G3NOF monitors this band but doesn't operate here too much, preferring 21 and 28MHz. Don notes the early long-path openings to VK and ZL, between 0700-1000Z, while the short path has often opened in the evening, 2000-2200Z. Short Path Asians were noted 1500-1700Z, and the odd African was in evidence between 1600-2000Z. Actual s.s.b. contacts mentioned include BV2FA, DU9CO, FY5YE, TJ1SR, TZ6VV, V63AO (ex-KC6IN), V85NR, 4K3SS and 9M8FH.

The 21MHz Band

G3NOF again; Don found the long path open to VK and ZL between 0800-0900Z, followed by the short path opening till 1300Z with Asians as well. North America appeared between 1100 and 2100Z; Africans between 0900Z and noon, and again 1700-2000Z. South America was also noted 1000-1200Z and 2000-2200Z - but nothing from the Pacific. Turning this finding into s.s.b. QSOs meant AP2SAR, EF1SIT, FY4FC, HK5JPS, HL5FMF, HL9HH, HL0APQ, J73WA, JAs, KO7N, LQ21DX (LU1ICX), P29BT, P29VMS, PJ2WG, RA0AD/JT, T70A, TA4A, TU2PA, TU2QQ, UA0QEF (Zone 19), UL7PP, V51NAM, VE5RA/7, VE6RLS, VE7KC, VP9LR, W7CFL (Utah), ZC4GA, ZB2/HB9FMD, ZL1BXA, 3W3RR, 4K3SS, 9S5G and 9K2HA.

G3BDQ mixed his modes here. On s.s.b. he notes KG4RC (Guantanamo Bay), KB0NL, YV5ENI and A47RS; on the c.w. side there was VP5P (Turks and Caicos Is).

Now to the GM0DEQ log; his 21MHz c.w. pickings include UL8PWS, W3DXK, KA3GTC, K2OZ, UL7ACE, N8KEM, W3NZ, W3STA, VE3FIU, UL8GA, W2VAC, VE2RA, NG4E, JE1JIQ, UA9CCY, K2DXE and the similarly sized crop of Europeans.

Just one for G2HKU, who offers K0GVB/C6A.

Mike GW0HWK went on 21MHz and raised CE6NUG, WA4WXE, WA4CXZ, W1IDP, K1LJT, K2QAR, NY1F, KB4FUW, K0MAH and WA2BPO.

Another c.w. only merchant next; ON7PQ. Pat mentions K0GVB/C6A, J34LTA, KH0/JP1RZS, J6LSN, AH3C, ZM0AEM, JR4ISF/CE0, V63AN, BY5RT and S0IEA.

Finally the list from GM3JDR. Don seems to have deserted his erstwhile favourite, in favour of 28MHz, but he did make it over to JT1CS, 3W3RR, YC3XDH, A45SZN and BY5RT.

The 28MHz Band

G3NOF opens the scoring here again. The short path to Asia was open in the mornings, but not always strongly; N America was noted between 1130-2100Z, and VR6JR was noted on several days between 1500-1700Z. Nothing was heard from Australasia or the Pacific. Contacts, using s.s.b., were made with A61AD, CF25A (25th anniversary of the Canadian Flag), HL0B, HZ1AB, JAs, K7GS, K7GI, K0CS (Colorado), KA7MCX, LQ8DX for LU, N7ABJ, N7LOX, NO7F, P4/PA3BES, PJ6/WD4JNS, TI2SAH, V31PC, V51NAM (Namibia), VE7SZ, VR6JR, VU2DMM, W0CP, WB7VFO/M, WB0O (N. Dakota), XE3XE and 7J1AGW.

At G3BDQ, 28MHz showed up with s.s.b. contacts with 9J2AL, FW/YJ8M (Wallis) for a real find, UA0WDQ, 9M2CW and 5T5RSR.

Next GM0DEQ, and here I notice that overall a couple of new countries were added, by way of 4K Antarctica and VP2E Anguilla; in addition the odd 28MHz QSO, such as N8CXX, VK6ZH and RA9WK.

Over to Sheppey, where G2HKU keyed with XF1C, K7EP, N5TP, W8EGB and W6DU.

Quite a pile from GW0HWK, who found WA5AQE, KC5SC, N4CLE, N0CWR, KA4UFW, K0JFN, N9IGO, WA6DXP, KG5XJ, KD0IR, KA1HXK, AB4ND, WA1SMH, KC8NY, KC4MIZ, KA1ENC, K3IA, N1GRA, N4SSE, WV4UQV, K6GXO, NX6I, KA6VQV, WA2BPO, K6SMF, YU1VK, K8ZBY, KB2SE, WD9GVA, KC1SO, K5KDG, N4XYL, KK4UC, AK1L, W1WKO, KA8PUP, N2CYL, W6MTH, W6QKS, W9HOT, W4USW, W1IOP, N4BM, N3GPP, K6PIZ, WD5DNA, K5TGE, KB0AU, WA6TNI, N6YRO, N5PIX, K1CCE, KC4MEI, KB5IXU, N4PTL, WB4UQV, W3AFB, W7LPH/M, N5HUG/M, K6ILM in N. Dakota for a new State, KA7CZB in Oregon for another new one, VY2BIJ (Prince Edward Island), 7X2VXK, VE2ICI, TA1AO, VE7FJE, VE1ALK, TU2QQ for a new country, VQ9LV on the Ivory Coast for another and HR1KAS for a third new country.

Over to Pat, ON7PQ, who worked J34LTA, 4K2OT (Franz Josef Land), KH0/JP1RZS, PJ6/WS4E, TL8PS, J8Aa, J20TW, HS0SM, BY8AC, XX9TDM, S01EA, 9L1US and A45ZM/0.

Mainly c.w. at GM3JDR; Don mentions LU1EPQ, HS0SM, C56/G4LJA, RY8T/UZ0SXF, ZM4HB, G4WYG/ST2, PY3DK, UD70DFF, 6D2DX, EX9A, RW0AM, RA0AU, VP2EZD, LU3XAM, BV2FA, RA0QA, VK6RU, BZ1OK, HL4SF, HL1EJ, HL2AVD, 9V1WP, LU2EWP, A61AC, 3W3RR, J37AE, YB2FRR, J6LSN, VS6DL, ZP5XFB, 8P6BX, YB0BRT, UA0BW, ZS1WQ, J20TW, PY4KQ, JAs, while on s.s.b the microphone got a response from EL7X, HL3IID, HC1EEV, HK3LBF, PZ1AP, CX3BBX and W5UXL/C6A.

Help!

Will the s.w.l., Mr Hastie, of Exeter who wrote to me recently please get in touch again; I have some news for him!

Winding Up

Firstly, thanks to all those contributors who made it possible to put things together, and in particular, *DX News Sheet*, *The DX Bulletin*, *The Canadian Amateur* and *The DX Magazine*.

Deadlines

The reports are to arrive here by May 25, June 28, July 30, addressed to yours truly at the Newtown QTH.

Back-Scatter

VHF Up

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

Solar Data for March 1990

During the last few days of February up until March 4 there was very little in the way of solar activity. Solar flux levels continued to drop again, declining from 232 units on February 24, down to 170 units by March 4. The geomagnetic A index was at a quiet level of 7 units on March 4. As the geomagnetic levels fell so the radio quality indices improved, rising well above normal by March 3, as the 50MHz report from GJ4ICD testifies.

Solar activity continued to remain static during the second week of March, not really surprising as the quiet side of the sun was looking our way during this period. The solar flux levels declined from 171 units on March 4 to only 144 units on March 11.

The geomagnetic A index was quiet to unsettled, averaging 10 units during the same period. The solar flux started to pick up from March 12, reaching a level of 217 units by March 19. During this period the geomagnetic conditions were very unsettled. The A index was up to sub-storm levels on March 12, 13, 14 and 18.

A number of 144MHz auroras were reported during this period. A major flare occurred on March 19 giving rise to a polar cap absorption (PCA) event. This is bad news for the 50MHz operator looking for real DX from the Far East or Oceania, as this normally means that propagation is degraded in the auroral latitudes but on the other hand it was good news for the 144MHz operator as some small auroras were reported during this period.

Solar information can be obtained from a variety of sources. One of them is *The Solar Guide* broadcast on Radio Netherlands. It includes a weekly review and forecast by Mike Bird, famous for his Radio Australia broadcasts. The show to listen for is called *Media Network*, transmitted on Thursdays at 1152UTC on 5.955 and 9.715MHz and at 1452UTC on 5.955MHz.

The 50MHz Band

Conditions during March saw a slight improvement over previous months, especially on the north-south route. Openings into central and southern Africa became more common but by no means as good as many were expecting.

Geoff Brown GJ4ICD (IO)continues to report on openings that the rest of the UK operators can only dream about. March 3 was mentioned as being the highlight of the month. At 0920UTC, the band opened up to Japan with literally hundreds of JA stations calling. A total of 63 stations were worked but it was very slow going because of the intense QRM caused by wave upon wave of JAs.

A letter from **Juni-ichi Nishihara JR3HED** confirms the tremendous number of stations calling. He reports that comparatively few Japanese stations worked GJ4ICD because of the heavy, endless pile-ups. Juni-ichi suggests that in these circumstances stations should spread activity over a wider range by operating split frequency. During the opening, Geoff noted that the beam-heading, between 90 to 120 degrees, was well away from the great-circle bearing of 35 degrees.

Previous openings to Japan, from the UK, have exhibited the same feature. This particular path, in common with the UK/W6 or VE7 path, is very difficult because it would normally have to pass through the auroral latitudes, where signals can tend to suffer from severe attenuation.

The prevailing propagation tends to find the 'easiest' way of getting from A to B, even if it means arriving in the UK via an unorthodox beam-heading. The Japanese opening remained in for some time, the band still being open at 1025UTC when Geoff decided to put in a few hours at work! This didn't last for long however, as by 1230UTC he was back on the radio to hear both the TR8CA and 9L1US beacons. At 1440UTC, OE5KE was worked via some unidentified propagation mode as was LX1JX (JO30), at 1510UTC.

The mid-afternoon t.e.p. opening to Southern Africa commenced at 1500UTC, contacts being made with ZS3E and ZS3KC. At 1527UTC, a new station active from the Ivory Coast, TU4DH (IJ85), was worked on

Back-Scatter

c.w. The propagation mode for this contact and similar ones in the area, such as EL, J5, 5N and 9L, have incorrectly been reported by others, and myself, as being via t.e.p. but as these countries are on the northern side of the geomagnetic equator the mode can hardly be called trans-equatorial.

Propagation was still good the next day with VK6YA (OG89) being worked, 57 both ways, at 0940UTC. A brief opening to Japan followed at 1010UTC, but signals were too weak to make any contacts. The TR8CA beacon became audible at 1045UTC, with ZS6LN being worked, on c.w. at 1130UTC. Activity was good to the south on March 7, contacts being made from 1200UTC with ZS3E, ZS5AV and ZS6WB.

The Southern African beacons, ZS3E/b, ZS3VHF and ZS6PW/b were copied to the end of the opening at 1330UTC. It was even better on March 11, Geoff claiming this as the biggest ZS opening ever heard at his location. The first station contacted was ZS6PW at 1000UTC. By 1040UTC the band was really livening up with ZS6CE, ZS6LN, ZS6LUX, ZS6WB, ZS6XJ, ZS6XL and ZR6A being heard, mostly at S9+. At 1050UTC, ZS2BE, the first in this call area, started to come through, followed almost immediately, by reception of the FR5 beacon.

Stations in call areas ZS4 and ZS5 (KG30/50) were then worked. By 1120UTC more ZS2s were becoming audible. This was followed by the pick of the bunch, ZR1L (JF96), located in Capetown. It is worth mentioning at this point that it is not particularly easy to work into ZS1 and ZS2 from the UK. Records kept during past solar cycles indicate that this path opens up very infrequently, only at the most favourable time of solar maximum and generally with poor signal strengths.

Following the contact with ZR1L, more stations were worked including ZS2BE (KF26), ZS2NR (KF37), ZS2OD (KF26), ZS4RP (KG30), ZS5QB (KG50), ZS5X (KG50) and ZS6AXI (KG33). At 1150UTC the skip moved north allowing a quick contact to be made with A22BW in Botswana. This was followed by more contacts with stations in ZS3 and ZS6.

In total the event lasted for over 4 hours, petering out around 1440UTC. A truly remarkable opening. Geoff caught further Southern African openings on March 12 and March 14. The event on the 12th, between 1200 to 1300UTC, was restricted to ZS5, ZS6 and ZS9H, whereas the opening on the 14th, between 1055 to 1400UTC, provided a variety of countries, in the form of TR8CA, ZS3E, ZS6XJ, Z23JO and 9L1US.

The band conditions for stations located on the UK mainland have not been brilliant so far this year but **Ela Martyr G6HKM** (ESX) got off to a good start on New Years day by working 3 Stateside stations and KP4BZ (FK78). On January 4 Ela worked 3 more US stations and YV5ZZ (FK70), this contact giving another new square and country. This was the second contact Ela had made with Ed YV5ZZ, having previously worked him on Oscar 10 back in 1983.

The first of the South African openings was caught on March 10, contacts being made with ZS6AXT (KG33), ZS6LN (KG46) and ZS6WB (KG44). A similar opening on March 11 produced a repeat contact with ZS6AXT who replied to Ela's CQ call. The first Danish stations were worked in an aurora on March 12. Contacts were also made with GM8MBP (IO87) and GM6VXB (IO97) during the event.

Jim Smith G1DWQ (DOR) located in Wimborne near the south coast is in a favourable location for 50MHz work to the African continent. He copied the 9L1US beacon on February 24 at 1135UTC, working the operator on c.w. at 1208UTC. Later in the day, at 1845UTC, Irish television on 53.757MHz was heard aurorally but very little was heard on 50MHz apart from a few weak GM stations. No other DX was heard in February apart from the 9L1US beacon on the 25th, between 0915 to 1145UTC, and the ZS3VHF beacon, between 1740 to 1800UTC on the 27th. Jim caught the South African opening on March 10, working ZS6LN at 1210UTC.

A much better event occurred the next day, contacts being made with ZS3SW (G8WNP in JG87), ZS4S (KG41), ZR6A (KG44) and ZS9A (JG77). The contact with ZS9A, in Walvis Bay, was made in a slightly unusual way. Inadvertently hitting the wrong button on the auto-keyer, a 'QRZ de G1DWQ' was sent on 50.110MHz. This was instantly replied to by ZS9A, much to Jim's surprise. There was a brief auroral opening on March 21 with GM0GEI (IO77) being worked on c.w. at 1851UTC.

I'm not sure if many operators have tried DXing via packet radio on this band but the following report may be of interest. What is claimed to be the first 50MHz African packet contact took place between Etienne ZS6CE and Alain TR8CA at 1830UTC on March 11. Both stations were using Kantronics TNCs, at 300 bauds, a.f.s.k, operating on 50.105MHz u.s.b. Retry was set at RET 2/2. After the initial contact, both stations moved to 50.400MHz f.m. to continue tests with RTTY-45 and ASCII-110. The band was open for 45 minutes during these experiments, signals being S9+ both ways.

The 70MHz Band

I have received a number of letters regarding the proposal to alter the 70MHz band plan, as outlined in the April issue of PW. If you do have any views on this subject please put them on paper and send them to me as soon as possible.

Bob Price GW3ECH (PWS) has finished the conversion of a Dymar Lynx and is now crystalled on 70.260 and 70.450MHz. Bob is located 250m up in the Brecon Beacons so stations in the west country or the Midlands should have no difficulty hearing him.

Stephen Fowler G3UQY (DVN) is now active on the band from Bideford. Although he runs 40W of a.m. and f.m. very few contacts have been made so far.

A new station capable of running on s.s.b. is **David Hall G8VZT** (SPE). He is using an FT-225RD into a home-made transverter. The amplifier, also home-made, runs 60W output into a 3-element Yagi at 10m. At the present time it is fixed to the north, but David hopes to make it rotatable some time in the future.

The 144MHz Band

This band seems to have been in the doldrums for some considerable time. Although there have been a few auroras these were mainly short lived and only the dedicated operator could make much of them.

Tropospheric propagation seems to have been the main preoccupation for G6HKM in recent months. Highlights in the first quarter of this year have been few and far between but Ela managed to work DF1ZE/P (JO50) on January 3 and GM4AFF (IO87) on March 4. On March 7, at 1217UTC, EA1NV (IN73) was heard but the subsequent QSO was not completed because of the instability of the tropo duct. Fortunately, the situation improved and at 1403UTC he was heard calling CQ again, this time a complete contact being made. In the aurora on March 12, one solitary contact was made with GM0HUD (Fife).

Eric Gedvilas G8XVJ (CHS) has been spending most of his activity time working the recent auroras. On February 4, he contacted LA9BM (JP40), OZ1JVX (JO46) and 3 GM stations, all on s.s.b. An event, on March 12, was a little better in terms of signal strength but because of the lateness of the opening not many stations were active. From 2330UTC, Eric worked OZ1FKZ (JO56), PA3BIY (JO22) and 10 G stations. At 0056UTC, Andy GW0KZG/MM, located in IO66, was contacted for his first QSO via aurora. Andy was worked again, on March 15, this time via tropo from locator IO56.

Another aurora, on March 25, between 1604 to 1641UTC, produced contacts with

QTH Locator Squares Table

Station	50	70	144	430	1296	Total
GJ4ICD	3440	—	263	119	59	785
G3IMV	94	—	429	124	48	695
G6HKM	193	—	217	109	46	565
G4KUX	—	—	372	120	—	492
G3UVR	—	—	257	140	83	480
G1KDF	140	—	180	102	37	459
G4RGK	—	—	284	124	50	458
G3XDY	—	—	206	148	91	445
G0DAZ	—	—	277	128	27	432
G4DEZ	55	—	249	49	49	402
G3JXN	—	—	179	134	87	400
G6DER	—	22	183	110	78	393
G0LBK	—	—	257	89	46	392
G8LHT	79	19	185	93	14	390
G1EZF	—	—	263	93	—	388
G4XEN	—	—	274	111	—	385
G4MUT	82	22	153	93	31	381
G1SWH	143	25	149	53	—	370
G1LS8	44	—	172	143	—	359
G0EVT	88	—	209	57	—	354
ON1CAK	—	—	277	53	7	337
G4RRA	—	—	255	80	—	335
G3COJ	—	—	186	103	44	333
G4SSO	—	—	229	93	—	322
G4FRE	—	—	102	146	72	320
G1DWQ	171	—	142	—	—	313
ON1CDQ	—	—	251	54	7	312
G4TIF	—	—	200	110	—	310
G4DHF	—	—	307	—	—	307
G1EGC	—	—	198	80	23	302
G8HHI	—	—	148	110	38	296
G8PNN	—	—	129	99	64	292
G6MGL	—	—	141	89	59	289
G4NBS	—	—	119	105	63	287
DL8FBD	—	—	280	—	—	280
G8ATK	—	—	143	91	45	279
GW6VZW	118	—	143	6	—	267
G4PCS	—	—	258	3	—	261
G4ZTR	58	26	97	50	30	261
G1GEY	—	—	168	77	11	256
G3NAQ	—	—	175	80	—	255
G8PYP	118	—	105	31	—	254
G6STI	—	—	152	69	24	245
G6DZH	—	—	154	87	—	241
G3FPK	—	—	241	—	—	241
G4IGO	—	—	238	—	—	238
G0EHV	—	—	160	75	—	235
GM4CXP	—	—	198	31	—	229
EI5FK	—	—	172	56	—	228
G1SMD	115	—	106	—	—	221
G4DDL	—	—	216	—	—	216
G4MEJ	—	—	213	—	—	213
G8LFB	—	—	209	—	—	209
GW4FRX	—	—	204	—	—	204
G8MKD	—	—	150	49	—	199
GJ6TMM	—	—	151	48	—	199
G4YCD	—	—	197	—	—	197
GI1JJS	—	—	192	—	—	192
G1DDX	54	26	73	16	8	177
G6DZH	—	—	156	—	—	156
+G7ANV	—	—	153	—	—	153
G6MXL	—	—	91	45	16	152
G4FVK	—	—	78	49	21	148
G4AGO	—	—	104	42	1	147
G8XTJ	29	—	116	—	—	145
G0FYD	1	—	142	1	—	144
G6MEN	41	2	63	26	4	136
GW1MVL	—	—	109	22	—	131
G1WPF	—	—	97	29	—	126
G0FEH	—	—	101	24	—	125
G0ISW	45	—	59	17	—	121
G1IMM	—	—	98	17	—	115
G7CFK	109	—	—	—	—	109
G1CEI	11	—	77	18	—	106
GW1MVL	—	—	106	—	—	106
GM0HBK	—	—	107	—	—	107
GI4OWA	—	—	103	—	—	103
GM0GDL	—	—	81	22	—	103
G7CLY	—	—	100	2	—	102
G1TCH	—	—	95	6	—	101
G1SWH	—	—	148	53	—	101
G7ENF	—	—	70	19	—	89
G4WHZ	—	—	76	—	7	83
G0GTF	76	—	—	—	—	76
G0HEE	—	—	73	—	—	73
GU4HUY	—	—	73	—	—	73
G1NVB	—	—	73	—	—	73
G0HDZ	—	—	64	—	—	64
GM1ZVJ	6	—	48	—	—	54
GM0JOL	—	—	47	—	—	47
G2DHV	—	—	33	7	2	42
G7AHQ	—	—	34	—	—	34

No satellite or repeater QSOs
Starting date January 1 1975

144MHz QRB Table
Distance in kilometres

Station	Tropo	Aurora	Meteors	Sporadic -E
G0CUZ	2943	1758	1996	2943
G0DAZ	1251	876	2026	2249
G0DKM	2811	1488	—	2203
G0EVT	3080	1640	1808	3080
G0FYD	1315	1624	—	2019
G0ISW	1059	566	—	2057
G0LBK	3060	1755	1876	2350
G1DWQ	1454	1812	—	1836
G1EZF	1730	1757	1920	2375
G1KDF	3023	1421	—	2386
G1LS8	1319	733	1732	2723
G1SWH	3035	1429	—	2372
G3FPK	1835	1686	—	2337
G3LTF	1824	1846	2021	2174
G3SEK	1560	1681	1872	2154
G4ASR	2848	2029	2107	2853
G4DHF	1498	1530	2000	2448
G4JCC	1334	1158	1018	2173
G4MUT	1163	684	1533	2068
G4RGK	1466	1757	1920	2375
G4VXE	2862	1446	1501	2880
G4YTL	1404	1774	2025	2172
G4ZTR	935	1535	—	1978
G6DER	1834	997	1957	2068
G6DZH	2924	711	—	2233
G6HCV	2880	1450	1912	2880
G6HKM	1304	1555	—	2265
G6LEU	2620	910	—	2430
G8HHI	1742	—	—	2058
G8JDX	2667	1368	—	2663
G8LHT	3070	1780	1868	2510
G8MFJ	1209	1210	1329	2168
G8PYP	1083	1451	—	2318
GD4XTT	3053	—	—	1700
GI1JUS	3067	1614	1507	2216
GI8YDZ	1216	1809	1901	2562
GJ4ICD	1620	1100	2050	2090
GM4CXM	1428	1750	2100	2023
GM4YXI	3160	1881	2048	2513
GW6VZW	2830	1473	—	2236
ON1CAK	1420	1166	1948	2725
ON1CDQ	1420	1166	1948	2124

Annual c.w. ladder

Band (MHz) Station	50	70	144	430	Points
G4ASR	7	-	46	—	53
G4OUT	-	2	49	—	51

Number of different stations worked since January 1 1990

Back-Scatter

DL3LBA, DC5LX and DK0BIK, all in JO44 and with SM7FMX in JO65. A smaller event was detected on March 26 with one solitary contact being made with GM0EXN.

The 430MHz Band

Dave Lewis GW4HBK passes on news of a re-activation of Monday activity nights on 430MHz in the South Wales area. Stations that can be found on Monday evenings include GW3ZTH, who goes portable regularly, GW4NBY and GW4HDF, both in Mid Glamorgan and of course GW4HBK in Gwent. Dave mentions his best DX in March as being G4ZTR/P (ESX), worked during the contest on March 3. A partial contact was made with PE0MAR/P but QSB won on this occasion.

Rotator problems meant that G6HKM couldn't turn the antennas around during the 144/430MHz contest on March 3/4. All stations worked were with the u.h.f. antenna pointing due south, but even so, contacts were made with stations in Surrey, Isle of Wight, Powys, Dorset and Buckinghamshire. Following an overhaul of the rotator, a CQ call, on March 16, was answered by Don G1TEY (TWR).

VHF News

The news that West Germany obtained operating privileges for the 50MHz band, from April 1, came as a complete surprise to many, including myself. Although the German National Radio Society, DARC, had been negotiating for this facility for some time, few actually expected much to come of it.

On the other hand, very few people expected the divided nation to be brought together so dramatically and so quickly. The stumbling block had been usage of this band of frequencies by certain personnel that can now no longer be justified.

Full details will be given next month. The only information I have at the moment is that German operators will be limited to 25W e.r.p. A rumour in certain circles indicates that East German amateurs may also get the band. Perhaps they may even resort to the old DM callsigns!

Luxembourg is another country to release the 50MHz band to amateurs. Operators can run 100W e.r.p, horizontally polarised, between 50.000 to 50.425MHz.

Italy has also been granted a narrow frequency band, between 50.151 to 50.163MHz, with a maximum power output of 10W. The first contacts from Italy, with this new allocation, took place on March 19, between several Italian stations and ZS, in an evening t.e.p. opening. Italy has had a history of 50MHz permits in previous years, so be careful when making any claims for first UK contacts!

On March 20, Namibia became an independent country and by consequence the Amateur prefixes changed. Stations with a Class A licence previously signing ZS3 changed to V51 and those with a Class B licence, ZR3, changed to V50. Well known 50MHz callsigns to look out for will include V51E and V51VHF.

You won't hear Tom Freidrich V51AT however, as he left Namibia in February, following his tour of duty in that country. Tom was very active on 50MHz as ZS3AT, giving many their first ZS3 contact. He is now to be found as DF2JQ (JO31) on 144MHz. I managed to work him via aurora late last year when he was home on leave. His QSL card records that he runs an FT-221R, 100W amplifier and a 16-element Yagi.

Annual v.h.f./u.h.f. table
January to December 1990

Station	50MHz Country	50MHz Counties	70MHz Country	70MHz Counties	144MHz Country	144MHz Counties	430MHz Country	430MHz Counties	1296MHz Country	1296MHz County	Total
G6HKM	5	7	—	—	47	10	8	3	—	—	80
G7CLY	—	—	—	—	41	4	—	—	—	—	45
G4ASR	2	7	—	—	26	8	—	—	—	—	43
GW4HBK	—	—	13	2	—	—	13	3	—	—	31

A new call sign, **ZS9H**, has appeared from Walvis Bay recently. George Hart is the Captain of a fishing boat and is expected, in the near future, to be taking his 50MHz equipment on fishing trips! Walvis Bay has now been accorded DXCC status, retrospective to 1 September 1977. Cards should not however be submitted until 1 June 1990.

Following a trip to Fernando De Noronha (PY0F) in March, W9VA has left 50MHz equipment with **PY0FF**. An antenna has been shipped out to him from the States and it is expected that this rare island, located in HI36, will have a permanent 50MHz operator very soon.

Nick Garrod G6JHK (LDN) has passed on details of his plans to expand his station. The present situation is that only one antenna, a 144MHz 5-element Yagi, is located outside of the house. Moves are afoot to mount, on the same pole, a 50MHz HB9CV and a 430MHz 19-element Yagi. The indoor antennas have been very limiting because of the large amount of attenuation incurred getting the signals in and out of the loft. On 50MHz, Nick runs a *PW* Meon transverter and 20W p.a. into a wire dipole, but because of the built in handicap, the furthest contact so far is Ilford, a distance of only 30km. Most of the operating time has been spent on packet radio, using an Amstrad PC1512 and TNC into the local mailbox GB7DGK.

News has reached me that DL3ZM/YV5 recently became a silent key. He was well known for his 50MHz work and made a number of contacts into the UK. His QSL Manager K8EFS has all the logs and will send cards if you still need one.

Another well known operator, Bill Law G2ANT, has regrettably also become a silent key, passing away in February. Bill was active on many bands, but was particularly fond of 50MHz DXing.

Martlesham VHF Round Table

Building on their experience of having held many Microwave Round Tables, the Martlesham Radio Society recently decided to hold what is claimed to be the first VHF Round Table in the UK.

To the uninitiated a Round Table, be it microwave or v.h.f. is really a mini convention, catering to the needs of the specialist operator. This event was based at the BT Research Laboratories, Martlesham, an excellent venue, as all facilities were immediately to hand.

A comprehensive array of test equipment, allowing a variety of r.f. parameters to be measured on low noise amplifiers and transceivers, was available in a large conference room. Another conference room, with video and audio aids, was used for the afternoon lectures. A large seating area was also available where one could meet other enthusiasts and exchange news or just gossip.

During the morning there was an opportunity to visit an EMC laboratory and test range. A variety of equipment is tested in these areas to measure conformity to various EMC standards. The afternoon lectures were very well attended. Peter Blair G3LTF gave a talk on e.m.e., outlining the advances made in antennas and feeds, low-noise amplifier design and high power generation. He mentioned that during the 1960s, experimenters had used World War II antenna techniques, during the 1970s operators had progressed to 6m dishes, advancing to 13m dishes in the 1980s. The 1990s will herald the era of the half-acre antenna! Pre-amplifier design had started from valves or parametric amplifiers during the 1960s, through to silicon transistors in the 70s and GaAsf.e.t.s in the 80s. The 1990s will also see h.e.m.t. devices being used more often in low-noise amplifiers. New designs of high power amplifiers, using modern valves, now allow greater powers to be generated than was the case a decade ago. Computer prediction and antenna control has improved steering and pointing accuracy, allowing the operator to pick up valuable dBs, especially when using large Yagi arrays or dishes. System optimisation, using radio astronomy measurement techniques has also increased the sensitivity of the receiver.

The second lecture, given by Ray Cracknell G2AHU, concerned 50MHz propagation. Various modes were discussed, Tropo, Sporadic-E, Aurora, Auroral-E's, Meteor Scatter, t.e.p. and F2. Analysis was made of these forms of propagation during sunspot maximum, sunspot minimum and geomagnetic maximum and minimum. This showed some interesting results. For example, Sporadic-E at 50MHz, was shown to be predominantly solar driven. A new mode, that of 'field aligned sausages', was portrayed in detail. This was the nearest that Ray could describe elongated blobs of intense ionisation, situated in the E region, causing a form of trans-equatorial propagation.

The final lecture was given by Bryn Llewellyn G4DEZ, Chairman of the RSGB VHF Contest Committee. The talk concentrated on the before, during and after contest tasks that need careful attention. The 'before' areas concerned such aspects as informing members of the contest team as to who was bringing a particular piece of equipment. It's no good sitting on top of a 900m mountain if someone forgot to bring the mains distribution board. Forward planning is also needed to make sure that all equipment can be integrated together successfully and that the end result produces a clean signal. The various components of a v.h.f. station must be tested in its entirety, including generators, before the event, to ensure that the system works correctly and linearly.

To fail this latter point can lead to disqualification from the contest. Planning is also required for the 'during' phase of the contest. How many pencils did you bring? Where's the spare light-bulb? How do you fill a petrol generator safely in the middle of the night? Mountain tops get cold in the middle of winter! Lack of foresight in some of these areas may mean that you never compete in another contest ever again. Finally, the 'after' areas were discussed. Do you leave your contest site clear of litter? Did you account for all the guy pickets or is there one left to injure someone? The event is still not over when you finally make it home. Has everyone signed the cover sheet? Get them to do it on the hill top, not when they have dispersed around the country. Does your contest scoring programme really work accurately? Have you filled out the logs using the correct stationery? Inattention to many of these details can also lead to disqualification. Don't endure the wrath of your contest group. Forward planning brings many benefits! The Martlesham Radio Society are to be congratulated on making this, their first v.h.f. Round Table, such a success. Further events are planned over the coming years. Make sure you get there next time.

Decline of Activity

In the March edition of *PW* I mentioned the decline of activity on the v.h.f. and u.h.f. bands and invited comments. **Bryan Harris G3GTF** doesn't know specifically why there has been such a decline but wonders if it may be for the same reason that he gave up v.h.f. operating nearly 6 years ago.

Bryan cites the appalling behaviour within the f.m. section of 144MHz, especially on voice repeaters. He mentions a London repeater being used for a whole afternoon by someone playing 'musical' requests for his friends, and of a repeater in southern England being used by a mobile station, not in contact with anyone, but just broadcasting a running commentary on other drivers, the scenery and what gear he was using to go up a certain hill.

Bryan has also heard foul and obscene language being used over many repeaters, with no callsigns, of course, being given by these people. For a while he thought that this behaviour was confined to London and the south-east, but he claims that this is not the case and that this type of pollution now occurs all over the country. Bryan now wonders, would things improve if all voice

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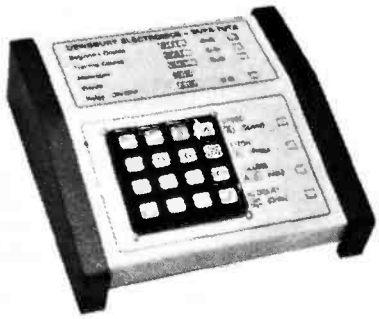

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Back-Scatter

repeaters were to be closed down?

By way of contrast I quote from a letter received from **Angie Sitton G0HGA**. She is not too sure why activity is declining but suspects that many people equate all types of v.h.f. operating with the worst that can be heard on repeaters. Perhaps also, some operators surmise they do not have the QTH for v.h.f? Angie thinks that contacts on 144MHz c.w. are very gentlemanly, and is proud to be a known as a v.h.f. operator. She quite often promotes the use of 144MHz c.w. via her 3.5/7MHz contacts and finds that an interest in v.h.f. makes an interesting QSO topic.

Angie feels there is little one doesn't know about l.f. or h.f. propagation but up on v.h.f. it is a different matter where we can use our role as experimenters during special events such as Aurora or Sporadic-E. As I see it there does not appear to be any specific reason why operators are not using the v.h.f. and u.h.f. bands as much as they used to do. I wonder if any of the h.f. fraternity can tell me if they have noticed a similar fall in UK activity on the lower frequency bands?

Perhaps the decline is not restricted to the UK. I would be interested to hear from other countries whether they also have a decrease in activity. You can use statistics based on contest entries or reports from f.m. repeater groups to help in your replies.

Beacon and Repeater News

A proposal for a packet repeater on 50, 70 and 144MHz, to be placed in the Chelmsford area, has been approved by the DTI. The unit will use the callsign GB7EP.

Other packet radio repeaters that have recently been licensed include GB7EY in Scarborough, with additional ports on 50 and 144MHz, and GB7PP in Wolverhampton, on the 430MHz and 1.3GHz bands.

Site clearance has been given to a new 1.3GHz television repeater, GB3TN, to be located in the Norwich area. Another television repeater, GB3RT in Rugby, on channel RT2, has recently been granted permission for a site change.

The DTI have also approved a site change for a speech repeater, GB3WC on channel RM15, to be located at Wakefield.

Expeditions

A group of US/USSR amateurs will be operating from locator square LN13 with the callsign **4J6X** from May 20. They will be active on 144MHz c.w. meteor scatter.

Two operators from the Grantham Radio Club, **G1EUU** and **G1JME**, will be active from various spots in the Outer and Inner Hebrides, between May 27 to June 3. They will be active on 50MHz and 144MHz from a number of rare WAB squares. QSL cards go via G1EUU.

Beam south if you want to work **Hans CT1DTQ** in IN56. He will be active on 144MHz from this locator square between June 6-8. In the afternoon of June 7 he will be active from the adjacent locator IN57. He is running 25W into a 9-element Yagi. There should be a good chance of working him from the UK as the incidence of Sporadic-E around these dates is normally very high. In fact I have always made a point of taking annual leave on the Monday and Tuesday after the first weekend in June, specifically to work the Sporadic-E DX. Last year I caught two openings, to Yugoslavia and Italy on these dates. In 1988 the openings were absolutely fantastic. Try it this year. You won't regret it!

Trevor Day G3ZYY will be going to Gibraltar from June 21 to July 12. He will be active on 50 and 28.885MHz, at weekends, evenings and occasionally during the day, using the callsign **ZB2HN**. Equipment will be a modified IC-211 and a 50W amplifier.

Between June 27 to July 10, the Square Bashers will return to Gozo (JM76) on h.f, 50 and 144MHz.

If you need to work the Spanish locator square IN72, keep a look out for **DL8OBC**. He will be operating, via tropo and meteor scatter, from there sometime this summer.

Meteor Showers

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times and when the shower is below the horizon.

The Arietids shower, encountered between May 29 to June 19, peaks on Wednesday June 6. Between 0400 to 0600UTC beam north or south, 0600 to 0800UTC beam south-west or north-east, 0800 to 1000UTC beam west or east, 1000 to 1400UTC beam north-west or south-east.

The shower is below the horizon from 1600 to 0300UTC. It should also be noted that although this is a rich shower, the particles are small and therefore any bursts are of a short duration.

The Zeta Perseids occur between May 23 to July 5, peaking on Thursday June 7. The beam headings are very similar to those of the Arietids shower with the exception that the west-east path is best between 0800 to 1200UTC and the north-west or south-east path is best from 1200 to 1400UTC.

QRZ Contest!

Operators of the 144MHz band should get an opportunity to work some of those wanted counties during a 24 hour contest to be held on May 19-20. There will be two sections, one for the single operator and the second for all other classes.

The Scandinavian activity contests will be run on the following dates. Microwave activity on June 4, 144MHz on June 5 and 430MHz activity on June 7.

The u.h.f. bands are sadly lacking in activity but the 430MHz contests scheduled for June 10 will hopefully rectify that. Two specialist events are planned, one for f.m. operators and the other for the c.w. expert.

Now is the time to polish up the antennas and blow the cobwebs out of your transceivers in preparation for the *PW* 144MHz QRP Contest. This year's event will be run between 0900 to 1700UTC on Sunday June 17

Deadlines

Please send your letters in to me by May 28 at the very latest. The dates for the following two issues are June 25 and July 30.

The annual v.h.f./u.h.f. table and the c.w. ladder are looking a little under subscribed at the moment. Can those of you that wish to participate in these tables go through your log books and send in the results as soon as possible.

Back-Scatter

RTTY

Reports to
Mike Richards G4WNC
200 Christchurch Road,
Ringwood, Hants BH24 3AS

This month I have received a couple of requests for assistance from readers. The first is from **Stuart Rison** in Switzerland. He has recently revived his interest in amateur data and would like to utilise his Amiga 500 computer to decode c.w., RTTY and AMTOR. The problem is a distinct lack of software!

So, does any one out there know of the availability of c.w., RTTY and AMTOR software for this computer? Please send any information direct to me and I will pass on the details to Stuart and also print anything of note in this column.

My second letter comes from **Milen Postadshieff LZ2MP** (Bulgaria). Because of the difficulties in obtaining imported equipment, Milen has had to built his own station from scratch which is no mean achievement. However he has managed to get his hands on an Apple II computer and a Dragon 32.

The Apple provides all his present data communications, but he is looking for software for his Dragon 32. In addition he would very much like to find a pen pal with similar radio interests, both to develop his grasp of the English language and to further his knowledge of amateur data comms.

For anyone who would like to take up the challenge, Milen's address is: PO Box 237, 7000 Russe, Bulgaria. The only source of Dragon software in the UK is Grosvenor Software - see later. If you know different, write to me and let me know.

IBM PC RTTY/AMTOR Software

The latest release from Grosvenor Software is a full featured RTTY and AMTOR program for IBM PCs and is the subject of my review for this month. I'll start with the hardware requirements, as this determines whether or not you can use the program. BMKMULTY as the program is called, has been designed to be as versatile as possible so runs on the following PC variants: IBM-PC, XT, AT, PS/2 or fully compatible clones. A single serial port is required and this could be either COM1 or 2.

On the graphics side the program could drive Mono, CGA, EGA and VGA screen standards. However the program did include a warning that some early CGA interfaces may suffer snowy interference problems, but it is known that Amstrad 1512s are OK.

Installation of the program was very simple and it could either be run from floppy or transferred to a hard disk. Of course if you were running the program from a floppy disk it would be wise to make a working copy of the original disk. The manual supplied with the BMKMULTY comprised a 13-page A4 document which was stapled together.

The instructions covered all the features of the program in detail, with clear explanations of some of the more advanced features. There was a comprehensive section on interfacing, along with a very useful AMTOR tutorial contained in an appendix. My only criticism was that there was no summary of the functions and commands. This was particularly important because of the large number of commands available and I found I had to make up my own summary sheet.

Interfacing

Like most PC RTTY programs, a terminal unit was required when using the BMKMULTY. The demands on the terminal unit were quite straightforward, though ideally it needed to be able to handle RS-232 signal levels. However the manual included details of a couple of circuits that could be built to interface between the

more common t.t.l. levels and RS-232.

One of these was for reducing the level of the transmit data from the RS-232 to a value suitable for direct connection to t.t.l. terminal units. The second circuit provided a drive for the p.t.t. line of a transceiver from the RTS (Request To Send) line of the serial port.

This p.t.t. controller used a VN10LM device as the output driver which should handle most modern transceivers. There was no additional circuitry suggested for the receive data, as most serial ports will respond direct to t.t.l. levels. With all the interfacing sorted out, the next step was to run the program and have a closer look at the available features.

Operation

Once past the copyright screen I was presented with the main operational screen and the mode was set to AMTOR. The screen layout was slightly unusual, so I will start with that.

The top line was set up as the first of three status lines and presented a range of information such as AMTOR selcall, mode, print and a 24 hour clock. The next fourteen lines were used for the display of the received text, while a further five lines were used to show the transmitted text, after transmission. The type ahead buffer holds 1000 characters of which the last line is shown on the screen.

The second status line was used to display further information regarding the current parameters in use within the program. An additional feature on this line was a simple tuning indicator, but more of that later.

The final status line was normally left suppressed but, when activated, was used to display help information. That completes the screen layout so let's move on to the main operation of the program, starting with RTTY. As I mentioned earlier the program actually started in AMTOR mode so the first action was to change to RTTY. This was achieve by pressing Escape to enter command mode and typing RTTY - simple enough.

Being designed for amateur operation the program started with a baud rate of 45 baud which is the most common on the h.f. bands. Changing the baud rate was achieved with the Up arrow for an increase and conversely Down arrow for a decrease. The speed steps were fixed at 5 baud and the limits were 40 baud to 100 baud, which was a usefully wide range.

The transmit and receive functions were controlled by the function keys, where there were two receive modes in addition to transmit. The default receive mode was standby which some of you may know as autoprint. This mode helped to prevent the screen filling with rubbish, either in between transmissions or when tuning around.

The more conventional receive mode could also be selected and was the best choice for difficult conditions or when trying to work some exotic DX. The transmit mode was conventional in operation and transferred all text a word at a time from the type ahead buffer. This 'word mode' as it is called, was very useful as it allowed spelling mistakes to be corrected before the word was transmitted!

A feature not often found in RTTY programs, was the language option. This was primarily of use for operators working in a language other than English and meant that the character translations could be changed.

An example of this would be to display Ö and Ä with an umlaut instead of ! and #. Switching between the standard character set and the user programed one was achieved by entering the LANG command whilst in command mode.

Moving on to the receive side, the function keys could be used to set a number of common facilities such as unshift on space, reverse data and printer. There were some additional and very useful facilities provided.

The first was an intelligent callsign capture facility which, when enabled, stored any valid received call prefixed by DE into a memory for subsequent use during QSOs. This turned out to be very effective in practice and didn't once capture a false call which says something for the software.

Another useful extra was the built-in disk log file. This could be set to either store all data or only that occurring during an AMTOR QSO. This log could also be reviewed via a command without having to leave the program, which was handy for back checking on details that may have been missed.

The tuning indicator comprised a character in the centre of the second status line which represented reception of a high or low tone with either a vertical or horizontal line. This may sound a little odd but it was in fact quite useful.

AMTOR

The AMTOR implementation used was very good and provided a number of useful features. The AMTOR mode was selected from the command mode and incorporated all the standard options which most operators take for granted. These include ARQ, FEC and the listen mode.

Additionally all the options I described with RTTY such as QSO logging were also available. One of the slightly unusual aspects of BMKMULTY was the facility to set up a timing correction to take account of the variations between different computers.

This facility is essential as timing is crucial to effective AMTOR communications. The calibration process was very easy and simply involved tuning to a good FEC station, pressing control f8 and noting the timing correction figures that appear on the screen.

The instructions claim that after calibration the residual timing error will be less than 100 parts per million which is very creditable and well within the specification for AMTOR. There were a couple of shorthand keys available to the operator covering the +? handover string and the END key for ending an ARQ or FEC transmission.

Running along with both the RTTY and AMTOR modes was the automatic c.w. ident. This was permanently enabled and came into action in between overs if at least fifteen minutes had passed since the last ident.

Although this is a requirement of the licence, the fully automatic operation could be a bit of a problem at times. This was because the program was effectively suspended during the ident and if the other station in the QSO was quick off the mark you could miss the first part of the transmission.

Memories

No self respecting RTTY/AMTOR program would be complete without a set of memories and BMKMULTY is very well equipped in this area. The memories were divided into two distinct groups - pre-programmed and user programmable. Two of the pre-programmed memories were set up with the registered users callsign and selcal and acted as a copy protection feature.

The only problem I discovered with this was when I wanted to use my station for a special event and found I couldn't change the callsign. Although I could easily arrange to send only the correct callsign from the keyboard, I couldn't change the c.w. ident call!

Of the two other pre-programmed memories, the first contained the current time of day and the second held the most recently captured callsign. One point to note about the time of day was that it used the PC's clock so you would either need to make sure that it was kept set to UTC or set up the appropriate correction in the set up file.

Moving on to the user programmed memories, there were a total of thirty-six available. These were recalled by typing backslash followed by A to Z or 0 to 9. The maximum number of characters that could be stored in all the memories was 4000, and this could be split in any combination over the 36 memories available.

This nesting of memories could be programmed for up to eight levels which should prove more than adequate for most operators. One of the most powerful features of the BMKMULTY program was the control file. This contained all the set-up options for the program including text for the user programmed memories.

The file used a simple ASCII format and so could be created or edited with a wide range of basic text editors on word-processors. With this system it was possible to create more than one control file to cover a range of situations, i.e. you could have one for contest operation and another for normal use. The set up details contained in the control files also defined the various screen colours in addition to the basic program default values.

Conclusion

I found the BMKMULTY program to be very effective during the review period. Its performance decoding both RTTY and AMTOR was excellent, as was the very clear screen display.

One notable point was that the FEC mode would synchronise to a signal without having to wait for idles, unlike most black box systems. I feel there are a couple of minor areas that need some attention, i.e. the enforced c.w. ident and the inability to change the user callsign, but these will not effect most operators.

I have spoken to Mike Kerry of Grosvenor Software and the c.w. ident is now user controlled and he is prepared to to offer copies for special event stations at a special limited use price. He has also accepted that a command summary sheet would be useful.

To conclude then, BMKMULTY is a program that I can confidently recommend. If you would like more detail contact **Grosvenor Software, 2 Beacon Close, Seaford, East Sussex BN25 2JZ**.

The current prices are £29.50 for AMTOR only and £10.00 extra for RTTY. Post and packing is £0.50. If you need the software on 3.5in media this is an extra £1.25. Don't forget to include your callsign with the order.

DO YOU READ AND ENJOY 'BACKSCATTER'? IF YOU DO, PLEASE WRITE AND LET US KNOW. WHAT DO YOU FIND MOST INTERESTING? DO YOU FEEL THAT THE INFORMATION THAT YOU NEED IS THERE? OUR CONTRIBUTORS AND PW STAFF NEED TO KNOW YOUR NEEDS.

WRITE OR PHONE (0202) 678558 (OUR ANSWERING MACHINE) TONIGHT!

Back-Scatter

Amateur Satellites

Reports to
Pat Gowen G3IOR
17 Heath Crescent
Hellesdon, Norwich, Norfolk NR6 6DX

Amateur Satellite Update

The microsats continue to be loaded and placed into active service, but further casualties have occurred. Whilst UoSAT-OSCAR-14 is making good progress, UoSAT-OSCAR-15 still remains silent. OSCARs 14, 16 and 19 have shown a few software protocol anomalies requiring revisions to the loaded software whilst DOVE, OSCAR-17, has suffered an on-board computer crash.

U-o-14 is quickly attaining stability, and computer controlled commanding of the on-board electromagnets has resulted in spin, topple and roll reduction of the satellite to a level approaching the point where the gravity gradient boom can be deployed. This will result in correct pointing and placing the solar panel assembly faces at that position and spin rate to provide optimised battery charge.

Tests of the 9600b.p.s. f.s.k. have been proved successful, and few insurmountable problems have evolved.

U-o-15 has had its weak (-60dB) local oscillator first detected by the giant telescope at Stanford on March 10 and 11 by employing DSP techniques to recover the signal. **Roy Long** reports that as expected from results of earlier ground tests, it was found to be even weaker than the emission from U-o-14. Thus, both tracking and knowledge of the potential command frequency are now firmly established. Steps are now being planned to place high power commands to the satellite to attempt to change its command receiver frequency, which will be noted by the detected local oscillator frequency change, so proving command capability.

The satellite has three command receivers, each with its own specific local oscillator signal radiation detectable. The next step, knowing its 'listening' frequency and now knowing exactly where to accurately point the big dish, will be to attempt to load the necessary commands in order to try to bring UoSAT-E back to active life. Most of the team involved seem quite optimistic, and we certainly cannot write this satellite off yet.

Both microsat OSCAR-16, PACSAT and 19 LUSAT have shown that 10W to a 10 to 13dB gain antenna, tracking in small interval gaps, provides enough signal to the satellites. The deviation required is given as 3kHz, and more than this has been shown to give access problems.

OSCAR-1B, WEBERSAT, is sending pictures down on a daily basis. These are colour pictures of an area of only 435km² when looking down at earth, so one needs to have a good geographical and topographical knowledge to define just what is being seen in the image produced.

DOVE, OSCAR-17 suffered a computer crash on March 14, resulting in a plain continuous carrier on the 145.825MHz previously packet radio modulated downlink. This caused the battery to lose power during the eclipse period, and the volts to the GaAsf.e.t. pre-amplifier of the receiver dropped out to cause a severe deafness to attempts to command the satellite. The services of W5UN and his monster 32dBi gain 144MHz e.m.e. array were provided to overcome the attenuation, resulting in the acceptance of an 'off' command on March 18 so allowing the battery to top up again. Whilst the 145MHz downlink is still silent at the time of writing in early April, the S band beacon remains active, from which telemetry is required. The problem may have been due to a solar flare, and is not thought to be serious in the long term. Hopefully, reloading and reactivation of the popular 145.825MHz packet radio signal, later with f.m. speech messages, will occur soon.

FUJI-OSCAR-20

As FO-12 slowly stabilises into alignment with earth's magnetic field, the spin is reducing and the tumble is lessening, currently providing up to 28 seconds of deep QSB on JA mode before transponded signals return to full readability. On JD mode, the downlink averages some 10dB stronger and the nulls are thus little noticed.

A schedule now seems to be effective that makes the digital mode available on each Wednesday, and both modes together at other times. This format should be able to be maintained while the battery and solar cells are at peak performance. Whilst this gives optimum use to both types of user, it has been observed that the presence of packet signals in the analogue passband are causing considerable de-sensitization of the c.w./s.s.b mode.

This problem is possibly exaggerated by the very high power being used by some of the JD mode enthusiasts, and that JD signals appear in the JA passband. The reverse is also true, as Mode JD users report that strong s.s.b. signals 45kHz below the JD signal are often repeated on or just below the digital downlink, which is all due to the non-linearity of the FUJI transmitters.

Many avid users enjoyed the Mode A analogue periods of super-DX provided by the satellite when it reached its apogee of 1740.4356km at the furthest northerly point. **David Rowan G4CUO** used s.s.b. with an uplink set at 435.860 or 435.870MHz to work AE7R in Idaho, W7JHV in Oregon, WB0RHK in Wyoming, and WD0EHP in Nebraska. W0IT and WY0C were worked in North Dakota and N7ZL in Washington State. **G0MRB** in Lincoln was delighted to work WY0C also for his very first satellite QSO.

DJ2QV worked K7BB0 (Washington) and **W0CA** worked RL7GD, both QSOs being at the absolute mutual range limits for the stations concerned. Best of all were QSOs by G4CUO with N6ME and K6HHJ in California. Heard, and almost worked, were JA8ISU and JA9CAO, the latter at first thought to be the very active G3CAG until

```
  8J1JBS>KB7HTA <RR C P R3>
  8J1JBS>ON5PV <RR C P R0>
  8J1JBS>HB9AQZ <REJ R F R4>
  8J1JBS>HB9AQZ <RR C P R4>
  8J1JBS>DF5DP <RR C P R5>
✓ 8J1JBS>DF5DP <I C S2 R5>:y common when uploading a message.  The BBS locks up ha
  8J1JBS>DF5DP <I C S2 R5>:y common when uploading a message.  The BBS locks up ha
  lf
✓ way through the upload.  Inspection of the BBS contents later shows th
✓ 8J1JBS>DF5DP <I C S3 R5>:e
✓ file to be incomplete.  Only way out is to disconnect, but then you get
✓ problem #2 !!

✓ 5. The KILL BUG
     ------------
✓ It is q
  8J1JBS>DL1CR <RR C P R2>
  8J1JBS>KB7HTA <RR C P R3>
  8J1JBS>ON5PV <RR C P R0>
  8J1JBS>DL1CR <I C S1 R2>:0056 03/12 17:31  ON6UB    ALL      JD - USERS (3)
  MODE JD USERS LIST COMPILED  FROM USERS      DATE MARCH 9 1990    PAGE 3
  Please
  8J1JBS>KB7HTA <I C S6 R3>:-2 instead of WA8DED only.

  PROTOCOL BUGS
  -------------
  1. The LOGON BUG
     -------------
  Everybody complains of this one.  Yo
  8J1JBS>HB9AQZ <RR C P R4>
  8J1JBS>ON5PV <C R>
✓ 8J1JBS>DF5DP <I C S4 R5>:uite possible to READ a file addressed to you while som
✓ 8J1JBS>DF5DP <I C S4 R5>:uite possible to READ a file addressed to you while som
✓ eone is
✓ still uploading it.  Thus you receive an incomplete message, assu
  8J1JBS>HB9AQZ <RR R F R5>
  8J1JBS>HB9AQZ <I C S6 R5>:Enter text, <CR>.<CR> to end.

  8J1JBS>KB7HTA <I C S7 R3>:u CONNECT 8J1JBS, get ***CONNECTED,
  and get the first 3 lines of the log-on message instantly, and then
  absolutely nothing else
✓ 8J1JBS>DF5DP <I C S5 R5>:med to be
  a type #4 problem.  Then you KILL it instead of waiting!  Surely the
  header should not appear in the Files list until
  8J1JBS>DL1CR <RR C P R2>
  8J1JBS>KB7HTA <I C S0 R3>:happens on the screen.  At the supervisory level a
  great deal of polling goes on, but there is stalemate.

   Below are two consec
  8J1JBS>DL1CR <I C S2 R2>:use this format to add your station. Tnx.
  8J1JBS>DL1CR <I C S2 R2>:use this format to add your station. Tnx.


  CALL
  8J1JBS>DF5DP <I C S6 R5>:the message is fully
  uploaded?
```

Fig. 1

Back-Scatter

it was too late! Did anyone even dream thirty years ago that such amateur SDX QSOs were possible on v.h.f. and u.h.f?

The Japanese Amateur Radio League have now sent the listing of requirements to use the Mode JD mailbox. To supplement the details already published on the requirements for a 10W 145MHz f.m. transmitter, the 435MHz s.s.b. receiver, antennas, modem, TNC and terminal, I can now provided the user data.

The TNC should be set up as: AX25L2V2 = ON, FRACK = 6, MAXFRAMES = 2, PACLEN = 100. AX.25 should be version 2, otherwise connection to JAS-1-B will not be possible.

FRACK, waiting time for the ACK signal, should be 6 or more, other time constants are similar to that of the normal packet link. If many users are present (as is the case in Europe) it might be better to increase FRACK even more.

Up to 7 packet frames may be sent in one series at any one time. PACLEN, the number of data bytes, should be less than 200. JAS-1-B uses PACLEN = 128 and MAXFRAMES = 1.

At this point, try the mailbox. The mailbox has no personal mail function, and anyone can read any mail freely and callsigns are only for convenience. When the downlink is received, you are ready to connect with JAS-1-B. Select an uplink on either 145.850, 145.870, 145.890 or 145.910MHz, and call the orbiting mailbox, whose callsign is 8J1JBS. When you are connected, the opening message and prompt will be transmitted.

cmd: C 8J1JBS. ***CONNECTED to 8J1JBS. FO-XX/JAS-1b Mail box Ver. 1.11. commands [B/F/H/M/R/U/W]. Use H command for Help. JAS>

There are ten commands for users of the mailbox. H is for help and explanation. JARL recommend you first try this, e.g.. JAS>H. which will give the other commands as follows:

Available command

B: List file headers addressed to All.

F: List latest 15 file headers.

F*: List latest 50 file headers.

F<d>: List file headers posted on day <d>.

H: Show this message.

K<n>: Kill a file numbered <n>.

M: List file headers addressed to current user.

R<n>: Read a file numbered <n>.

U: List current user(s) + SSID.

W: Write a file.

JAS>

If you transmit your user command after the invitation JAS> sent to you by the satellite, you can then write or read mail. Further explanation on each user command is supplied in that B: is the bulletin command, in which mails for all (ALL) will be shown in order of the latest. In F: only the very latest fifteen mails posted will be shown, whilst F*: shows the latest fifty mails posted, and F<d>: shows all of the mail written on the day designated by your choice. H: gives the above user commands and the simple explanation of the function, K<n>: deletes the mail with the number designated by <n>. When the other station is reading the mail, no deletion is possible. The mail may only be deleted by the sender and the addressee. M: shows the mail addressed to your station in order of the latest. R<n>: will allow transmission of the mail designated by <n>, U: gives the callsigns and SSID of the stations connected to the satellite mailbox at that moment of time. W: is for writing mail into JAS-1b. Having been asked the addressee and title, you have to answer these first, followed by transmitting your text, finishing up with "<Ret>. <Ret>".

You may use either capital letters or lower case for command names and the callsign of the corresponding station. Both are accepted by the system. Note that there is no log-off from the mailbox, and thus overcrowding can appear to occur, particularly when the spacecraft is in access range of well used areas of the world at peak times. Please be sure to disconnect by your normal TNC command function.

When writing mail, note that all ASCII codes may be used with the singular exception of '^Z' which only shows the end of the message. The mailbox has no digipeating function, and will not respond to frames of a digipeating signal.

Note also that if the packet audio is put directly into the 144MHz transmitter microphone socket, the distortion introduced can prevent good access. Internal coupling and good audio level determination is needed to provide the correct deviation. This must be undistorted by limiters and compressors and is ideally necessary for good, reliable results.

John Branegan GM4IHJ, reports that the mailbox is being overwhelmed by the large number of users when over Europe. That this is happening, is shown by a print out of a typical message, Fig. 1. "You will note", writes John, "that it starts to answer one chap, and then goes on to another, and then another, before returning to the same chap several minutes later. Please be aware that the individual message addressee does not get this mess, as he only sees that which is intended for him. Once he is connected, the other traffic ceases to be passed by his computer and the TNC, but of course, he still has the very long delays even when trying to get a message of just a few sentences." To pick out the message in Fig. 1, taken from JAS-1B on the evening of March 12, one has to link up those lines addressed to DF5DP, as marked by a tick.

John has found that both PACSAT and LUSAT are offering digipeater facilities while they continue to upload their main BBS software. He writes, "LUSAT in particular has an excellent signal into northern Europe, where I get five minutes of solid copy, in contrast with PACSAT which rarely gives any useful signal". John uses either his 21-element horizontally polarised Yagi or his right-hand-circularly polarised beam, and gets good passes between 0900 and 1415UTC, and again between 1800 and 2330.

He provides some useful hints and tips on using LUSAT with its 145.860MHz uplink and 437.125MHz downlink 1200b.p.s. f.s.k. He recommends that, assuming you are correctly tracking, you wait a signal that is moving your S-meter to assure good screen printing, when you will then find it sending a mixture of, telemetry and digipeater signals. "Set your TNC unpro command to unpro CQ via Lusat-1, then switch to Conversation mode by inputting the K command, then, every time you touch your RETURN key, you transmit YOUR CALL>CQ, LUSAT-1." He continues, "Listen carefully on the downlink for a moment when the data signal is idling, then transmit by

Keplerian Elements

Satellite	NOAA 9	NOAA 10	NOAA 11	METEOR 2/16	NAVSTAR 5	DO-17
Int. Design	84-123A	86-073A	88-089A	87-068A	89-097A	90-005E
Object No.	15427	16969	19531	18312	20361	20440
Element Set	483	343	200	369	10	12
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	53.44307907	53.56818548	53.33580038	44.45228705	4.11084330	55.05890315
Inclination	99.1643	98.6142	98.9687	82.5533	54.9482	98.7155
RAAN	50.6360	84.0259	1.6059	28.3594	146.8378	131.4930
Eccentricity	0.0014806	0.0012522	0.0011336	0.0010650	0.0065519	0.0012085
Arg of Perigee	334.7444	243.5643	245.8639	245.6587	43.8416	121.7102
Mean Anomaly	25.3001	116.4252	114.1346	114.3456	316.6546	238.5335
Mean Motion	14.12443006	14.23461437	14.11455166	13.83593353	2.00550076	14.28618169
Decay Rate	0.00000555	0.00000452	0.00000809	0.00000219	0.00000016	0.00000500
Orbit Number	26778	17830	7276	12587	43	471
Nodal Period	102.007368	101.219302	102.079051	104.135083	718.003313	100.854048
P-drag	2.839e-06	2.259e-06	4.148e-06	1.192e-06	2.858e-05	2.472e-06
Increment	25.499075	25.305130	25.518647	26.162517	180.011664	25.212424
I-Drag	7.145e-07	5.684e-07	1.044e-06	2.979e-07	7.159e-06	6.290e-07
Beacon-QRG	137.620=APT 1707.0=HRPT	137.500=APT 1698.0=HRPT	137.620=APT 1707.0=HRPT	137.400=APT	1227.6	145.825 2401.221
Ref. EQX	02 Mar1990	28 Feb 1990	28 Feb 1990	17 Feb 1990	11 Jan 1990	28 Feb 1990
Orbit	26885	17908	7356	12637	57	528
HHMM.MM	0032.77UTC	0113.28UTC	0009.85UTC	0138.04UTC	0211.58UTC	0113.49UTC
Degrees W	109.35	86.53	152.75	145.79	356.67	40.49

Satellite	METEOR 2/17	METEOR3/02	METEOR 2/18	METEDR 3/03	WO-18	UO-15
Int. Design	88-005A	88-064A	89-018A	89-086A	90-005F	90-005C
Object No.	18820	19336	19851	20305	20441	20438
Element Set	201	370	152	53	12	20
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	48.72052619	44.347923056	54.22801331	54.16392028	53.23543324	55.27691186
Inclination	82.5429	82.5243	82.5230	82.5542	98.7114	98.7116
RAAN	85.4362	5.0262	319.2818	298.4303	129.6772	131.6863
Eccentricity	0.0015792	0.0016228	0.0013992	0.0015069	0.0012817	0.0010839
Arg of Perigee	304.8082	266.7895	330.7665	254.4727	128.9972	119.4242
Mean Anomaly	55.1585	93.1500	29.2521	105.4763	231.2353	240.8021
Mean Motion	13.84294033	13.16878641	13.83936417	13.15852213	14.28729498	14.28272390
Decay Rate	0.00000162	0.00000391	0.00000189	0.00000088	0.00000543	0.00000389
Orbit Number	10365	7465	4980	1595	445	474
Nodal Period	104.082850	109.4073194	104.109696	109.492519	100.846202	100.878452
P-Drag	8.804e-07	2.468e-06	1.028e-06	5.588e-07	2.684e-06	1.925e-06
Increment	26.149541	27.480694	26.156404	27.501813	25.210483	25.218598
I-Drag	2.201e-07	6.171e-07	2.569e-07	1.292e-07	6.754e-07	4.843e-07
Beacon-QRG	137.400=APT	137.850=APT	137.300=APT	137.850=APT	437.075/.100	435.120
Ref EQX	28 Feb 1990	17 Feb 1990	28 Feb 1990	28 Feb 1990	28 Feb 1990	28 Feb 1990
Orbit	10508	7514	5047	1659	528	528
HHMM.MM	0121.37UTC	0141.98UTC	0143.67UTC	0043.58UTC	0109.24UTC	0126.18UTC
Degrees W	100.73	169.88	228.14	233.47	39.43	43.70

Satellite	OSCAR 10	OSCAR 11	RS10/11	OSCAR 13	LO-19	PO-16
Int. Design	83-058B	84-021B	87-054A	88-051B	90-005C	90-005D
Object No.	14129	14781	18129	19216	20442	20439
Element Set	456	616	48	76	17	21
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	49.80793411	55.20166771	56.88673669	54.30232158	54.28439073	54.28921251
Inclination	25.9253	97.9677	82.9227	57.0615	98.7145	98.7162
RAAN	218.0969	111.4028	50.7514	167.4197	130.7265	130.7247
Eccentricity	0.5995939	0.0011962	0.0013391	0.6899468	0.0012829	0.0011992
Arg of Perigee	119.7301	245.8594	70.1253	221.7458	124.9132	124.44102
Mean Anomaly	312.5438	114.1476	290.1374	57.5225	235.3282	235.7905
Mean Motion	2.05881408	14.64912701	13.72062933	2.09701315	14.28797281	14.28583324
Decay Rate	0.000000	0.00001743	0.00000401	-0.0000091	0.00000415	0.00000423
Orbit Number	5029	31942	13418	1299	460	460
Nodal Period	699.2	98.358426	105.010519	686.6	100.841416	100.856505
P-Drag	-	7.994e-06	2.238e-06	-	2.051e-06	2.092e-06
Increment	175.3	24.590602	26.378532	172.2	25.209254	25.213037
I-Drag	-	2.011e-06	5.595e-07	-	5.161e-07	5.263e-07
Beacon-QRG	145.810/.987	145.826 2401.5 435.025	29.357/.408 145.857/.903 29.407/.453 145.907/.953	145.812 435.651 2400.660	437.125=c.w. 437.150=p.s.k.	437.025/.050 2401.142
Ref EQX	02 Mar 1990	02 Mar 1990	01 Mar 1990	01 Mar 1990	28 Feb 1990	28 Feb 1990
Orbit	5053	32027	13461	1311	528	528
HHMM.MM	1102.91UTC	0010.81UTC	0032.34UTC	0034.51UTC	0106.73UTC	0114.70UTC
Degrees W	109.59	45.21	118.21	0.57	38.80	40.80

Satellite	SALYUT 7	MIR	POLAR BEAR	HILAT	FUJI-2	UO-14
Int. Design	82-033A	86-017A	86-088A	88-063A	90-013C	90-005B
Object No.	13138	16609	17070	14154	20480	20437
Element Set	73	430	495	684	14	21
Epoch Year	1990	1990	1989	1989	1990	1990
Epoch Day	58.68362801	58.69515723	349.24495166	350.99084571	48.04185854	55.20174903
Inclination	51.6063	51.8198	89.5389	82.0344	99.0553	98.7087
RAAN	135.1225	161.9350	65.1425	220.9879	123.6579	131.6114
Eccentricity	0.0000594	0.0016997	0.0041317	0.0048026	0.0540918	0.0012010
Arg of Perigee	18.9613	215.2625	98.8957	81.4623	302.5752	122.2958
Mean Anomaly	341.2116	144.8173	261.6884	279.1981	52.4250	237.9431
Mean Motion	15.55272067	15.58810973	13.72748792	14.28075778	12.83114314	14.28494406
Decay Rate	0.00058681	0.00071705	0.00000464	0.00001680	0.00000043	0.00000657
Orbit Number	44776	23100	15461	33714	236	473
Nodal Period	92.526494	92.316323	104.962927	100.893541	112.278857	100.862791
P-Drag	2.242e-04	2.723e-04	2.586e-06	8.316e-06	-	3.249e-06
Increment	23.516420	23.464615	26.316123	25.356540	28.083143	25.214678
I-Drag	5.517e-05	8.698e-05	6.482e-07	2.078e-06	-	8.176e-07
Beacon-QRG	19.953/142.417 925.240	143.625=voice 166.130=data+ ranging	435.9744 carrier	435.974 carrier	435.796/.910	435.070/.250
Ref EQX	04 Mar 1990	02 Mar 1990	22 Dec 1989	22 Dec 1989	28 Feb 1990	28 Feb 1990
Orbit	44844	23138	15554	33786	274	528
HHMM.MM	0115.17UTC	0004.04UTC	0034.25UTC	0051.09UTC	0006.87UTC	0117.98UTC
Degrees W	67.07	10.20	34.30	246.95	33.21	41.64

Back-Scatter

tapping the RETURN key. You should hear a burst of QRM as you transmit, then, after a brief pause, you should hear a 'brup-brup' as the satellite answers you. If you hear nothing after several tries, check your transmitter. If you do hear the answer, then you know immediately that you are getting in, but, if nothing appears on your screen, you will then need to check your reception.". GM4IHJ usually hears about three answers for every four transmissions.

John continues: "If you hear the reply and all is well, you will see 'GM4IHJ>CQ, Lusat-1*' on your screen each time you key RETURN. Having got two way communication, you can watch your screen to see who else is on. You may then call them (say ON4DY) by sending C ON4DY via Lusat-1 using the command mode. If successful you will see +++CONNECTED TO ON4DY on your screen, leaving you in conversation mode, so anything you type goes out when you hit RETURN.".

John sent me a pair of typical examples of such QSOs, and these are shown in Fig. 2. He points out that several countries are now aboard, and has so far identified the prefixes DL, EA, G, HB, I, K, N, ON, OZ, VE, W and YT.

Comparing the new satellites, GM4IHJ finds that LUSAT needs a better higher signal to noise ratio for consistent screen print copy than JAS-1 before it will print. PACSAT needs a very high signal to noise ratio for consistent screen print copy, and John wonders if this is a feature of the Raised Cosine Modulation, as for the first three days after launch PACSAT was easier copy when it was then on Manchester coded signals. He finds that WEBERSAT has a very rough signal, and needs to be S.9 before it will print, and that this is not due to AFC inconsistencies as some reports suggest, as it is equally bad on low doppler rate orbits. He suggests that it is more likely to be due to the surplus carriers in its signal.

John has been trying to capture the elusive PACSAT 2401.143MHz transmissions, which rarely seem to be on when it is in range of his window. This is literally a window, as due to the wintry-weather in GM, he is using a 2m dish with a home-brew wave-guide horn indoors, looking south through a very large single pane window!

"It is trainable from 135 to 225 degrees", writes John in his letter, " and was set up on sun noise using the standard technique of ensuring agreement of mechanical and electrical pointing, by lining up to get both the wave-guide horn shadow central on the dish, and receiving the maximum Sun noise at the same time". In the meantime, while waiting the needed signal, John is doing the odd confidence check on the A-O-13 S band beacon.

New RS Spacecraft

No further news on the launch date of RS-12 and 13 has arrived, but RS-14 with its 435/145MHz transponder is expected to be launched in July, complete with the AMSAT-DL RUDAK, having been postponed from the originally planned 'Gagarin Day' in April.

OSCARs 10 and 13

Whilst OSCAR-10 is still suffering (at the time of writing in early April) from low battery power due to solar attitude, OSCAR-13 soldiers on. From July 14 for 11 weeks, A-O-13 will suffer from eclipses, and will have periods of beacon only operation.

Rod Clewes G3CDK, of Wallington, Surrey, bemoans the lack of activity on the OSCAR-13 L mode. He says, "Whilst I have worked plenty of JA, DL and W stations, apart from VK8OB, VE7s VL and CLD, ZS, I8CVS, VK5AGR and SV3KH, there is little other activity". Rod uses to good effect a 1271E with a 100W TL1270 linear to four vertically stacked helices for the uplink, and a G3RUH helical to a masthead GaAsf.e.t. amplifier and thence down to an IC-475H for downlink reception.

Ernie Hayman G3ABU, of Kinkersewell, Devon, sticks to Mode B with his 45-50W to a 12-turn home-brew helix. "I have had recent QSOs with SV2, KA5, HG2, JA7, TK2, KG4, KP7, EA8, VK7, VE7, and Ws 1, 2, 3, 5, 7 and 9", says Ernie, who enjoys using c.w. on the satellites.

Keplerian Elements

Birger Lindholm of Dalsbruk, Finland, has again provided us with the elements for all the main satellites of interest, which readers will note, have grown somewhat this year. Birger uses the NASA 2-line elements as his source, relating the catalogue and object numbers to the name by which we know the satellite, he then collates them for us in a meaningful format for use in computers or with our trackers. To relate the new microsats to the catalogue and object numbers has not been an easy task, as a number of changes became necessary as the cluster separated, enabling individual spacecraft to be identified.

Birger calculates the nodal period and increment for the epoch day, then gives the P-Drag, i.e. the period drag, which is the nodal period decay rate per orbit. The I-drag is the increment decay rate per orbit. If the NASA supplied decay rate is negative, then the P and I drags are calculated using a zero figure.

He points out that whilst the sets are well within normal amateur time and tracking limitations, they should not be used for precise scientific analysis. He points out that the actual orbit number for OSCAR-13 is the NASA orbit number minus 2! Birger welcomes queries, comments and suggestions from users and readers, and may be contacted at Hasselbacken 305, SF 25900 Dalsbruk, Finland.

Orbit Numbers

As pointed out by Birger Lindholm, the orbit number alias revolution number of a satellite is not always agreed among the experts following them. This may seem surprising when a simple addition formula for each complete orbit from launch, is all that appears to be required to calculate the precise number of earth revolutions that have taken place

The discrepancy evolves from a number of factors. The first is that different launch agencies use different numbers at the on set of orbital injection. Some call the first passage orbit 0, some orbit 1. Secondly, sometimes the count commences from the first ascending (north bound) equator crossing immediately following launch and sometimes commencement from the first complete orbit north bound equator crossing is counted.

A further complication arises from the fact that the earlier circular orbiting satellites were incremented by a factor of one, each time the satellite crossed the equator on the ascending north bound pass. On the later elliptical orbiters, this is no longer necessarily true, as the orbit number may increase by one each time that the satellite passes through perigee, the lowest point to earth of the orbiting craft. This perigee point swings from the southernmost extreme to the northernmost extreme with time, very slowly in the case of OSCARs 10 and 13, and relatively quickly in the case of FUJI-OSCAR-20.

Thus, dependent upon the way in which your computer is programmed, e.g. for equator crossing or perigee point, and the orbit number it is supplied with from the Keplerian elements or reference crossing, so your orbit number supplied will vary. It thus can become rather confusing when a station makes schedules for a given orbit number, or when controllers predict happenings and changes referenced to orbit 'n' when that number is not common to all users.

It is not a serious problem, and can easily be overcome by stating the activity for a given labelled UTC time and date, which would be universally understood were it not for the added complications of BST versus GMT and international date lines!

MIR

The MIR cosmonauts Alexander Viktorenko and Alexander Serebrov took a trip on the 'space bikes' in February. It was thought that they might be attending to the matter of the earlier, adjacent SALYUT-7s space station's rapidly decaying orbit.

It was assumed that they might have managed to re-fuel the motor or had arranged to mate a Progress that would either enable SALYUT-7 to be boosted to a higher orbit, or, alternatively, to allow a retro-firing that would permit the large, currently unmanned, station to safely re-enter earth's atmosphere under command control.

As yet, no orbital changes have be seen, other than those exaggerated drag factors brought about by atmospheric expansion during solar highs. As far as is known, they did not enter the decaying SALYUT-7. Perhaps in about six months time, when the first space station approaches re-entry, we may see the results. The big BURAN 'shuttle' will not be ready in time to return SALYUT-7 to earth as first thought, as the escape system has yet to be finalised, so a very bright meteor may result when the big orbiter, plus its attached module finally burns out.

After their five month stay the Alex pair came back to earth on Monday February 19, having been joined on February 11 by Alexander Balandin and Anatoly Solvyov, who have taken over as the sixth crew in the four years of almost continuous manned operation.

Whilst the Alex pair were said as being 'not so keen on amateur radio' and were undoubtedly very busy with a large work load, it is to be hoped that the new crew, Anatoly , U6MIR, and Alexander, U7MIR, will have a little more time available to come up and make some 144MHz f.m. QSOs with their fellow earth amateurs. They obviously have the enthusiasm, and have already made a number of QSOs using their new transceiver on 145.500MHz (S20) and 145.500MHz (S22), having been heard by **Rob Mannion G3XFD**, while he was driving home from the *PW* editorial office one evening in March.

Leonid Labutin UA3CR, reports that as from March 6 this year, U6 and U7MIR will be intermittently active for a while after 2100 Moscow time (1800UTC) during weekday evenings, and at any time during the 0500-2100UTC time slot on Saturdays and Sundays. As the passes for the spacecraft cannot be predicted for long periods ahead, due to regularly planned orbital changes by the crew, it is best to listen to the AMSAT nets for topical information on passes over your area.

QSL cards for early MIR QSOs are now arriving direct from UW3AX. Fig. 3 is that for a 1416UTC December 17 QSO made by U2MIR with G3IOR, received direct from UW3AX in January. More recently, similar direct QSLs have been received by **Eric Clarke G6CSX** of Chichester, and **Ray Gathergood G4LUA** of Wymondham, Norfolk, who made QSOs with Alex Volkov U4MIR in February this year on 145.550MHz.

If you are fortunate enough to work the new crew, send a card via the bureau, or via Boris Stepanov, UW3AX, Box 679, Moscow 107207, USSR, with an s.a.e. and a few IRCs.

Finally, plans are now being made to attempt the first amateur space station-to-space station QSO between MIR and the STS-35 shuttle mission planned to orbit from 9 May 1990, with windows for mutual visibility now under investigation.

```
SM5BVF>GM4IHJ,Lusat-1*<C C P>
+++CONNECTED TO SM5BVF via Lusat-1
Hi name is John
Hello name is Henry
73 from GM
QTH near Stockholm JO89VL
tnx and 73 John>
OK fine Henry 73 must do some tests
BYEBYE
cmd: d DISCONNECTED (I disc)
```

```
N4HY>GM4IHJ,Lusat-1*<C C P>
+++CONNECTED TO N4HY via Lusat-1
Hello John this is Bob
Hi from Scotland
Hello this is great
Gotta check the batteries just
wanted to say hi
Yep good copy despite snow
BYE
+++DISCONNECTED (he disc)
```

Fig. 2

Back-Scatter

Propagation

Reports to
Ron Ham
Faraday
Greyfriars, Storrington, West Sussex RH20 4HE

Sunspot Cycle 22

Over the years **Cmdr. Henry Hatfield** (Sevenoaks) has gathered a comprehensive set of solar records derived from the observations that he made optically, through his spectrohelioscope and by radio, with telescopes operating at 136 and 1297MHz. **Neil Clarke G0CAS** (Ferrybridge) has given readers the benefit of his computer records showing the daily variations of the solar flux compared with changes in the earth's magnetic field. Therefore, it is important to begin this time with the current opinions of these two experienced observers about the present sunspot cycle.

"I think that there is much evidence now to indicate that the high activity we saw last spring and summer has declined. My hunch is that either we are over the 'maximum', or that it will be a 'double maximum'," said Henry. "For the first time in this cycle the smoothed sunspot number has fallen, it dropped from 158.0 for July 1989 to 157.2 for August 1989," wrote Neil and continued, "This may not be the peak for cycle 22, it could start to rise again but I think that if it did climb again it would not get much higher than the present peak." The photograph of the 'angry' sun, Fig. 1, taken at 1612 last August 31 is one of many that Henry took during the summer of 1989.

Fig. 1

Solar Reports

In February 1990, **Ron Livesey** (Edinburgh), using his projection apparatus, observed 5 active areas on the sun's disc on the 21st, 6 on the 3rd, 7 on the 23rd, 8 on the 1st and 26th, 10 on the 27th and 13 on the 25th. Neil Clarke tells me that the mean sunspot number for the month was 128.4 and points out the high level of solar flux shown on his print-out, Fig. 2, between the 18th and 28th. **Ern Warwick** (Plymouth) heard fluctuations in the background noise on 28MHz at 1230 on the 25th and between 1300 and 1400 on the 26th and, not surprisingly, he reports fadeouts at 1130 on the 25th.

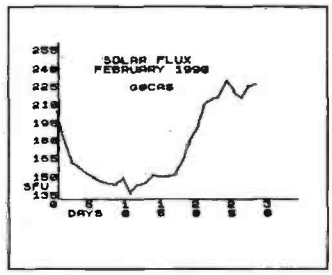

Fig. 2

During March, **Patrick Moore** (Selsey) observed the sun as often as clear skies permitted and kindly sent the drawings which he made, with his special solar apparatus, of the sunspot positions at 1130 on the 22nd, Fig. 3, 1105 on the 25th, Fig. 4, 1250 on the 26th, Fig 5 and 0910 on the 28th, Fig. 6. Henry Hatfield located the information shown in Table 1. In Bristol, **Ted Waring** counted 20 sunspots on March 18 and 48 on the 22nd, Ern Warwick reported fadeouts on the 1st and solar noise at 1115 on the 10th and in Storrington, **Fred Pallant G3RNM** logged a high level of noise at 1100 on the 21st.

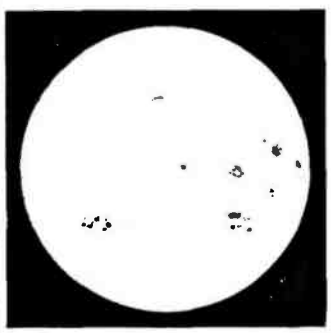

Fig. 3

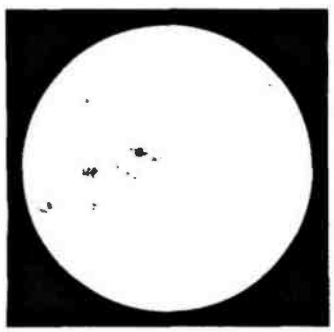

Fig. 4

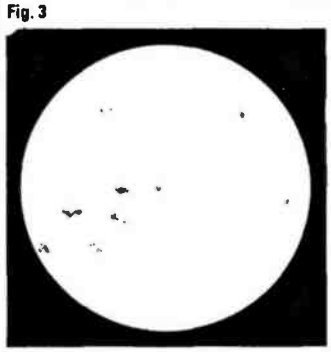

Fig. 5

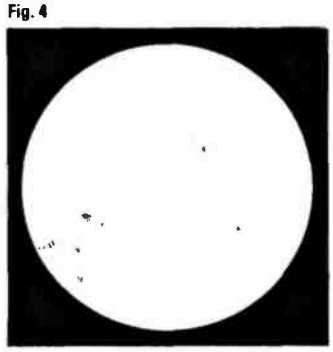

Fig. 6

Auroral

"There has been a lull in the aurora since the turn of the year but in February magnetometers and visual observers saw an upturn of activity," wrote Ron Livesey, the auroral co-ordinator for the British Astronomical Association and continued, "It used to be said that the number of observers on a reporting night might be an index of activity. It is good to record that we now have so many keen, active observers that there need only be a sensation of auroral light and somebody spots it." All good stuff Ron and long may there be co-operation between the optical and radio observers. By the end of February Ron was receiving reports of 'glow or unspecified form' seen from observers in Alness on February 1, Wick on the 14th, Morpeth on the 20th, Cornwall on the 24th, Kirkwall on the 25th and St. Andrews on the 27th, 'homogenious arc or band' from Central Scotland on the 8th, Edinburgh on the 13th, Worcester on the 15th, Halifax (Nova Scotia) on the 18th and Central Scotland on the 20th, 'rayed arc or band' from Wick on the 19th, 'rays or ray bundles' from Morpeth on the 15th and North Scotland on the 20th and 24th, 'active forms, pulsating or flickering' from Shetland on the 7th, North Scotland on the 13th, Shetland on the 16th and Wick and Kirkwall on the 18th and 19th, respectively and 'coronal structures' from North Scotland on the 15th and Shetland on the 20th.

That 'raspy', 'ghostly' and 'watery' effect that aurora has on terrestrial radio signals caused was observed by **Doug Smillie** (Wishaw) on February 4 and 7 and by **Tony Hopwood** (Worcester) during the afternoons of days 15, 23 and 26. "I am very interested in the watery pre-auroral c.w. signals on 3.5 and 7MHz we hear. I recently had a report "599 but auroral" on 7MHz from Sweden. I too give auroral reports on l.f. - why not? If one recognises the tone it is relevant to report, the other chap may be a VHF'er too and pleased to know," wrote **Angie Sitton G0HGA** (Stevenage) on March 27. Angie currently uses her Ten Tec Century 21 with an untuned long wire antenna because her vertical was a victim of the January 25 gales. She was enjoying a 599 contact with a station in Texas when the wind bent it to 45°.

Angie is active on c.w. only on all bands from 3.5 to 28MHz, and has a special interest in the propagation of radio waves, especially under tone-A conditions. History has shown that the radio observations from many enthusiasts, like Angie, have greatly advanced our knowledge of the auroral events which occur during the hours of daylight. Without such reports, these manifestations would have passed by unseen and unrecorded.

Magnetic

The various magnetometers used by **Gary Hawkins** (Bristol), Tony Hopwood, Ron Livesey, **Dave Pettitt** (Carlisle) and Doug Smillie, between them, recorded magnetic 'storm' conditions on February 12, 15, 16 and 24 and Neil Clarke's report emphasises the peaks of 46 on the 16th and 34 on the 23rd as displayed on his chart of the Ap index, Fig. 7.

Ionosphere 'F2'

From his home in Meerut, India, **Lt. Col. Rana Roy** received smeary and distorted television pictures on Ch. E2 (48.25MHz) and/or Ch. R1 (49.75MHz), via disturbances to the 'F2' region of the ionosphere on December 15, 17, 21, 23 and 24 and January 11 and 13. The source of some such pictures were unidentifiable but others gave clues of coming from China, Malaysia and the USSR. A typical entry in Rana's log began at 0800 on December 17, when he found a 525-line 'rolling' picture on Ch. A2 (55.25MHz) which he corrected by adjusting the vertical-hold control. "The script appeared to be S.E. Asian. Probably Vietnam" he wrote. Around 0810, he added 'TV3' from Malaysia on Ch. E2 and remarked, "Pictures were fairly clear considering that this was an 'F2' reception. Pictures faded away at 0850."

28MHz

Firstly my thanks to the 10 Metre FM Group for a regular copy of their newsletter and their latest issue reports that, from Southern England and mainly mobile, **G0DWZ**, **G0ENJ** and **G4ADO**, between them, made contact during January and February with stations in Azores, Canada, Finland, Greece, Hungary, Iceland, Jamacia, Japan, Malta, four call areas of the USA, the USSR and Yugoslavia. The group has around 150 members and readers wishing to know more about their work should send an s.a.e. to the membership secretary, at 9 Highlands Road, Portslade, Sussex BN41 2BN.

Propagation Beacons

As usual my thanks to **Mark Appleby G4XII** (Scarborough), **Chris van den Berg** (The Hague), Henry Hatfield, **John Levesley G0HJL** (Bransgore), **Greg Lovelock G3III** (Shipston-on-Stour), **Ted**

Date	Groups	Filaments	Quiescent Prominences	Remarks
02.03.90	4	21	7	at 1235
03.03.90	3	15	8	at 1123
12.03.90	1	17	11	plus a large loop filament in the north-west quadrant with a bandwidth of 1 Angstrom at 1235
17.03.90	2	23	12	long quiescent filament near the south-west limb at 1050
18.03.90	5	26	12	at 1225
20.03.90	3	21	3	at 1145
29.03.90	4	21	6	at 1120

Table 1

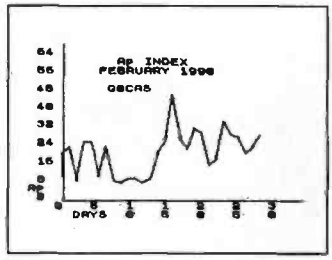

Fig. 7

Owen (Maldon), Fred Pallant, Ted Waring and Ern Warwick for their detailed 28MHz beacon logs from which I compiled the chart in Fig. 9.

Between February 25 and March 23, Ern Warwick received signals almost daily from PY2AMI (Brazil) on 24.931MHz, OH2B (Finland) and ZS6DN/B (South Africa) on 14.100MHz and DK0WCY (Germany) on 10.144MHz and less frequently from IK6BAK (Italy) on 24.915MHz, JA2IGY (Japan), KH6O/B (Hawaii) and 4X6TU/B (Israel) on 14.100MHz. Ern also heard PY2AMI on 18.100MHz on March 2, 16, 20 and 22.

Tropospheric

The slightly rounded atmospheric pressure readings for this period, Fig. 8, were taken at noon and midnight from the Short and Mason barograph installed at my home in Sussex. Although the pressure, throughout March was high and fluctuating mainly above 30.1in (1019mb) there was surprisingly few tropospheric openings. However, for the 17th, **George Garden** (Edinburgh) wrote,

"The weather map showed a high pressure of 1042mb (30.7in) over Europe with a good bit of the ridge affecting much of Scotland & UK," so, having this in mind, he drove to one of his favourite band II and TV DXing spots, high on Cairn O' Mounth and, using his car radio around 1500, received a fluctuating signal from BBC Radio York. "It was very strong while it lasted," said George, who returned there around 1400 on the 31st when conditions again looked right for DX as another spell of very high pressure was rapidly ending. This time, which he cannot do often from this site, George logged strong signals from Radios Cumbria and York and TFM which is a part of IBA Radio Tees and at 0930, prior to climbing the hill, from his home in Laurencekirk, he logged IRN Radio Borders "at phenomenal strength", Clyde 1 FM from Black Hill and Radio Tay from their Dundee transmitter. The previous day, at 1600, as conditions began to improve, I received a weak picture from France (Canal+) on Ch. L5 (176MHz), using my Yoko TVC8M receiver with its own rod antenna, while my car was parked near Ardingly in East Sussex and later, from home, with my ex-military R216 and chimney dipole, I added a picture from Belgium (RTBF) on Ch. E8 (196.25MHz) and BBC Radio WM from Birmingham in Band II.

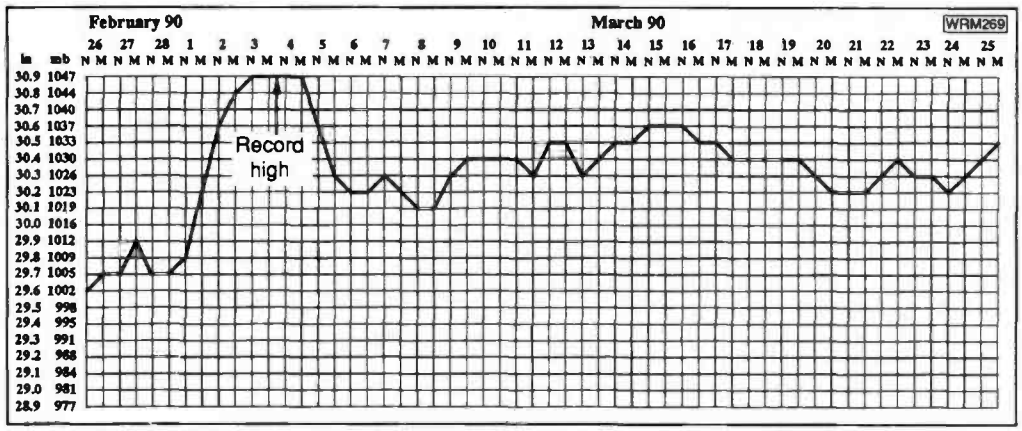

Fig 8

Beacon	Feb 26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mar 15	16	17	18	19	20	21	22	23	24
AL7GQ																		X									
DF0AAB	X	X	X	X	X	X	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X	X		
DK0TEN					X																						
DL0IGI	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	
EA3JA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
HG5GEW		X	X	X	X	X	X	X	X				X														
IY4M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X				
KA1NSV											X	X	X	X	X			X		X	X		X				
KB4UPI	X		X	X	X	X				X	X			X						X	X						
KC4DPC	X	X	X	X	X	X	X	X		X	X	X	X	X	X			X	X	X	X	X	X				
KD4EC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X		X				
KE2DI	X		X	X	X	X	X	X	X	X	X	X	X	X	X			X		X	X						
KE5GY	X		X	X	X	X	X	X		X	X	X	X	X	X					X	X						
KF4MS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X		X	X	X			
KJ4X	X	X	X	X	X	X	X	X		X	X	X	X	X							X		X				
KW7Y		X		X	X	X	X		X																		
LA5TEN					X														X								
LU1UG	X			X	X	X	X		X		X	X	X	X													
NX20/B	X	X	X	X	X	X	X	X		X	X	X	X	X	X			X		X	X		X				
OH2TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	
PY2AMI	X	X	X	X	X		X	X	X				X	X	X			X	X	X	X		X	X			
SK5TEN					X		X																				
VE1MUF										X					X				X								
VE2HOT			X	X	X	X	X			X	X	X	X	X	X				X	X	X		X				
VE3TEN	X		X		X	X	X			X	X	X	X	X	X				X	X	X		X				
VE6YF					X	X	X													X							
VK2RSY			X			X	X		X			X	X	X	X			X	X	X	X	X	X		X	X	
VK5WI										X	X	X	X						X	X	X	X	X		X		
VK6RWA			X				X	X			X	X	X		X				X		X	X	X	X		X	
WA4DJS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X			
WB4JHS					X	X					X			X									X				
WC8E	X	X		X	X	X	X	X		X	X	X	X	X	X			X	X	X	X		X				
W3SV	X		X	X	X	X	X	X		X	X	X	X	X	X			X		X	X		X				
W3VD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X				
W7JPI			X		X							X	X	X							X						
W8UR			X		X			X				X			X												
W9UXO	X		X	X	X	X	X	X			X	X	X	X	X			X	X	X	X	X	X				
YO2KHP	X	X	X	X	X	X	X	X	X			X	X	X	X		X		X								
ZL2MHF													X						X				X	X			
ZS1LA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
ZS6PW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
Z21ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4N3ZHK							X																				
5Z4ERR						X	X							X							X	X	X	X	X	X	
																						X	X				

Fig 9

Back-Scatter

Broadcast Round-up

Reports to
Peter Shaw

The past month has been a reasonably quiet time in international broadcasting, with little of consequence occurring, with the exception of one or two name changes by radio stations.

Radio Bucharest is no more, having been replaced by Radio Romania International (a title which does not seem to flow off the tongue quite as easily). The change happened during the first week of March. Following the Namibian independence, Radio South West Africa Radio Namibia on March 1.

The Federal Communications Commission (FCC) in Washington DC, the regulatory body for broadcasting in the United States, has reduced from four to two the number of seasonal frequency changes for short wave broadcasting. From now on, changes will last six months from March and September only, displacing the May and November changes. It has always struck me that the changes at the end of September were rather uneccessary when followed six weeks later by the November alterations, so perhaps this will be adopted by other administrations as well.

Last month I reported, somewhat prematurely it seems, on the cessation of German language transmissions from Radio Canada International. The service has been granted a reprieve although this means that the new Arabic news service for the Middle East due to have started on April 2 has been delayed indefinitely.

The Voice of America was also reported as being subject to cuts which would have resulted in six of its language services being taken off the air. A review has taken place (as suggested in this column) and now all six languages, including Tajik for the Soviet Union, will continue. Funds will be diverted from other areas of the US Information Agency which is responsible for VOA.

With a continuing war of words between Lithuania and the Soviet Union following Lithuania's declaration of independence, the international service of Radio Vilnius disappeared from the airwaves in mid-March. In their place were programmes from Radio Moscow in Russian and English, on the short wave frequencies scheduled for the the Lithuanian overseas broadcasts.

All short wave frequencies used by Radio Vilnius, with the exception of the 49 metre band wavelength of 6.10MHz, are broadcast from transmitters across the USSR. The station's broadcasts are part of a complex radio transmission system that relays programmes from other republics, as well as broadcasts from Radio Moscow's many services.

The Lithuanian authorities lodged a protest with the Ministry of Communications of the USSR, and after a few days received a reply which suggested that an "error had occurred whilst stand-by transmitters were being switched over for the shift to summer time and operating frequencies...were being changed".

Meanwhile, Lithuanian Radio's domestic service has now started 24-hour transmissions on its m.f. channels of 666kHz and 1.557MHz.

The North American service of Radio Moscow has for many years had a DX programme but this has come to an end, for the time being at least. It seems that lack of staff in Moscow is responsible.

European Stations

All times UTC (=GMT)

Radio Netherlands has dropped its early morning broadcast to the Middle east, which leaves their schedule looking like this:

0730 to New Zealand on 9.715 & 9.63MHz (via Bonaire)

0830 to New Zealand on 9.77MHz (via Bonaire (not Sunday)

0830 to SE Asia on 21.485 & 17.575MHz (via Madagascar)

1030 to Australia on 11.89 & 6.02MHz (via Bonaire)

1130 to SE Asia on 21.52*, 21.48 & 17.575MHz (via Madagascar)

1130 to Europe on 9.715* & 5.955MHz

1430 to SW Asia/Europeon 17.605*, 13.77*, 5.955* & 15.15MHz

1630 to S&E Africa on 15.57 & 6.02MHz (via Madagascar)

1830 to S&C Africa on 21.685, 17.605 (via Bonaire) 15.56 & 6.02MHz (via Madagascar)

2030 to W.Africa on 15.56*, 13.70* & 6.02MHz*

0030 to East N America on 11.74, 6.165 (via Bonaire) & 6.02MHz*

0330 to West N. America 9.59 & 6.165MHz (via Bonaire)

Frequencies marked * are from the Flevo transmitter in the Netherlands, all others are from the relay stations indicated.

The Italian Radio Relay Service continues to broadcast on 9.86MHz on Sundays from 0800. Tests can also be heard from time to time on Sunday afternoons on 21.50MHz.

The summer schedule for Radio Sweden in English to Europe:

1530 on 21.655MHz
1700 on 9.615, 6.065 & 1.179MHz
2100 on 11.705, 9.655 & 1.179MHz
2230 on 1.79MHz

African and Middle Eastern Stations

Radio Parakou in Benin has been noted in French around 0600 on 5.025MHz.

The religious broadcaster ELWA in Monrovia, Liberia, operates in English, French and vernaculars to Africa and the Middle East:

0545-0700 Arabic to Middle East on 11.955MHz

0630-1000 English to Africa on 11.83MHz (Sat/Sun only)

0700-0815 Arabic to Middle East on 11.955MHz

830-1600 French to Africa on 9.55MHz (Sat/Sun only)

1200-1330 French Africa on 9.55MHz

1245-1600 English to Africa on 11.83MHz (Sunday only)

1600-2205 English to Africa on 11.83MHz

1600-2045 French to Africa on 6.07MHz

The Voice of the UAE from Abu Dhabi in English is heard daily at 2200 until 2400 on 13.605, 11.985 and 9.60MHz, with a relay of the Capital Radio local English language service on from Abu Dhabi between 2230 and 2300.

Asia, Pacific and the Americas

At some times in the year the Northern Territory stations on 2MHz from Australia can be heard in the early evening. The station in Katherine on 2.485MHz has now been noted on 5.025MHz at 2130.

Radio Bangladesh transmits English to Europe at 0800 on 17.580 and 15.195MHz for 30 minutes and at 1230 on 17.85 and 15.04MHz. During the evening there is a 45 minute transmission at 1815 on 15.04 and 11.86MHz.

HCJB in Quito, Ecuador is making some changes in May. There will be a general rationalisation of English language programmes as a result of staff shortages, and all programmes produced in Quito will be consolidated into a 60 minute block called Studio 9. Programmes during May in the *Dateline 90* slot include on May 14 the programme looks at 'Russia - Its Present and Its Future'; May 21 has a discussion on International Literacy Year; June 11 looks at 'Rain Forest, the Endangered Resource'.

HCJB can be heard in Europe at 0730 on 9.585 and 9.61MHz and at 1900 on 21.47, 15.27 and 9.61MHz.

The Honduran station Radio Landia in Cumaygua has been noted during the early morning, usually until 0330 sign-off on 4.964MHz. On 4.82MHz, La Voz Evangelica has been heard with reasonable reception until 2400 or thereabouts.

Radio New Zealand is offering reasonable reception at 1700 on 17.68MHz, and during periods of good reception conditions, on the same frequency at 0500.

The Voice of Vietnam has resumed use of its 19 metre band channel of 15.01MHz for the summer. English is heard to Europe at 1800, 1900, 2030, and 2330 for 30 minutes, with 9.84MHz as an alternative.

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
71 Falcutt Way
Northampton NN28PH

SSTV on VHF and HF

First of all a nice long letter from **Mike Drew GW0HWK** on the subject of slow-scan. He is pleased to see that ATV news is now carried in the 'Back-Scatter' section of '*Practical Wireless*' and is thus reaching a wider audience. He writes: "I have been working SSTV from my home location for several years and have had very good results with a Spectrum 48 using the G1FTU program, both on 144MHz f.m. and on h.f.. Although the Spectrum is very limited in grey scales, most people who have not used one are very surprised at the results gained from colour TX high definition modes when the Spectrum is used for RX. The colour TX from the specification is not too bad either.

Mike says, "My home location is 5 miles north-west of Wrexham at 1050ft. a.s.l. on the Clwydian Mountains. Under normal conditions on 144MHz I can work stations from N. Lancs., Leeds, parts of S. Yorks., Birmingham and Hereford and Worcester. Obviously enhanced conditions allow working of all the south and east coast and the near Continent. West/south-west is difficult, as I have the mountains behind me. I also operate from my works location near Ruthin (Clwyd Valley). If you are wondering, I work at the North Wales College of Agriculture as a lecturer and am also the head warden. So I am /P on a rota basis some evenings and weekends.

"I have noticed over the last few years all the new modes that have come for the Robot-type machines have tried to improve the quality of the pictures, by (1) going into slower speeds and (2) using new higher definition modes. Great, but what about the s.w.l.s etc., that have only a passing interest in SSTV and cannot afford the dedicated equipment? This is a problem several of us in the Rhyl and District ARC have discussed on many occasions. (I am the secretary of the club). There are six or seven members and several s.w.l.s in the Rhyl area who enjoy watching the TX between us in the valley on 144MHz f.m.

Back-Scatter

when I am /P at work.

"With this problem in mind, and as many people not now being able to use their limited systems to receive the new modes, I have asked on 144MHz and h.f. as many people as possible, if they or their SWL friends would be interested in a lot more B&W on the h.f. and/or v.h.f. bands. The result was a resounding YES. Owing to that fact, you may be interested in the following details about the 'new' Black and White Net that I have started up on 3.5MHz.

Day : SUNDAY, Time : 1500 GMT, Frequency: 3.734+/- QRM Main TX modes are 8 and 82 second B&W - 8 frames 8 seconds, then a pause and 1 frame of that picture in 82 second mode.

"The other main participant, and the person who will run the net if I am not about, is Pam GW0LAL, QTHR, Rhyl. Pam uses a Robot 1200C with all new modes fitted. Reception reports, comments on the type of picture or speeds that would like to be seen in B&W, can be sent to me at the following callbook address, enclosing an s.a.e. if a reply is required.: Mr M.P.Drew, GW0HWK The Warden's Flat, Llysfasi College of Agriculture, Ruthin, Clwyd, North Wales LL15 2LB.

"Pam and I started the net in early December '88, and have had several people call in. I have also had various reports from v.h.f. contacts of the 3.5MHz net. Obviously we would like to get more people involved, especially the s.w.l.s. After all, they could well be the ATV amateurs of the future.

"Now we come to v.h.f. activity, which unfortunately in the NW of England and North Wales is rather lacking. This is mainly due to a few ill-mannered people (some licensed - who use 144.500 as an open channel, and as soon as anyone they can hear comes on with TV, they cause deliberate QRM, even though they may have been speaking on the frequency for most of the evening).

This problem and the bad language that has sometimes gone with it, has driven away the very few who used the frequency for SSTV calling and working. In some areas of the country, as you have said in your column, there is good activity with no problems from the other locals, because they know the SSTV nets exist. I have worked many people from the North York Moors, to the south coast and listened to and watched many more. But I only joined in, or put a call out myself, if the frequency was not occupied when challenged or put up with the abuse, etc. when it suddenly became busy.

"I may well be on my soap box, but to find that the crowded 144MHz band has a frequency used in this way, is rather annoying to say the least. It was nearly as annoying as hearing the RSGB newscaster request, in a bulletin before Christmas, that 'operators should stay clear of 145.300MHz as it is the RTTY frequency'. Not much activity up here - I wish there was, as I enjoy a chat on the keyboard as well. I am only too willing to start up a 144MHz SSTV net (ignoring the QRM. They'll get the message eventually!) if there were a few more about who monitor the frequency and will stick with it, even though we might suffer to start with.

"Perhaps Andy, a comment in your column suggesting a regular weekly evening for all interested in 144MHz f.m. SSTV, will get it off the ground and beat our QRM problems once and for all. Who knows? I have tried, but it is difficult to work nobody, or someone who is 50+ miles away who you can work, until the problem starts that is!.

"My SSTV system is a Spectrum 48K (SAGA 1 Keyboard) with Opus Disk Drive as picture/program store. Pictures are digitised from a Romantic Robot Videoface using a Canon video camera and recorder.

By the way, here's a useful snippet of information that I recently received from Pam. If you are using the G1FTU program, you can get fairly good results when listening to what is known as 'Martin's New Mode' (72 second high definition) by going into 48 second 'Quasi'. The pictures I have seen, are quite acceptable considering the differences between the two modes."

430MHz Lives - Continued

I have another letter from North Wales, this time from **John Cronk GW3MEO**. John has been 'at it' for quite a while now, in fact since the days when r.f. receive amplification was virtually unknown on 430MHz and most people used diode mixers. Anyway, since moving to Prestatyn, he has re-activated his 430MHz gear and has hooked up with a local station, GW4VHP. John loaned him a receiver and antenna, and proved the gear was still functioning. Now it's down to generating a bit more activity and possibly tracking down GW3JGA on the air! John is also experimenting with 1296MHz equipment 'but on my lonesome'. It's a pity, he says that the repeaters are out of range.

Another who has set up afresh on 430MHz, is **Andy G8SUY** in Faversham. At the moment he has only 250mW at his disposal. He intends to bring this up to the 20 watt level soon, with the aid of a linear 'blue brick' module. Already with the QRP set-up he has managed to work Chris G4AYT at nearby Whitstable, achieving a P3 report. Faversham is quite well placed to work Essex, East Anglia and parts of the Midlands, and Andy looks forward to repeating the contacts he used to make in the 'good old days'.

News from YTV-Land

Clive G8EOZ has been busy trying to improve the receive side of GB3ET, the Emley Moor repeater, and his experiments show it is possible to improve reception considerably. His inspiration was an article in 'Der TV Amateur', the German ATV magazine, the idea being to use a 'gainy' preamplifier ahead of a satellite TV receiver. Several people are using these receivers because they already tune the 1296MHz ATV band without modification, but they may not be getting the best results. Clive found that most receivers perform best when driven really hard, at the same level as they would if connected to a satellite LNB (up to 5mV of signal).

Accordingly he robbed the post-mixer amplifier from a Grundig LNB and fitted it inside one of the little circuit boxes you can buy with a BNC connector at each end. This device, which is arranged to be line powered, now gives 30dB gain and performs a treat in conjunction with a Bradford-made 'Pace' receiver. So old satellite systems do have their uses and it might be worth asking your local installers if they have any dead equipment!

Apart from that, Clive is continuing work on GB3KT, the projected Kingston-upon-Hull TV repeater. Already constructed are a 200mW test transmitter and a caption generator with a sequencing message display. Other local news: G4YTV is now QRV on 430MHz at low power and is using an Icom power module to build a 20W PA. In Bridlington, G3PWN has built a 430MHz up-converter and has already received pictures on it. He is now constructing a transmitter for the band.

In the same town G3ZTR is assisting Clive in the construction of a water-cooled twin 2C39 tube power amplifier for 1.3GHz contest use, so watch their results once they start using this! In fact they're not doing too badly already, having found a secret mountain-top with excellent take-off. Clive also notes that activity from his QTH is a little restricted at the moment after the January gales ripped the teeth out his rotator's gearing, even though his tower was fully down. He has also acquired an Amiga computer for video work.

Sign-off

Well, it's interesting to know that SSTV is still practised in some parts of the world. And once more that's all for this time. Please let me have all your reports in good time for the next article and send them to address above. Thanks.

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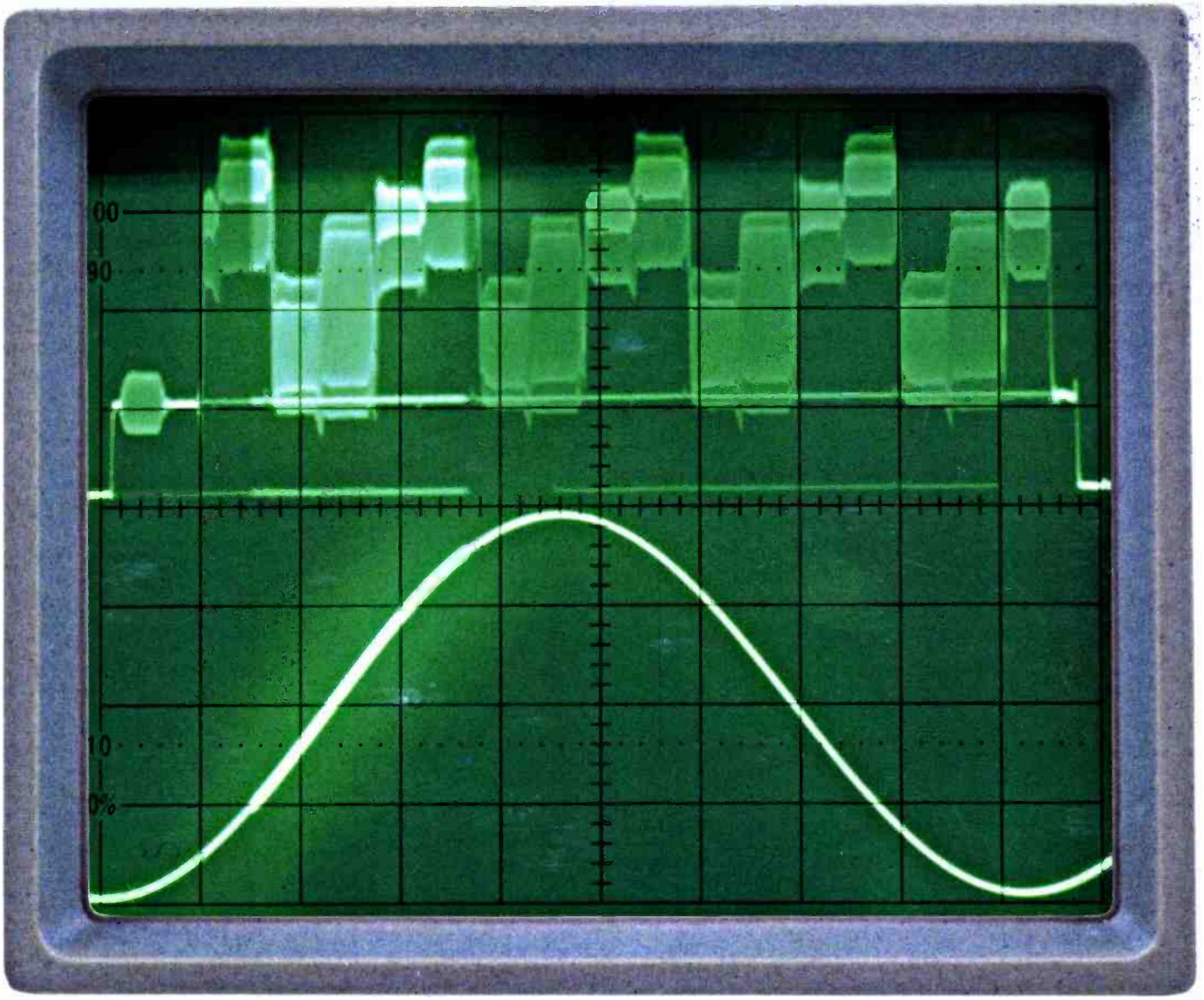

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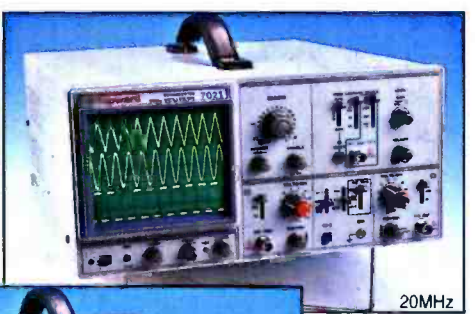

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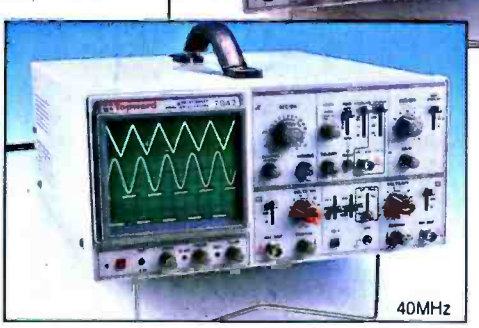

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