DECEMBER 1989 £1.30

Practical Wireless

ISSN 0141-0857

The Radio Magazine

BATTERIES NOT INCLUDED

ALINCO DJ-100E 144MHz PORTABLE TRANSCEIVER REVIEWED

VISUAL REPEATER ANTI-TIME-OUT PROJECT

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

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Whether you're a beginner or a veteran, it's a great way to start. And a great way to go.

DX ready. The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30MHz.

And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

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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NEXT MONTH

Into the 1990s with Practical Wireless!

PRACTICAL WIRELESS PW

PracticalWireless...
known to all of its friends as *PW* launches into the future with a strong new editorial team. New logo, new features, new projects, new ideas but not leaving behind many old favourites.

★ ***Interested in Ten Metres ?***
What goes on up there?...Find out in our new special feature for everything on Ten.

★ ***Home brewing your style?***
PW kicks off into the new decade with new ideas and lots of interesting constructional projects. Amateur radio ideas, transmitting projects, short-wave receiving, test gear and ancilliary equipment.
We show you how to build them in *PW!*
Regular "state of the art" features. Read about the latest technology.

★ ***Favourites such as...***
"Antenna Clinic", "Understanding Circuit Diagrams", "Swaps Page".
Famous faces, famous calls...see them all along with the new features, in *PW.*

★ ***Prize puzzle competitions every month.***
Have a go and win a prize before the rest of the family do! Crosswords, wordsearch... providing a lot of fun and great prizes!
More pages, better, brighter paper along with a new crisp presentation style provide, at £1.60, the best value-for-money radio communications magazine for the radio enthusiast of the present and the future.
★ ***TUNE TO THE FUTURE WITH PW - INTO THE 90s!***

DECEMBER 1989
(ON SALE NOVEMBER 9)
VOL. 65
NO. 12
ISSUE 993

THIS MONTH

Regular Features

NEW STYLE PW on sale 14 Dec

Editorial and Advertisement Offices:
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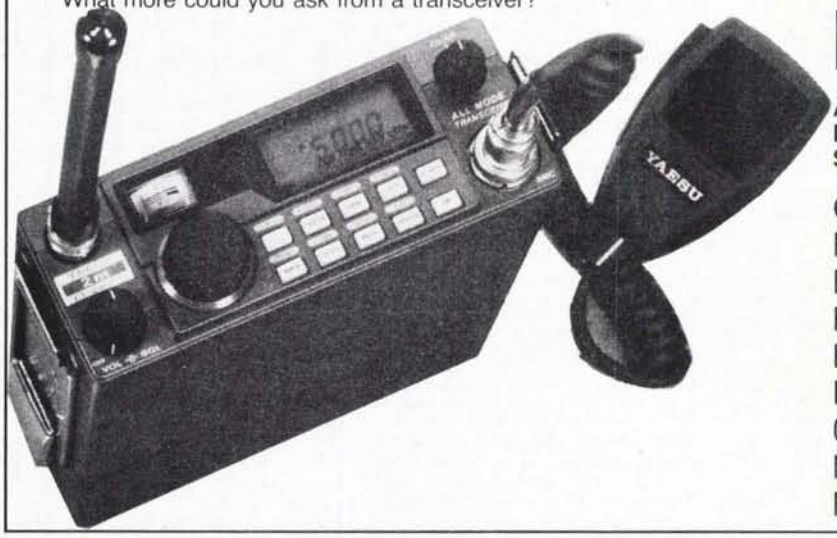

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NEW! DIGITAL READOUT!

The new HOWES DFD5 kit helps give that "professional" look to your home-brew receiver, transmitter or transceiver project. However, the most important feature of a digital frequency display, is that it enables more accurate netting to standard working frequencies, the QRP calling frequency for example. If you are tuned "spot on" then your CQ call is more likely to be heard by those monitoring the frequency. Listeners will also find the DFD5 with its 100Hz resolution, a boon for finding the fixed frequency stations with precision, and repeatability. If you know the frequency you are listening to accurately, you can always retune to the same spot.

- ★ Five digit .43" high LED display.
- ★ Covers 1 to 30MHz without prescaling.
- ★ Connects directly to all HOWES VFOs, and with the CBA2 buffer amplifier, can be connected to all HOWES receivers except TRF3.
- ★ Assembly is straightforward, but neat soldering is required!

HOWES kits have always offered a way of building excellent equipment at a reasonable cost, now with the DFD5 digital frequency display you can add the main visual feature of factory built gear, to your home-brew station. It will look the "bee's knees" with a DFD5!

DFD5 kit: £39.90 **Assembled PCBs: £59.90**

HOWES CBA2 Buffer Amplifier.
A counter circuit can not be connected directly to the oscillator stage of a receiver without chronic frequency pulling. The CBA2 buffer amplifier provides the isolation you need to avoid these problems, and so enables a digital readout to be used with all the direct conversion receivers in our range.

CBA2 kit: £5.80 **Assembled PCB: £8.90**

DXR10 10, 12 & 15M AMATEUR BAND RECEIVER.
This receiver kit is designed to enable you to enjoy long distance reception. SSB and CW stations can be heard from all corners of the globe on these bands, now that the sunspot level is high. You will hear almost as much with the DXR10 as with the most expensive sets. The performance for a simple receiver is amazing! Requires one 50pF tuning capacitor.

DXR10 kit: £24.90 **Assembled PCB: £36.90**

DcRx20 20M AMATEUR BAND RECEIVER.
A straighforward single band receiver kit, the DcRx20 has been the introduction to amateur radio for many beginners. It offers world-wide reception on the most popular long distance band. We have a companion transmitter (MXT20) for the licenced amateur, and this simple set can be expanded into a full transceiver if you wish. Two 50pF tuning capacitors (£1.50 each) are required. Receives SSB and CW stations. Versions of the DcRx are also available for 160, 80 and 40M amateur bands and also for the 5.45MHz HF airband.

DcRx kit: £15.60 **Assembled PCB: £21.50**

TRF3 SHORTWAVE BROADCAST RECEIVER.
The TRF3 will pick up stations from all over the world. It tunes from around 5.7 to 12.8MHz in three bands, covering most of the regular shortwave broadcasters. Plenty of audio output is available for loudspeaker or headphones, and it can operate with large or small antennas. This kit has been designed with the beginner in mind, and it makes an excellent introduction to shortwave listening. Requires one 50pF tuning capacitor.

TRF3 kit: £14.80 **Assembled PCB: £20.20**

AA2 ACTIVE ANTENNA AMPLIFIER.
Build your own miniature active antenna for long, medium and shortwave reception with our very popular AA2 kit. 6 or 8 feet of wire and the AA2 amplifier will give similar signal strengths to much larger conventional antennas. You can also make your miniature antenna rotatable to reduce interference - you can't do that with a long wire! If you are limited for antenna space, need a rotatable medium wave antenna, or simply need a compact portable antenna for holiday use, the AA2 can help.

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

ASL5 DUAL BANDWIDTH FILTER.
Add extra selectivity to your receiver with the HOWES ASL5 filter. Sharper roll-off for SSB and a 300Hz bandwidth CW filter give a very useful improvement with all the popular Japanese receivers/transceivers. Easy to build. Simply connects in line with your external 'speaker or 'phones, no mods to the radio are needed. Very worthwhile station accessory.

ASL5 kit: £14.90 **Assembled PCB: £22.50**

All **HOWES KITS** include a good quality Printed Circuit Board, with the parts locations screen printed on it for easy, accurate assembly. All board mounted components are supplied, as are full, clear instructions. Sales and technical advice are available by 'phone during office hours. For specific product information sheets, or a copy of our free catalogue, please send an SAE.

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

73 de Dave G4KQH,
Technical Manager.

The QSL Carry On

Sir:

I am writing in reply to the letter "All about QSLing" in the October 1989 *Practical Wireless.*

I am a short wave listener of many years now. I wonder how many readers who are amateurs or listeners have experienced the thrill of receiving their first QSL card from some far off land or amateur. I also wonder how many have had that "sinking dejected" feeling after spending many hours tuning, many months waiting and many pounds invested for what? Nothing.

Amateur radio and short wave listening are not cheap hobbies these days. So come on amateurs and broadcast stations, let's have some replies. After all, you never know who is listening and when their services may be of use, as mentioned in "Brickbats" and the recent hurricane in the Caribbean proved.

D.J. Lawery
Poole

Sir:

By what divine right does D.J. Burton think that, by virtue of contributing to a couple of the smaller publications, he is qualified to vilify his fellow amateurs as he does in his rather paranoid letter? Any list of the sort suggested would accomplish nothing except give these people additional ego-trips.

In any case, no publisher would, for obvious reasons, print same. Those of us with possibly longer memories than Mr Burton will recall some years ago a similar self-appointed "policeman" had the same idea. I do not recall all the details, but the case certainly went to court, and the bruises, both financial and physical, were felt for some time.

Apart from the theft of IRCs, which is reprehensible, our mutual friend must bear in mind that nobody is under any obligation to reply to unsolicited communications in which he has no interest. In addition, those friends of mine who receive QSLs say that a large proportion are frankly so much waste paper. Especially those from some s.w.l.s who usually fail to give detailed information such as comparative signal reports compared with other stations. The attitude so often is "I have heard you once at S9, now you are a rotter as you do not send me a card".

Possibly, now that what was once amateur radio is becoming just another TV gain, those who must have something in print will be able to get this direct from their computers and the rest of us will be able to enjoy ourselves without the continual hassle over contests, cards, squares, countries, prefixes, islands, honour rolls, etc.

A.J. Hind
West Barnes

STAR LETTER
£10 TOKEN WINNER

Valve Memories

Sir:

Your correspondence reference "Bright Emitters" stirs memories and perhaps you may be amused by the following.

Just after the War, I visited a Post Office receiving station just outside Cupar in Fife. This was the eastern end of a transatlantic channel that was then kept as stand-by in case the cable took a dive.

The receiver room had dimensions akin to those of a BBC medium wave transmitter hall and, right down its exact centre, was a long line of unlit racks many of which apparently held a single enormous valve. Fresh from the Royal Navy, I fancied myself back in the alarming presence of six transmitters.

At the far end of the room one of the most beautiful creations I have met; bored shift engineers had constructed a transatlantic loop antenna that I could easily walk through - and did so several times!

The PO engineer muttered something about bright-emitters and filaments only, walked to wall and threw a jumbo-sized knife switch. As the valves came slowly to life the stygian gloom was transformed to the likeness of a modern colour TV studio and the temperature noticeably began to rise.

I have often wondered if, out there somewhere, a retired Post Office Engineer has his sideboard framed in a beautifully-constructed loop antenna?

K.H. Green
Tintagel

Sir:

Reference the article in *Practical Wireless*, October '89 "Go Anywhere Slim Jim Antenna for 430MHz" written by Tony Martin G4XBY.

May I respectfully point out that as the designer of the Slim Jim antenna (originally for the 144MHz band) and published in an earlier edition of *Practical Wireless*, that the antenna *has virtually NO directivity gain.*

Mr Martin is, I'm afraid, wrongfully claiming that his version of this antenna for 430MHz has a gain of 3dBd (d indicating gain over a dipole). Being in effect an "end-fed" folded dipole, the Slim Jim has a purely theoretical directivity gain in either omnidirectional (vertical) or cosine (horizontal) mode, of only, 0.08dBd. This is so small as to be not worth considering, even if obtained in practice.

Therefore in any performance specifications I have given for the original and "mechanically" different versions of the Slim Jim for 144MHz operation, and my 430MHz version as published in *Practical Wireless* March 1983 (repeated in *Wires and Waves*), the directivity gain has always been quoted as unity (0dBd).

I should also mention that if a 430MHz version of this antenna is mounted at the centre of a metal car roof, then maximum vertical angle radiation will be high, probably in the region of 30 degrees, as the car roof will behave as a quite efficient "ground-plane". The near "free-space" performance of the antenna, which would otherwise allow maximum vertical radiation to occur at nearly zero degrees, will be completely spoiled.

Maximum vertical radiation as high as 30 degrees represents a considerable loss of radiated r.f. power at angles nearly parallel to ground. A better, although not perfect performance, as found during field strength measurements and road trials of a 430MHz Slim Jim, would be obtained with the antenna "gutter mounted".

F.C.Judd G2BCX Norfolk

LETTERS TO THE EDITOR

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*.

NEWSDESK...*Compiled by G4LFM*

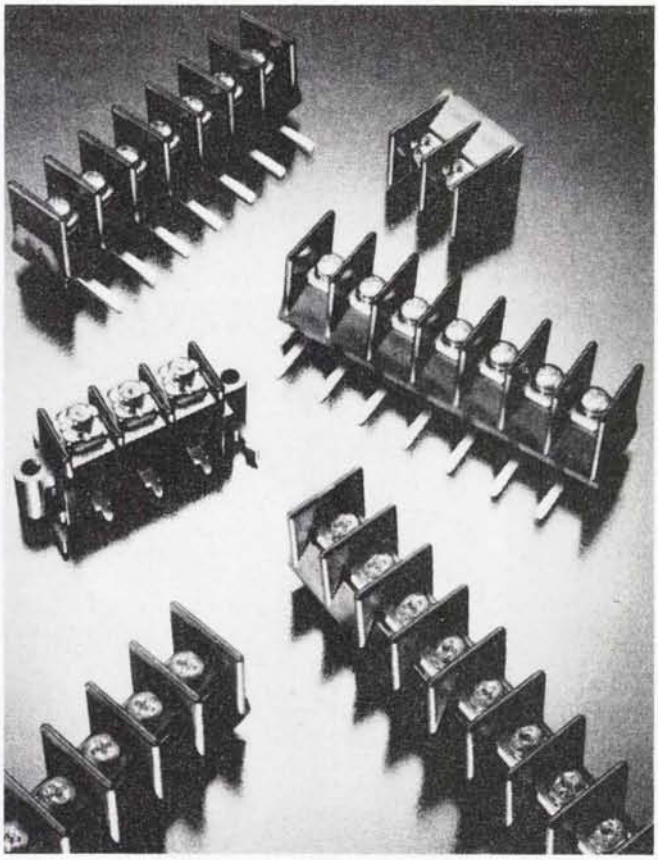
Terminal Blocks

A new range of UL/CSA approved p.c.b.-mounted terminal blocks is now available from Watts International Components Ltd., of Chichester.

These heavy duty PBS terminal blocks are rated at 15A and up to 250V and have an insulation resistance of 2kV. With M3 and M4 terminal sizes, they are available from 2- to 12-way, in either straight or right-angle terminals.

Applications include power supplies, alarm systems controls; indeed anywhere there is a high power termination requirement. Snap-fit clear plastic covers are also available as an option.

Watts International Ltd., No.4 Phillips Business Centre, Terminus Road, Chichester, West Sussex PO 19 2UL. Tel: (0243) 533479.



Radiophile

The Radiophile is now back under the sole editorship of its founder, Chas E Miller. A host of interesting features covering servicing, restoration, nostalgia and constructional projects will be appearing in the magazine. Existing subscribers will have their subscriptions honoured in full, but new UK subscriptions will cost £10. Full details from

The Radiophile, "Larkhill", Newport Road, Woodseaves, Stafford ST20 0NP.

Low-cost Iambic Keyer

The PEK-1 electronic keyer is assembled on a high quality CAD designed p.c.b. measuring only 74 x 61mm. This means it can be built into existing equipment or, with the addition of case and connectors, can form a stand-alone unit.

The keyer can be used with either single or twin paddles, and features dot and dash memories, a built-in speed control, sidetone output and low power consumption. Both solid state v.m.o.s. and relay output enable a wide range of transmitter keying options.

Priced at £22, the PEK-1 is available mail order from:

Proelectron, 35 Cromwell Road, Cheltenham GL52 5DN.

Vintage Wireless Swapmeet

The 8th Aerial Christmas Vintage Wireless Stall Sale and Swapmeet is to be held at Clarence House near Bristol on Sunday December 3.

A special feature will be a working display of vintage television sets and, of course, the usual Christmas Fare and refreshments!

Entrance is strictly by advance ticket - booking forms are available by sending an s.a.e. to:

Mrs D. Roe, 7 Ashdown Road, Portishead, Bristol BS20 8DP.

Can You Help?

Mr Rowe has been reading with great interest, the letters in your letters column about the old ST Radios. With his brother, he has been trying for quite some time to get information on the last radio made , **the ST Super**.

If you can help, contact him at: Mr E. Rowe, 11 Thorstone Drive, Irby, Wirral, Merseyside L61 4XR.

Could any reader please help with information on **how to receive SSTV** to an s.w.l. now turning after 20 years to this mode on the h,f, band. Derek Lawrence is using a Sony ICF-6700W and a Spectrum 128 with a RMS-3 program. He can find the signal, but cannot resolve it into a picture. Derek Lawrence. 145 Tudor Way, Dines Green, Worcester.

What is the **equation for converting metres into MHz and vice versa**. Kevin Langthorne used to have this equation in a computer program, but has sold the computer and the program has been lost. Can anyone help? Kevin Langthorne, 127 Blackfell Road, Blackfell, Washington, Tyne & Wear NE37 1JU.

Has anyone got a manual or circuit diagram of a **Pye Table Radio model PE340**? Photocopies would do, and all expenses will be met. Chris Buckhurst, 66 Corringham Road, Stanford-le-Hope, Essex SS17 0AE.

Mr Porritt is curious about **BERNE (sometimes pronounced BERNA) Radio**. He listens to Berne Maritime on a number of frequencies - 4.379, 8.784 - all messages seeming to involve ships in the Mediterranean. Its location is Berne Switzerland - 200 miles inland, why there? Is the transmitter up in the Alps? H. Porritt. 7 Birney Edge, Danas Hall, Ponteland NE20 9JJ.

Mr Levers is looking for a service manual/information on the **GEC HF Communications Receiver type RC410/R or RC411/R**. All costs will be paid. M. Levers "Waverley", Independent Hill, Alfreton, Derbys DE5 7DG.

In May 1983, Brookes Electronics Ltd advertised their **FDU7** - a frequency display unit to replace the dial on an FRG-7. Mr Whayman fitted this and until now it has been satisfactory. Now only the hundreds digit is indicating, erratically "0" or "9" with or without a signal input. He can't find Brookes Electronics any longer, can anyone help with either their address or how it works? J. Whayman. 95 Elizabeth Avenue, Little Chalfont, Amersham, Bucks HP6 6RS.

Peter Wessels would like to construct his own **spark transmitter and coherer detector**. Does anyone has construction details about these subjects, or does anyone know the titles of suitable books? He is also looking for a circuit diagram of a Novak valved receiver, probably from the 1950s. Peter Wessels PA3FLG, Middelstraat 20, Nieuw Beijerland, 3264-ZH Holland.

Newsdesk...*Compiled by G4LFM*

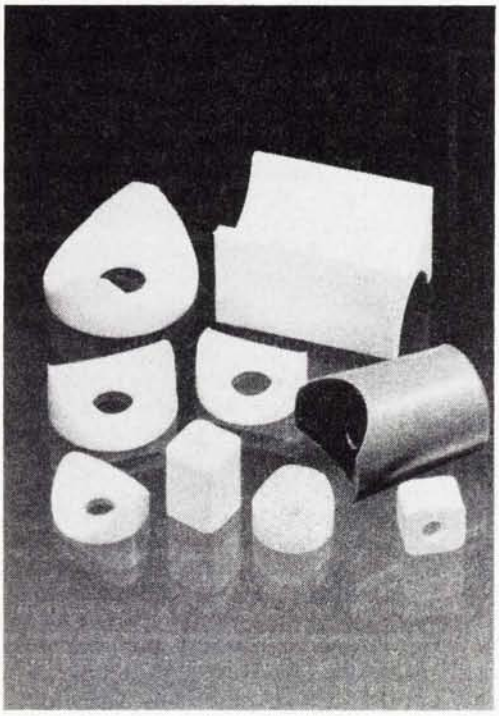
Knobs, Washers & Spacers

Moss Plastic Parts produce a range of over 60 different knobs as well as a range of white polypropylene dished washers and spacers.

There are round knobs with diameters as small as 3/8in and up to 1.25in. Like the other shapes supplied they have either a part drilled hole or a through hole. Hole sizes can be specified from 2mm up to 19mm. All the knobs manufactured in polythene, are available in a wide selection of colours.

The dished washers and spacers are available in a variety of sizes for between 5/8 and 1.25in diameter tubes.

Moss Plastic Parts Ltd., Langford Lane, Kidlington, Oxford OX5 1HX. Tel: (0865) 841100.



Catalogues

A new 8-page full-colour brochure has been produced by STC Electronic Services on its extensive range of multi-layer ceramic, surface mount chip and moulded as well as dipped radial leaded capacitors from Syfer Technology.

The publication highlights the multi-layer ceramic chip capacitor range with nickel barrier solderable terminations, which prevents the dissolution of silver electrodes and base termination materials into the solder during the bonding operation.

In addition, it provides detailed technical specifications and diagrams to assist the designer. Other information includes availability of the product either loose or taped and reeled and its conformity to BS and CECC specifications.

Copies are available free of charge by telephoning ***The Capacitor Group, STC Electronic Services on (0279) 626777.***

Doped Diodes

The Microwave Division of Marconi Electronic Devices Ltd., have announced the general availability of a new range of GaAs planar doped barrier diodes.

These advanced 3-5 material technology diodes offer the advantages of high pulse burn-out resistance, low local oscillator drive requirements and high tangential sensitivity. These advances, together with improved l.f. sideband noise performance, give extremely good detection sensitivity and enhanced temperature stability.

The diodes are available for either mixer or detector use in three outlines. Microstrip l.i.d. for use to 20GHz, low parasitic micro-l.i.d. for higher frequencies to 40GHz and metal.ceramic/metal for coaxial or waveguide assemblies. Alternatively, the devices are available as MESA naked chips.

Marconi Electronic Devices Ltd., Microwave Division Doddington Road, Lincoln LN6 3LF. Tel: (0522) 500500

The 1989-1990 Tandy catalogue is now available, this contains all the details on their receivers and scanners as well as their other products that may interest the radio enthusiast. These are available from your nearest high street Tandy store.

The Kanga Catalogue for September 1989 arrived in the offices recently. It contains the details of all their kits. A few examples of the kind of items you can purchase from them are, the LCK superhet TR/X, the Morse practice oscillator, a dual-band receiver and transmitter, a dummy load and lots more. For a copy of the catalogue, send an s.a.e. to:

Kanga Products, 3 Limes Road, Folkestone, Kent CT19 4AU. Tel: (0303) 276171.

Reallocation of Callsigns

We have recently received a letter from the DTI about the reallocation of deceased amateur callsigns.

"I have received a letter from one of your readers asking if he could be allocated the callsign of a friend who had recently died. In support of this request he sent a cutting from October's *PW* which asks for readers to notify a Mr Dunn if they know of the whereabouts of an unused callsign. The article mentions that the authorities at Waterloo Bridge House are prepared to consider his application for the callsign if he can get it released from the original holder or their next of kin. I am writing to let you know that this is not, in fact, the case.

I think Mr Dunn must have spoken to a junior member of my staff who either misunderstood the question or in trying to be helpful exceeded their authority in verbally agreeing to his request. The situation is this:

Because there have been, in the past, instances of recently bereaved families being bothered by requests from radio amateurs for their late relative's callsign, DTI decided that the only way to protect them was to have a strict policy regarding such transfers to which there would be no exceptions. An additional consideration was the extra administrative work caused by these requests for transfers. Thus, we will only consider transferring a callsign to an immediate member of the family, (spouse, parent or offspring) or to a person named in the will of the deceased. I think misunderstanding arises because people think that if the 'request' comes from an immediate member of the family we will consider passing the callsign on to a third party, when we, in fact, limit the transfer to family members for their own use.

I hope that this will help to put the record straight particularly to avoid a rush of approaches to the bereaved.

We operate this policy with the best intentions and I believe it to be the right one." From a longer letter from the DTI.

PRACTICAL WIRELESS **PW**

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Newsdesk...*Compiled by G4LFM*

Rallies

November 12: The Donegal Amateur Radio Club's Annual Rally and Junk Sale will he held in Jackson's Hotel, Ballybofey, Co. Donegal. The proceedings starts at 1pm.

***November 19**: The Bridgend & District ARC will be holding their 1989 rally at the Bridgend Recreation Centre, Angel Street, Bridgend, Mid-Glamorgan. Doors open at 11am.

November 19: The West Manchester Radio Club's Red Rose Winter Rally will be held in Astley & Tyldesley Miners Welfare, Meanley Road, Gin Pit Village, Astley, Tyldesley, Manchester. More details from: ***D.R. Camac. Tel: (0204) 24104.***

November 19: The MARS Birmingham Radio Rally will be held in the Stockland Green Leisure Centre, Slade Road, Erdington. Doors are open from 10am to 5pm. There is free parking and the entrance fee is 50p. More details from: ***Pete Haylor G6DRN. Tel: 021-326 7515.***

December 10: The Leeds and District ARS are holding their annual rally at the Civic Centre, Dawsons Corner, Pudsey Leeds. This is on the main Leeds Ring Road between Leeds and Bradford. Admission is 50p and the doors open at 10.30am. There will be the usual traders stalls and a bring and buy stall. There is a licensed bar and refreshments. ***Geof Stubbs on (0532) 585801.***

1990

February 24: The Rainham Radio Rally will be held in the Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. Doors are open from 10.15am to 4pm (10am for disabled visitors). The usual traders, Bring & Buy and refreshments will be there. Talk-in by GB4RRR on S22 and SU22. ***Bob G0LKE. Tel: (0634) 362154.***

March 9-10**: There will be an amateur radio show a Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9. Details from: ***London Amateur Radio Show, 126 Mount Pleasant Lane, Brickett Wood, Herts AL2 3XD.

March 18**: The Norbreck Amateur Radio, Electronics & Computing Exhibition will be at the Norbreck Castle Exhibition Centre, Blackpool. Details from: ***Peter Denton G6CGF. Tel: 051-630 5790.

***April 21-22**: The RSGB are holding their Convention and Exhibition at the NEC, Birmingham.

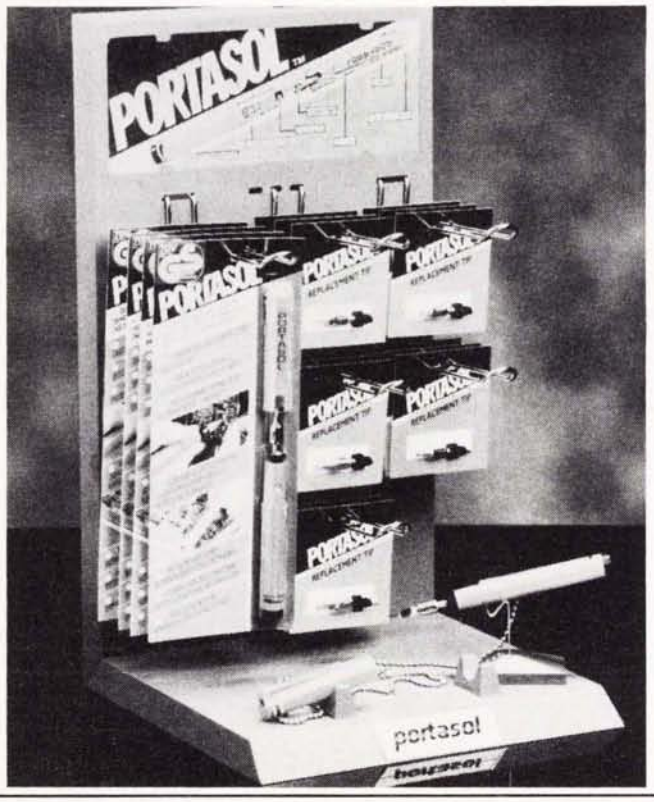
May 13: The VHF Convention

Available Retail

The Oryx Portasol cordless soldering iron is now to be marketed through retail outlets using specially-designed point-of-sale display units.

The Portasol proved so economic, simple and versatile in use that a rapidly increasing number of electrical enthusiasts have been enquiring about outlets. So, typical outlets will include superstores, electrical shops and hardware stores.

The Portasol does everything that a normal soldering iron of 10-60 watts will do except that it clips easily into a pocket and is actually powered by butane gas. A single refill from a standard gas lighter fuel container will enable up to 120 minutes of continuous operation. Ignition of the heating source is by means of flint mechanism in the Portasol's cap, whilst the catalytic heating action employed, both safeguards sensitive components and eliminates flame with its attendant fire risk.



Tool Clips

Emlux Holdings Ltd have introduced a range of spring steel tool clips, with capacities from 6mm diameter up to 50mm diameter.

The range with some 10 sizes available, are competitively priced, and are ideally suited for use where the need to hold hand tools and equipment securely is of prime importance. The "tool clips" incorporate a hole in order to secure the clip using a standard screw or bolt.

The use of spring steel, ensures that the tool clip retains the required degree of "springiness" to carry even the heaviest of hand tools.

"Tool Clips" are another example of the comprehensive range of spring steel

fastenings, that are manufactured by Carterton based Emlux Holdings Ltd, and are available through most wholesale outlets nationwide.

Emlux Holdings Ltd., Industrial Estate, Black Bourton Road, Carterton, Oxford OX8 3EZ. Tel: (0993) 841574.

Young Radio Amateur of the Year

Ted Walker, a sixteen-year-old Warwick school-boy, was named as the UK's top young radio amateur of the year of 1989. Rachel Oakley from Gateshead and Paul Moss from Evesham were runners up.

Ted is a keen user of radio and has also restored radio equipment and built his own antennas. He is also very active in radio clubs and in RAYNET.

The Young Amateur of the Year Award is organised by the RSGB as part of its "Project Year" which aims to introduce more young people to the hobby.

Change of Venue

After 40 years at its previous venue, Stoke-on-Trent Amateur Radio Society (SoTARS) have moved to the Rose and Crown public house, Etruria, Stoke-on-Trent.

Meetings have also been changed to Friday nights at 7.30pm. The club is, at present, preparing a list of future activities, both inside and outside normal club meetings.

Further details from:

Dave Wroe G1MLU. Tel: (0782) 639476.

will take place at Sandown Park Racecourse, Esher, Surrey.

May 13: The Yeovil ARC 6th QRP Convention will be held at the Preston Centre, Monks Dale, Yeovil at 9am. The first lecture is at 10.30am. Lectures during the day will be conducted by GM3OXX, G3RHI, G3PCJ and G3MYM. All the usual traders will be there. Refreshments are also available. ***D.J. Bailey G1MNM, QTHR.***

***June 24**: The Annual Longleat Mobile Rally will be, as usual, held at Longleat, near Warminster, Wilts.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there's a grand Bring & Buy, Morse tests, lectures on various aspects of amateur radio, a raffle and talk-in on S22. There is a licensed bar and cafe available for refreshments. The Knavesmire is well signposted and there will be additional RAC signs round the main approaches to York. ***Frank Webb G3ZKS. Tel: (0904) 625798.***

September 16: The South Bristol Amateur Radio Club are holding the 1990Bristol Rally in the Great Train Shed, Temple Meads Railway Station, Bristol. ***David Farr G4WUB. Tel: (0272) 839855.***

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

If you are organising a rally and would like it mentioned in *Practical Wireless*, then drop us a line, preferably as soon as you have fixed the date but no later than six weeks in advance (marking your envelope Rally Calendar) and we'll do the rest. Please make sure that you include all the essential details such as the venue, starting time, special features and a contact for further information.

The Mizuho QRP HF Transceiver Competition Results

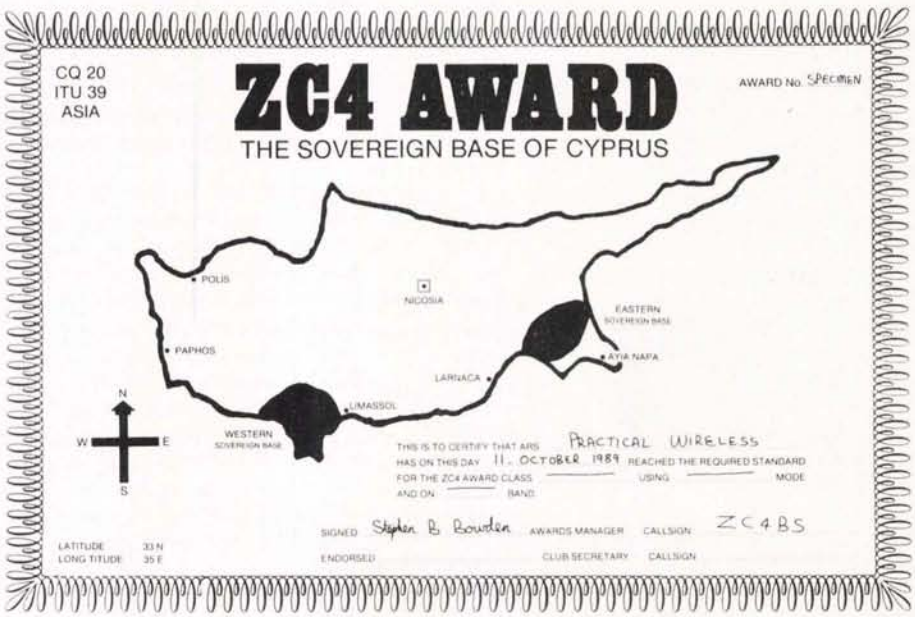
The winner of the competition was **Simon A Baird GM0FHS** and he should be using his 7MHz version sent to him by Waters & Stanton.

As the standard of the reasons for wanting a Mizuho were so high, we have decided to give nine runner-up prizes of either a subscription to *Practical Wireless* (starting with the January 1990 issue) or a £5 voucher to spend on any of the PW Services.

The Subscription Runners-up: **Eldar Soreq G3UOK,** University of Keele. **Dr J.D. Midgley**, Oldham.

£5 voucher Runners-up: **A, Sammons**, Essex. **Gerald Smith**, Irthlingborough. **A. Gardner GW7DHG**, Gwent. **Ian Capon G0KRL**, Suffolk. **John Quash**, Grimsby. **Michael John Cooke G4DYC**, Norfolk **S. Hartley GM0FUW**, Ayrshire.

Many thanks to all those who entered the competition. Look out for more in the future issues of *Practical Wireless*. Thanks also to **Waters & Stanton, 18-20 Main Road, Hockley, Essex SS5 4QS** for kindly donating the prize.



ZC4 Award

This award is open to both amateurs and short wave listeners for contacts with ZC4 stations after 1980. You need to send a list of QSOs with your application together with a signed declaration showing that the credits necessary for this award and the licensing conditions of your country have been adhered to.

Don't forward your QSL cards, they aren't needed to confirm this award. The award comes in three classes with various band and mode endorsements.

Europe/Asia: Class 1 = 15 points, Class 2 = 10 points, Class 3 = 5 points

Americas/Oceania/Africa: Class 1 = 10 points, Class 2 = 5 points, Class 3 = 3 points.

Each contact with a ZC4 station counts one point, the same station may be worked on different bands for additional points.

Contacts with the two club stations ZC4ESB or ZC4EPI count double points, as do any special event callsign (ZC4JAM or similar having three letters after the prefix).

Contacts on 50MHz or on 7MHz and below count two points. So, a contact with ZC4ESB on 3.5MHz would count 4 points.

The cost of the award will be 10IRCs or $3 (US).

Additional information can be obtained by contacting the Awards Manager. This is the first ZC4 award and should issue a fair challenge to amateurs and s.w.l.s alike. At present there are 16 ZC4 stations active.

The Awards Manager.
Stephen B. Bowden ZC4BS, ZC4 Bureau,
JSB, BFPO 53.

Batteries not included

Occasional barefaced lies about products and developments by Peter Rouse (GU1DKD)

I am delighted to be able to start this occasional series with news of a small technological miracle of electronics which I have in fact invented myself. It's called the "Squadger" and it started life as a project for *Practical Wireless* but ran into difficulties on two counts. First I felt the financial rewards were not really justified for such a marvelous piece of equipment and secondly there was great difficulty in finding a name for it as all the obscure names of west country places and rivers that I liked had already been used by the editor for previous projects.

I am now delighted though to tell you dear reader, that the manufacturing rights for the Squadger have been bought-up by a major manufacturer. But what, I hear you say is a Squadger?

Put simply it is the logical development of the familiar metal detector or "treasure tracer"...you know the kind of thing, it looks like a dinner plate on the end of half a broomstick which is attached to a human who appears to be using a primitive form of Sony Walkman. But whilst the metal detector has both limited range and scope (in terms of what it can find), the squadger can be programmed to find almost anything.

No matter how many DIN plugs, PL-259s, ballpoint pens and paper clips you buy, you can never find one when you want one. I can tell you now that they are all piled up in a massive hole in the ground in the West Riding of Yorkshire and the prototype Squadger found them in no time at all. Soon you will be able to buy a squadger. At this very moment the first ones are coming off a production line on a small trading estate near Cambridge. It consists of a slim black box made of matt black plastic and has a full QWERTY keyboard with pushbuttons made from squidgy rubber that feels like cuttlefish skin. The price will be £99.95 (not including batteries) and delivery will no doubt be much longer than 30 days.

Fancybox Law

All amateur constructors, experimenters and even professional equipment designers have suffered the effects of this law even though they probably haven't realised it. Now researchers have found definite evidence of this phenomina and have even defined a precise mathematical formula to guage it's effect.

The law comes into play when developing or designing a new item of equipment and in some instances has even been observed whilst assembling a perfectly harmless and well tried kit. Picture the scene: The item of equipment is working to perfection and all the bugs and quirks have been ironed out. Admittedly, it consists of a circuit board which is barely visible under a mass of jump leads, substitute resistors and capacitors (full length lead wires of course) and some dubious solder connections. All is sheer perfection and clearly this item of equipment deserves a proper case with nice front and back panels, sockets, switches and knobs.

You know and I know that the moment we package this conglomoration of electronics into such an enviroment complete with neat solder joints and loomed cables that the project is doomed. Somehow though we plunge ahead....this time, maybe this time, it really will turn out right. It's like a vice. Like some compulsive gambler betting his last pound we turn on the mains switch with trembling hand. Smoke curls gracefully from the power supply and we know that once again we have been suckered by the likes of Vero, West-Hyde, Bonos and others who profit from our foolishness and misery.

The only consolotation lies in knowing that we are not alone, out there in the world are others who suffer just like us. Now there is some small consolation in knowing that we can at least predict the outcome. The formula goes like this:

T = the TIME in minutes spent in tweaking, changing component values, replacing components when you accidentally applied reverse polarity on the 678th try, etc.

V= The value (in pence sterling) of the brand new case, switches, matching control knobs, etc.

M= The time in minutes you spent carfully applying rub-down lettering to the front panel.

CsO= The chances of sucessful operation.

Fancybox Law: CsO = 1.29556 divided by T x V x M (answer in percent of chances of sucessful operation from then on).

Sprocket Communications

A group at Poole University say they have now fully developed a new system of digital communications that will revolutionise the way messages are sent. The team have announced the development of "Sprocket" and say that like many great inventions it happened by accident. It was only when auditors started querying the department's annual quarter million pound grant that the breakthrough came.

The group say Sprocket takes the familiar Packet Radio system to its ultimate conclusion. With Packet, amateurs were able to send streams of data back and forth and even pass messages on in relays via several stations. However, as the group points out the big drawback with Packet was having to devise messages. They say details of weather conditions and equipment used on the station rather limits the scope of message content and this became obvious when unmanned packet stations were merely announcing their existence to other stations which in turn merely announced that they were ready to receive even though the first station had nothing to send.

As the Poole group point out this is waste of spectrum use and by building a limited artificial intellegence into the system the stations could actually hold a simple conversation. Admittedly the conversations have limited scope and consist of simple messages such as:

Station 1: 'can you receive me' ?
Station 2: 'Yes'.
Station 1: 'Good'
Station 2: 'I am pleased its good that I can receive you'
Station 1: 'It's good to be received'
Station 2: 'Yes'

This is a typical example of how two stations can keep up communications round the clock but the group say it is when other stations join in that the Sprocket really comes into its own. As more stations join in they automatically transmit in sequence (hence the name Sprocket). Once 50 stations are "talking to each other" smaller groups can split-off and automatically shift up or down in frequency to form a new Sprocket Network (correctly called a Cell). Ultimately with enough sprocket stations on air it should be possible to fill an entire band with transmissions so dispelling fears that under-utilisation of the spectrum could lead to amateurs loosing allocations.

Because the station operator does not need to devise a single message equipment is simple and requires no keyboard. All that is needed is the ECB (expensive complicated box) and Mike Beergut, the Poole team leader, says this in itself has been a major breakthrough as they have managed to go through the £1000 barrier which many equipment designers said was impossible. He's also poured scorn on an alternative method of sending and receiving the messages produced by Global Software Systems. Global's directors Ian Swot and Roland Acne (both aged 14) have produced a simple decoder/encoder (Verobox and just one switch labelled on/off with Dymo tape) which connects to a Spectrum computer. Speaking from their factory (Ian's bedroom in a semi in Woking) the pair

said that whatever Mr Beergut might say their system was just as good but admitted that a lot of software had been returned to them. It appears there had been corruption when programme cassettes had been duplicated from his Ghetto-Blaster to his father's music centre but they had now bought one of Mr Amstrad's naughty double cassette decks and even though 200 tapes went out recently with a Michael Jackson LP on instead, no one had spotted the difference.

In future

Next time round, I will be reviewing the new all-mode, all-band transceiver from Yascom that can work cross-band and cross-mode and display all sorts of gibberish on a built in screen whilst automatically tuning the antenna for any band between 180m and 23cm. It comes complete with a small man who knows what all the buttons and dials do and costs more than the annual military budget of some of the smaller Third World countries. I will be comparing it with a slightly less sophisticated unit that employs two transistors and a single crystal. This is a new British design by the Very Reverend Q. Arpee and is available in kit form. ***PW***

Repeater Time Out Alarm

This useful gadget, designed by Gus Montgomery GM0ATI should make it more unlikely to timeout through your local repeater, and provide both visual and audio indication of the duration of an 'over'.

Who has not found when listening to the local repeater that there are some users who have an ability to 'time out' regularly. Also to be fair, we have all on occasion found that 'timing out' is easy when talking to people who we know well, but haven't talked to for a while.

For those readers not familiar with repeaters, they are essentially relay stations that provide wide ranging cover for mobile stations. Normally mounted on hilltops the repeater will allow mobile stations to enjoy improved communications over a much enlarged area. Because of this large area cover they are often in great demand with many stations wishing to use them. To prevent any station monopolising the repeater, a timeout is normally built in to it. If a transmission goes on after a predetermined time the repeater will go into 'timeout'. Normally signalled by the received audio being blocked and replaced by the callsign of the repeater given in morse code, until the original transmission ceases. By this means those who 'timeout' are given an incentive to shorten their transmission times

This article describes a unit which will give an indication of the aproaching timeout condition, both visually and audibly, and cut of the transmission after the period has expired. Unlike simpler units this should enable the operator to bring his over to an end before the unit ends his over.

The original unit was built with 10 bright Light Emitting Diodes (l.e.d.), 5 green 3 yellow and 2 red ones. Green signifying normal time, yellow nearing timeout, then on the illumination of the first red l.e.d. emits a loud beep meaning 'about to end over'. Should the second red l.e.d. come on then the rig is switched back to receive thus not timing out. When connected to the rig this virtually guarantees no timeout however over enthusiastic you are to communicate.

The design also has provision to set much longer periods other than the normal 1-2 minutes before timeout. On the prototype up to 25 minutes could be set, although this length of transmission is not good practice. Perhaps you may wish to label the l.e.d.s 'good', 'boring', 'VERY boring', 'Inhumane', and 'Lethal'.

Circuit Description

The circuit diagram of the project is shown in Fig. 1. Gates a and b of IC2 in conjunction with C2 and C3 combined with a selection of resistance values chosen using S1 form an oscillator. If one of R14 to R17 is in circuit then the time period may be varied over a range of about 6:1 in each case. With S1 in the position shown the unit is switched off. In the next 4 counter-clockwise positions variable time periods are obtainable. Finally when both 3.3MΩ resistors are switched into circuit a fixed long period before timeout is available. The output is buffered and inverted via IC2c and fed into the Clock input of IC1.gate d of IC2 is a used to drive TR1 to activate relay RL1 for the period of transmission.

The rig returns to receive immediately the microphone transmit switch is released or after IC1 has counted and decoded clock inputs until the final l.e.d. is illuminated. At which point gate IC2d changes state switching off TR1 allowing RL1 to drop out and the rig returns to receive.

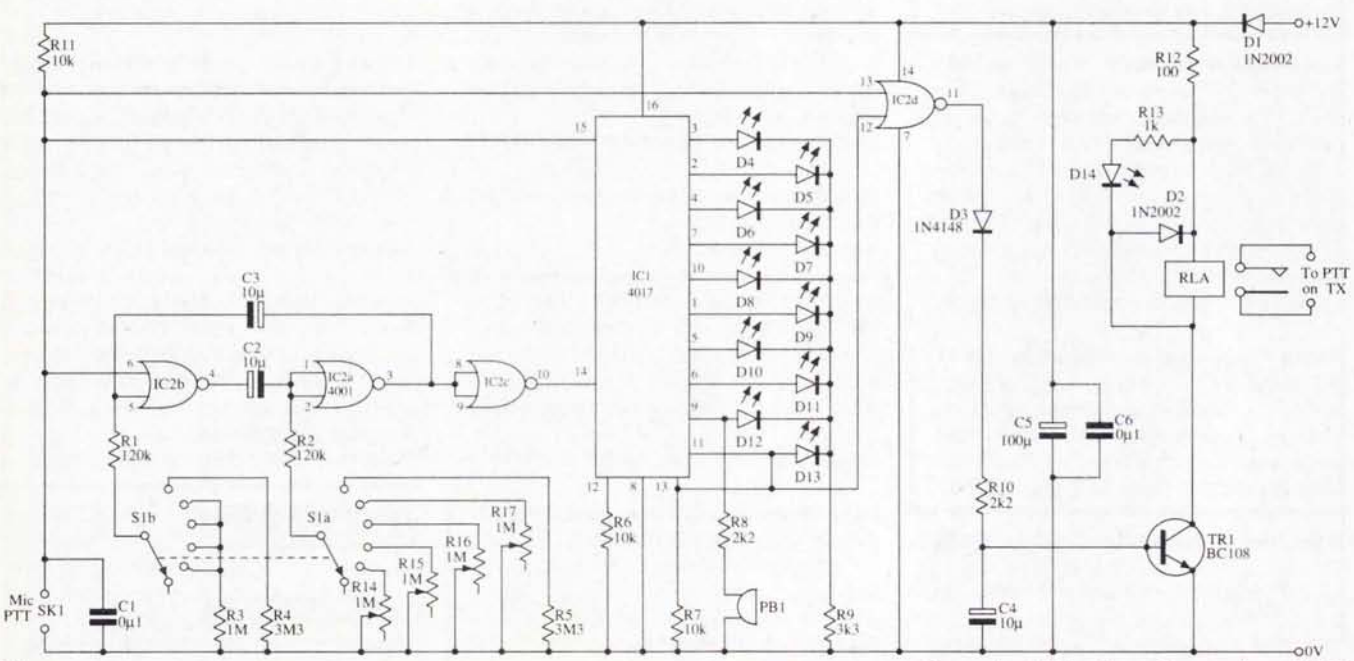
The display, which consists of l.e.d.s D3 to D14 is driven by the output lines of IC1 a decade divider-decoder, is arranged in a line against a printed time scale.

Construction

Construction is relatively straight forward, and should cause no problems if the printed circuit board is used.

Using the component overlay of Fig. 2 solder the sockets for IC1 and 2 in first, followed by the resistors and capacitors. Care should be taken with orientation of diodes D1, D2 and D3 when inserting them into the board. Finally insert and solder in TR1.

It is advisable to use sockets for the I.C.s, as Murphy's law states that if an I.C. is suspect and soldered in, then the manipulative skills of an octopus are required to unsolder it from its resting place on the board.



Caution should be exercised when handling the c.m.o.s. devices as they are easily damaged by high levels of static built up in a body wearing Nylon clothing, or walking on carpets made of synthetic material. This static build up may be discharged before handling these devices, by touching an earthed object such as a radiator or water tap.

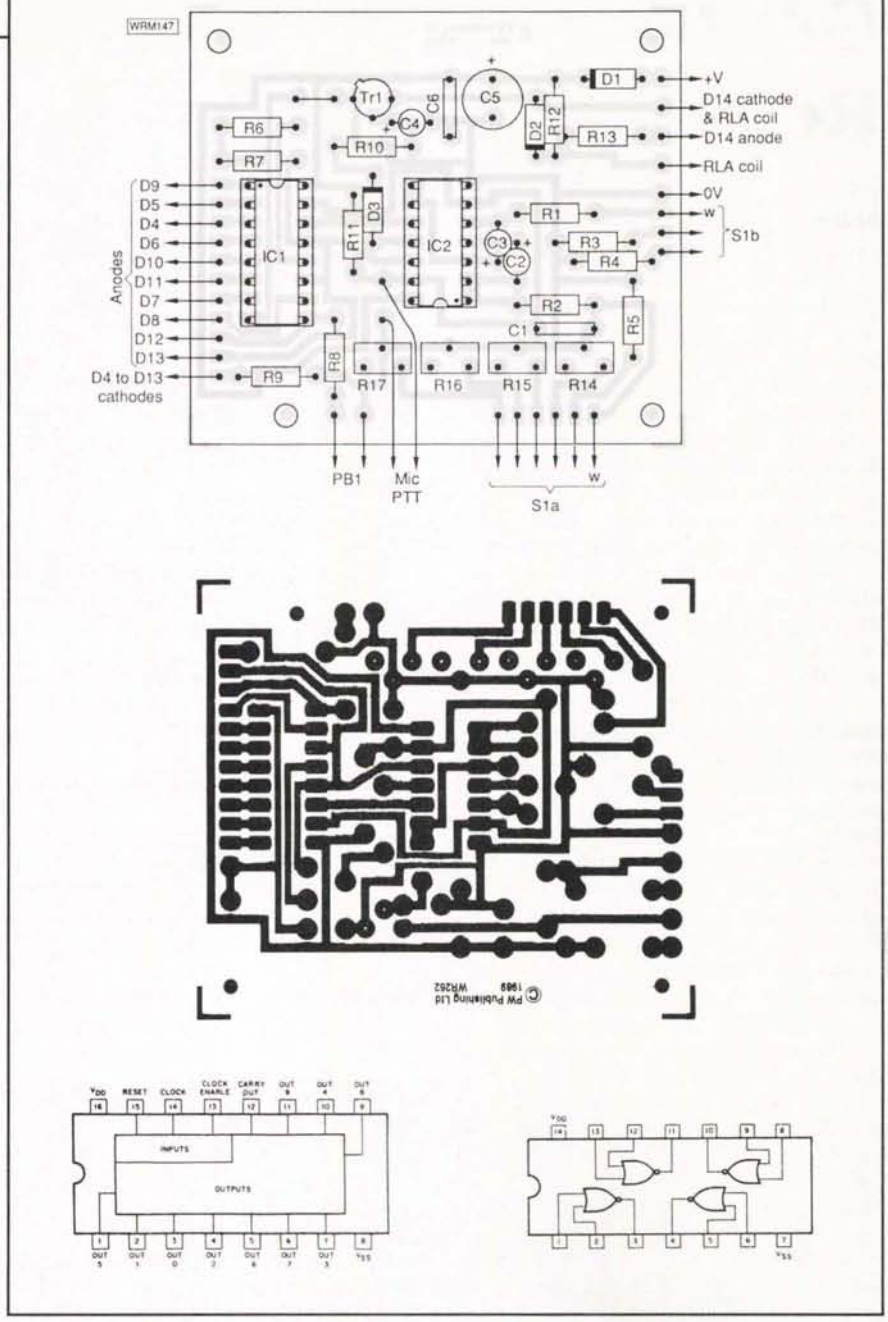
Finally when all the above steps are carried out, remove all traces of flux from the track side of the board with a solvent such as turpentine, white spirit or methylated spirits and insert IC1 and IC2. Removing the flux will minimise timing errors caused when very high ohmic resistance values are shunted by the moisture that flux can attract.

After cleaning and drying the board, make a final check of placing and orientation of all components. Then connect the ground pin to the negative of the power supply, and using a multimeter set on a current range connect the positive of the p.s.u. to the 12v pin. The circuit loading should be no more than 1 or 2ma at this point.

Construction may be completed by wiring all other connections to their corresponding positions on the board.

Finally

Consideration was given to maximum flexibility in building, so the components should be freely available from most suppliers. Relay RL1 may be almost any low power 6 or 12V type which is available. In the prototype a National NF2-6 was used, but most types should be suitable. If a 12V relay is used then replace R12 with a wire link. Similarly the Piezo Buzzer PB1, may also be one of the



Shopping list

Resistors

0.25W 1% carbon film

1k	1	R13
2.2k	2	R8,10
3.3k	1	R9
10k	3	R6,7,11
120k	2	R1,2
1M	1	R3
3.3M	2	R4,5

0.5w 1% carbon film

100R	1	R12 (see text for changes)

Potentiometer Lin.		Min. skeleton vertical mounting
1M	4	R14-17

Capacitors

Disk ceramic

0.1µF	2	C1,6

Tantalum 25v working

10µF	2	C2,3,4

Radial lead electrolytic 25v working

100µF	1	C5

Semiconductors

1N4002	2	D1,2
1N4148	1	D3
4001	1	IC2
4017	1	IC1
BC108	1	TR1

Light Emitting Diodes
'Ultra bright' types preferred

	11	D4-13 (see text)

Miscellaneous

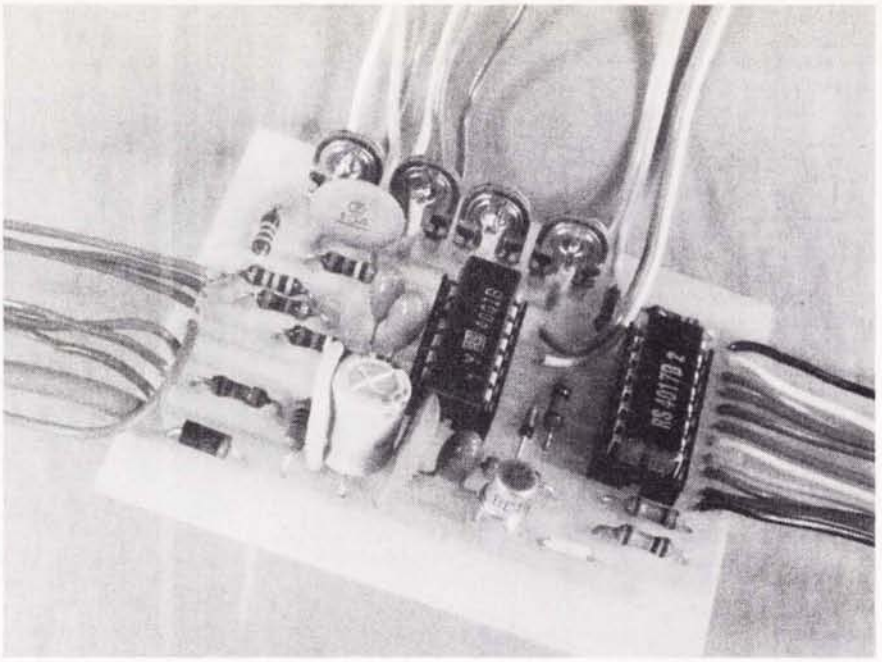
S1 2 pole 6 way wafer switch; p.c.b.; switch knob to suit; RL1 6v min. s.p.s.t. (see text); PB1 Piezo ceramic buzzer (see text); a suitable box for the project, and a microphone plug and socket to suit the rig in use; a length of microphone cable; interconnecting wire as neccessary for power.

HOW MUCH ?
£ 20.00
HOW DIFFICULT
Intermediate

many available. Cirkit supplied the original, but many other types should work.

R14 to R17 have been chosen to give a suitable range of timings, but may be modified to suit the timeout period required.

However a little more attention needs to be paid to sourcing the l.e.d.s (D4-D13). Each output of IC1 can only supply a low current and so these diodes should be of the 'ultra bright' type for best results The originals were Maplin type UF72. These l.e.d.s provides more than 20 times the normal light output whilst drawing no more current. They may normally be identified by the clear plastic lens in place of the usually coloured one. In the initial model normal l.e.d.s were used with a 1k5 ohm limiting resistor (R9). This was adequate without the 4017 complaining, but changing to the 'Ultra bright' type the display, even in the brightly lit surroundings of a car in daylight, became impressive. **PW**



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The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have 29MHz f.m. rig SMC Oscar 10 with repeater shift mic and manual. Would exchange for anything radio. John G4YWB. Tel:Liskeard 83934.
G946

Have Cossor 1035 oscilloscope, complete but not working; TV screen enlarger; Marconi TV sweep generator TF923; Cossor 1320 TV alignment pattern generator. Would exchange for Eddystone signal strength meter or w.h.y. A.J. Humphriss. Tel: (0926) 400876.
G952

Have Newbrain Burns and Porter Computer full QWERTY keyboard with ROM and peripheral ports, housed in metal case with dedicated Grundy p.s.u., plus green screen monitor and expansion module. Works but needs attention. Would exchange for w.h.y? Tel: (0443) 757569.
G973

Have Hoover rotary transformer No.1 sender, 11.5V input, 490V output. Also WWII Stromberg Carlson SC1265A communications receiver, 6 Bands 240V a.c. Would exchange for software/hardware for the Acorn Electron. Tel: (0858) 63383.
G990

Have Commodore A500 computer second disc drive, printer and loads of software, including word processor, database and spreadsheet. Would exchange for 144MHz multimode base station transceiver, e.g. TS711, FT726 or w.h.y? Kris G0LOH. Tel: Haywords Heath 457202. Evenings.
G982

Have Trio TR2500 hand-held transceiver along with SMC 25 speaker mic plus DC25 d.c.-d.c. converter, SC8 leather case, NiCad charger. All in mint condition with original packing. Would exchange for 144MHz mobile transceiver with mounting bracket and mic. Don't fancy swap £180 waiting to buy. A. W. Sharp, 27 Neville Drive, Irlam, Manchester M30 6JD.
H039

Have Kenwood TH215E boxed with manual and circuit diagram in perfect working order. Would exchange for 430MHz linear amplifier 10 watts in 100 watts out. John. Tel: 061-202 2715.
H058

Have Olympus OM10 camera with 50mm lens and motor wind. All in excellent condition with boxes if required. Would exchange for best 144MHz hand-held transceiver offered. Peter Briggs, 35 Pinehurst Cottages, Pinehurst Avenue Farnbourgh, Hampshire GU14 7LJ.
H090

SNIPPETS

Here's a quick and easy audio oscillator with enough output to drive a speaker. The circuit shown in Fig. 1. can be used as a Morse practice oscillator and even a continuity tester. The circuit is based on a Hartley oscillator, and all of the components can be culled from an old transistor radio. Transformers like T1 are used in the audio output stage, likewise the loudspeaker and transistor. Transistor TR1 can be almost any general purpose n.p.n. silicon device. The 1kΩ resistor and the capacitor set the frequency of oscillation although the type of transformer has some bearing on this parameter. The whole circuit will run quite happily on any d.c. voltage from 3-9 volts.

E.F.W. *G733*

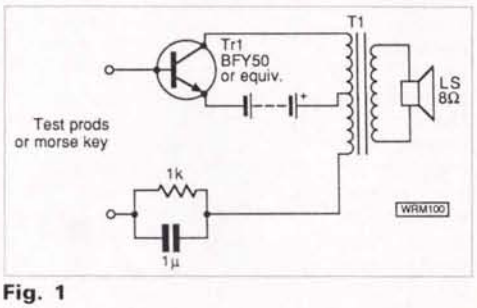

Fig. 1

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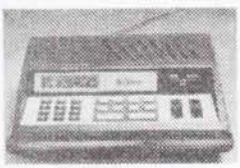

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Raycom package price	***£479.00***

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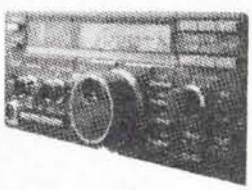
ICOM IC-725



ICOM's latest addition to the family, the 725 gives a full 100 watts of multi-mode power and is the second rig to use the DDS (Direct Digital Synthesizer) system. 10 Hz steps for smooth tuning, all mode squelch, 26 memories, and many other features make the 725 the starter rig for those who want more than a starter rig - it's unbeatable value - just look!

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Wall charger	£17.71
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Broadband mag-mount antenna	£14.95
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Raycom package price	***£425.00***

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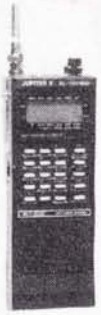

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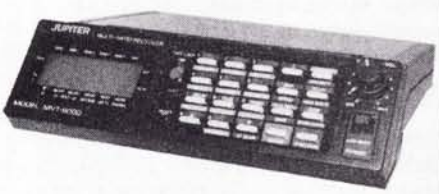

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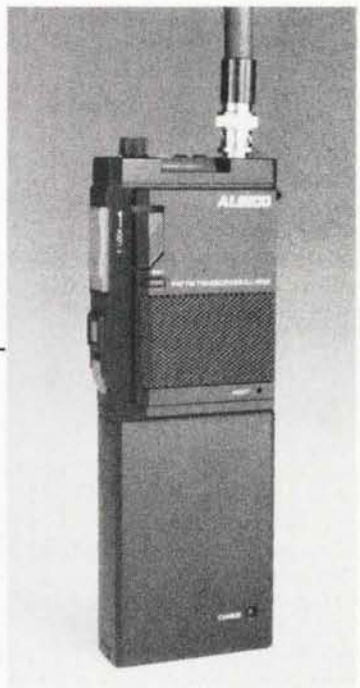
PW REVIEW

Alinco DJ-100E 144MHz Hand-held Transceiver

The DJ-100E is the latest 144MHz portable from the Alinco stable which, in addition to being very compact, features extended transmit and receive frequency ranges and a maximum output of 6.5 watts. It seems there is a never ending demand for hand-held 144MHz transceivers and it is probably fair to say that the majority, of amateurs own one at some time so lets see how the DJ-100E measures up says G4WNC.



Connecting-up

As with most hand-helds, connecting-up was straight forward. The supplied 100mm moulded rubber antenna fits to the top panel via a standard 50Ω BNC socket. This is a good choice as it makes it very easy to connect an external antenna without having to resort to special plugs.

Next point to look at was the power connections and the DJ-100E was quite versatile in this respect. The supplied EBP-9NA power unit slides on to the base of the receiver and locks in place, which seems to be the standard technique on most modern rigs. The standard battery pack had one or two very useful features which are worth mentioning. The first was the provision of a charger socket and l.e.d. indicator. This socket is used to connect the supplied trickle charger to the battery pack. The second and very useful point, was the external power socket which included a d.c. to d.c. converter so the DJ-100E could be powered from either the standard shack 13 volt supply or alternatively the raw car supply.

One important fact which is often not appréciated by the newcomer is that the maximum r.f. output of the rig is determined by the battery pack voltage. The standard pack produces 7.2 volts which gives a maximum output of 3 watts. If you want a higher power you will have to buy the 9.6 volt EBP-6NAZ for 4 watts or the 12 volt EBP-8NAZ which gives an impressive 6.5 watts of r.f output.

If you want to run the DJ-100E from dry cells a pack is available which takes 4 x AA cells, but this only gives an output of 1 watt. Finally, if you need to operate for long periods the EBP-18 could be very useful as this belt mounted pack can hold six C cells giving extended operation with 3.5 watts of r.f. output.

The only other external connection available to the user is the speaker/mic socket on the top panel. As its name implies this 2.5mm stereo jack socket is primarily for the connection of a speaker-microphone, but it can also be used for an external earpiece and p.t.t. or just an external earpiece. One other thoughtful extra is that a very neat rubber cap is provided to prevent moisture entering this socket and the cap is secured to the rig so that it doesn't get lost when the socket is in use.

I think you can see from the foregoing, the few external connections on the DJ-100E have been well thought out to give maximum versatility.

Operation

At first sight the DJ-100E looks to be very simple rig to operate as you are not presented with a vast array of multi-function buttons which is so often the case with modern rigs. There is only one rotary control and that is the combined volume and on-off which is mounted on the top panel. The squelch on the DJ-100E is unusual in that it is pre-set, though it can be held open by operating a latching push button on the top panel.

The p.t.t. button is the now standard large push-button on the left hand side of the DJ-100E. Immediately below this is a smaller button which is used to send a 1750Hz tone burst for repeater access.

The front panel has only two controls, the first being a small push-button marked SHIFT which if pressed whilst using a repeater shift reverses the transmit and receive frequencies. This is particularly useful for checking the input frequency to see if you could work the other party simplex. Though again the button is very small. The SHIFT button can also be used to select a repeater shift provided the FUNCTION button is held down. The other front panel control has a very useful feature which when operated, locks the operating frequency to prevent inadvertent frequency changes. This is particularly useful when operating portable under difficult conditions. One other feature of the front panel is a small hole marked RESET just below the speaker grille. Hidden in here is the reset button which when depressed erases all the memories and returns the rig to its original power-up condition. It may seem a bit of an obscure facility but it can be useful if the memory contents have become a mess and you want to start again!

Turning to the back panel, there is a single recessed slide switch which is used to switch between high and low r.f power output. As mentioned earlier the maximum output is dependent on which battery pack is in use, and unusually the low power setting also varies, but with the standard pack it is 450mW.

There have been many ingenious systems used for frequency selection on portable rigs and the Alinco DJ-100E uses & and ‡buttons which shift the operating frequency up or down in 12.5kHz steps. These buttons are mounted on the back edge of the top panel and are approximately 4mm square, which may

well prove to be rather fiddly especially with a gloved hand. Obviously it is not very convenient to have to tune the whole band in 12.5kHz steps, so there are options included to increase this tuning step. The first is to press the blue FUNCTION button, which then increases the frequency steps to 100kHz, but only while the FUNCTION button is pressed. If you want a coarser frequency step, the FUNCTION and MEMO buttons can be used by holding the FUNCTION button depressed and pressing the MEMO button to give 1MHz frequency steps. This latter feature is essential if you want to make use of the optional extended receive frequency range of 140MHz to 170MHz.

The frequency display used was of the familiar liquid crystal type, but it was angled at about 20 degrees which made it easier to read. The display shows an abbreviated operating frequency with the one hundred MHz digit missing and conventional digits for tens and units of MHz and hundreds and tens of kHz. For the final digits three blocks were used to show that either 2.5kHz, 5kHz or 7.5kHz needs to be added to the displayed frequency. I'm sure this description is more confusing than the display, as I actually found it to be quite clear!

Signal strength and transmitter power output were indicated by a curved bargraph display which ran from the bottom left of the display to the top right.

The remaining segments of the display were used to indicate the memory channel, function key and f-lock operation.

Memories

No self respecting portable would be complete these days without a selection of memories and the DJ-100E is no exception. The DJ-100E is equipped with ten very versatile memories which can be recalled very quickly and easily. One of the notable features of the memories is that they work rather like ten v.f.o.s in that once a memory has been selected you can use the & and ± buttons to change the frequency. The only problem with this system is that if you change the frequency the new frequency is stored in the memory so you can get yourself in a mess if you're not careful. Having said that, Alinco have a solution to the problem as each of the memories can be locked if required and this is indicated by a small M next to the memory number on the display. In addition to being able to store the operating frequency, the memories will also store 600kHz repeater shifts which is a very handy feature.

Storing a frequency in a memory is very simple. All you do is press the MEMO button until the required memory number is displayed, then set the frequency with the & and ± buttons. If you want to lock the memory you just press FUNCTION and CALL buttons. Recalling a memory is equally simple as you only have to select the required memory number using the MEMO button.

The last memory feature is the CALL memory which is actually memory 0. This is particularly useful as it can be instantly recalled just by pressing the CALL button while a second press of the CALL button returns you to the previous operating frequency. This is ideal for storing a common local frequency, i.e. the local repeater.

On The Air

My first thoughts when I picked-up the DJ-100E was how well it fitted into the palm of my left hand, with the p.t.t. in just the right place for my thumb. The angled frequency readout was also very pleasant and definitely easier to read than some I have seen. Like a lot of amateurs, I'm always far too impatient to read the manual when I first get my hands on a rig, and usually spend the first few minutes working out what all the controls do! The very simple layout of the DJ-100E meant that this was very easy and I soon had the basics sorted out.

Because the review model was a very early version (Ser No 512) the supplied manual was only a photo-copy, but nevertheless it proved to be quite adequate. The format for the manual was A5 and there were 10 pages starting with a specification and followed by a list of, and brief description of all the controls. The final section gave a description of how best to use some of the features.

Although the manual doesn't give details, it is apparently very easy to extend the transmit coverage to 140MHz - 146MHz and more usefully the receive coverage can be extended for 140MHz - 170MHz. One point to note here, is that for best results an external antenna will be required.

I found the audio level and quality from the DJ-100E to be very good, with it being just bright enough for clarity without being too harsh. On the transmit side, I received equally good reports from a number of stations. The receiver sensitivity was also good for a rig of this type.

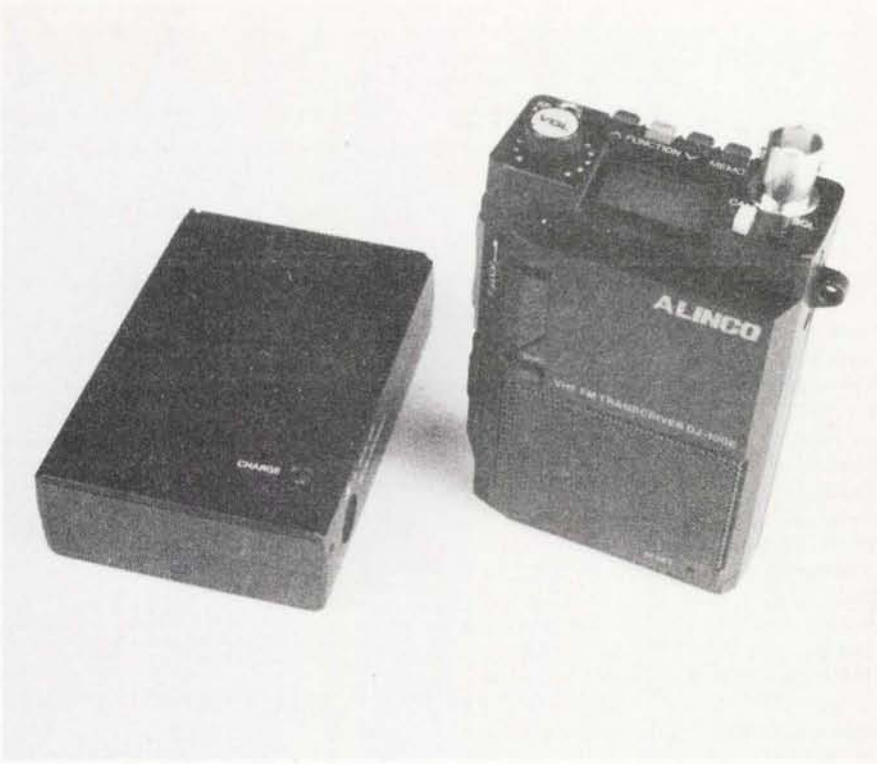
Specifications

Frequency Coverage	144MHz-145.995MHz
Tuning Steps	12.5kHz
Signal Type	F3 (f.m.)
Antenna Impedance	50Ω (BNC)
Operating Voltage	5.5 to 12 volts
Operating Current	
Battery Save	15mA
	Squelched 42mA
Max. audio	98mA
Transmit Hi	750mA
Transmit Lo	350mA
Dimensions	168 x 60 x 30mm
Weight	250gm
RECEIVER	
Type	Dual Conversion
1st i.f.	21.6MHz
2nd i.f.	455kHz
Sensitivity	< .25µV (12dB SINAD)
I.f Rejection	> 60dB
Selectivity	7.5kHz at -6dB
	15kHz at -60dB
Audio Output	> 200mW at 10% t.h.d.
TRANSMITTER	
Output Power	2.5watts Hi
	450mW Lo With EBP-9A Battery
Modulation Variable reactance f.m.	
Max. Deviation	5kHz
Spurious output	> -60dB

My main complaint with the DJ-100E was the row of buttons used for frequency selection. I found these to be far too small and close together for easy use under portable conditions. Those with smaller hands than me will have no problem though. I found that the best way to use the rig portable is to make sure you have your working frequencies locked into the memories, as this only requires the pressing of the end button which is just about manageable with gloves on!

The facility to have an extended receive capability, although initially attractive, was spoilt for me because of the tuning technique. This combined with the lack of a scanning facility meant that manual searches were sometimes tedious.

Looking on the positive side, the DJ-100E incorporated a very useful battery saving circuit which powered down most of the receiver circuit for about 700ms in every second. If a signal is received the battery-save circuit is disabled until the signal disappears. Just to show you how effective it was on my tests, the normal quiescent current under no signal conditions was 42mA which reduced to 15mA with the battery-save circuit running. This is obviously a great advantage when operating portable, particularly on RAYNET exercises and the like, where you are listening for most of the time. ***PW***



Summary

I did enjoy using the DJ-100E during the review period, it was very comfortable to hold and produced good audio in both transmit and receive. If you can live without direct frequency entry and can cope with the frequency selection buttons, you could be very happy with the DJ-100E.

The DJ-100E cost £219.00 and is available from **Waters and Stanton Electronics** who were kind enough to loan the review model.

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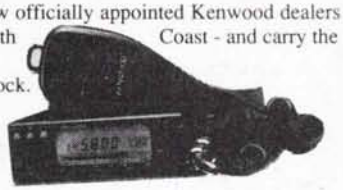

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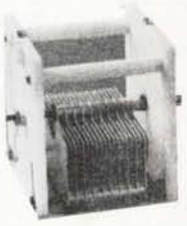

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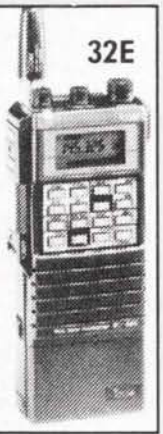

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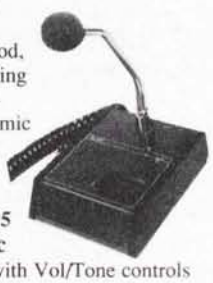

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Reading & Understanding Circuit Diagrams

(with a bit of theory thrown in)

In part 20 of this series, R.F. Fautley G3ASG starts to look at the various methods of impedance matching.

Impedance Matching

First of all, what do we mean by "matching". In the section about filters, we discussed matching a source to a load (Fig. 19.2) and stated that if the load impedance (which may be completely resistive like RL) is made the same value as the source impedance (or resistance like RS) then the source and load are said to be "matched". This condition provides maximum power to be sent from the source to the load. It can be proved mathematically that this is so by use of differential calculus, but it can also be shown graphically as below.

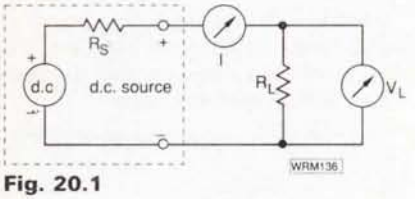


Fig. 20.1

Taking the circuit of Fig. 20.1 as a simple example of a d.c. source (battery or power supply) having an internal (or source) resistance of R_S and a resistive load R_L, we can evaluate the power in the load for different values of RL.

By Ohm's Law:

$$I = \frac{V_S}{R_S + R_L}$$

and the power in R_L, call it P_L, will be

$$P_L = (I)^2 \times R_L$$

Suppose the source has a voltage of 12V d.c. and a resistance of 6Ω. Although this value of source resistance is very much higher than would usually be met with in practice, it is suitable for demonstrating the principle.

If $R_S = 6\Omega$ and $V_S = 12V$

$$I = \frac{12}{6 + R_L} \text{ and } P_L = (I)^2 \times R_L$$

Putting in values for R_L from 0Ω to say 20Ω, the power for each value can be evaluated.

If $R_L = 0\Omega$ then:

$$I = \frac{12}{6+0} = \frac{12}{6} = 2A$$

and

$$P_L = 2^2 \times 0 = 4 \times 0 = 0W$$

which is fairly obvious if there is no load resistance!

Taking RL = 0.5Ω then:

$$I = \frac{12}{6 + 0.5} = \frac{12}{6.5} = 1.846A$$

and

$$P_L = (1.846)^2 \times 0.5 = 3.408 \times 0.5$$

$$= 1.704W$$

Let $R_L = 1\Omega$

$$I = \frac{12}{6 + 1} = \frac{12}{7} = 1.714A$$

and

$$P_L = (1.714)^2 \times 1$$

$$= 2.938 \times 1 = 2.938W$$

Continuing with different values for R_L we get the table below.

Plotting the values of R_L against P_L gives the graph shown on Fig. 20.2 which clearly indicates that the peak power is obtained when R_L is 6Ω. This is, of course, the same value as RS, the internal resistance of the d.c. source. QED!

Although the same principle applies to a.c. sources and loads it all becomes more complicated when reactance also appears with resistance within either the generator (source), the load, or both. The problem is then about matching impedances rather than simple resistances, which is really what this section is all about!

The whole of this part comprises design, but the subject of impedance matching is a design problem. The matching circuits on their own would provide very little information.

In general, impedance matching means providing some sort of device or network which will enable the maximum power to be transferred from a source to a load. It has already been demonstrated for a d.c. supply that this maximum power transfer occurs when the resistance of the load is equal to the resistance of the source. This is also true for a.c. sources, but if the resistance of the available load is not the same as the source resistance, some form of matching device will be necessary or the maximum amount of power will not be transferred. This matching could take the form of a transformer, or alternatively a network comprising reactive components, and it's the latter method that will be discussed.

All sources and loads have resistive components and it's these resistive parts that need to be matched to provide the maximum power transfer. Unfortunately, sources and loads are not always purely

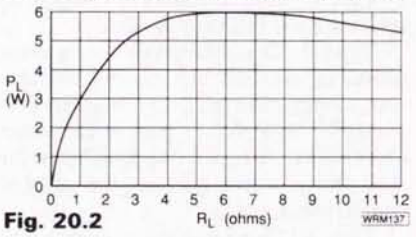


Fig. 20.2

R_L (Ω)	$6 + R_L$ (Ω)	$I = 12 / (6 + R_L)$ (A)	$P_L = (I)^2 \times R_L$ (W)
0	6	2.0	0
0.5	6.5	1.846	1.704
1	7	1.714	2.938
1.5	7.5	2.560	3.840
2	8	1.500	4.500
3	9	1.333	5.330
4	10	1.200	5.760
5	1	1.090	5.940
6	12	1.000	6.000
7	13	0.923	5.964
8	14	0.857	5.876
9	15	0.800	5.760
10	16	0.750	5.625
11	17	0.706	5.483
12	18	0.667	5.339
15	21	0.571	4.891
20	26	0.462	4.269

resistive, with one or the other or both being complex, i.e. having both resistive and reactive components.

One of the shortcomings of using reactive networks is that they are correct at only one frequency. Usually though, they are near enough to be used over a small band of frequencies such as one amateur band, especially if one of the components is variable.

Matching problems fall into one of three categories:

(i) Both impedances purely resistive but of different values

(ii) One impedance resistive and one complex

(iii) Both impedances complex

These three, however, have to be sub-divided yet again into nine types to provide working systems to cover all the different combinations that may be met.

Type 1: Both impedances purely resistive

Type 2: One impedance purely resistive, the other comprising resistance and reactance in series. The pure resistance being a higher value that the resistive part of the complex impedance.

Type 3: One impedance purely resistive, the other comprising resistance and reactance in series. The resistive part of the complex impedance being a higher value than the pure resistance.

Type 4: One impedance purely resistive, the other comprising resistance and reactance in parallel. The pure resistance being a higher value than the resistive part of the complex impedance

Type 5: One impedance purely resistive, the other comprising resistance and reactance in parallel. The resistive part of the complex impedance being a higher value that the pure resistance.

Type 6: Both impedances comprising resistance and reactance in series

Type 7: One impedance comprising resistance and reactance in series, the other comprising resistance and reactance in parallel. The resistive part of the series complex impedance being a higher value than the resistive part of the parallel complex impedance.

Type 8: One impedance comprising resistance and reactance in series, the other comprising resistance and reactance in parallel. The resistive part of the parallel complex impedance being a higher value than the resistive part of the series complex impedance.

Type 9: Both impedances complex comprising resistance and reactance in parallel.

Bet you didn't think it could be so complicated? Once the type of matching required has been established, though, it's only necessary to follow the appropriate procedure to solve the problem (I hope!).

There's just one thing to cover before starting on to the nine types, that is the equivalence of series and parallel impedances at one frequency.

(i) First, we'll look at the series impedance and translate it to its parallel equivalent, shown in Fig. 20.3.

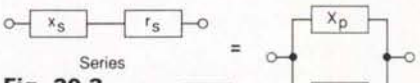


Fig. 20.3

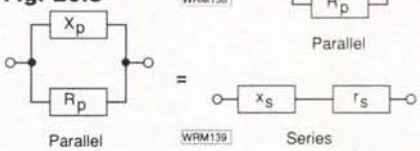


Fig. 20.4

$$R_P = \frac{r_s^2 + x_s^2}{r_s}$$

$$X_P = \frac{r_s^2 + x_s^2}{x_s}$$

(ii) Now the other way round. The parallel impedance translated to its series equivalent, as shown in Fig. 20.4.

$$r_s = \frac{R_p \times X_p^2}{R_p^2 + X_p^2}$$

$$x_s = \frac{X_p \times R_p^2}{R_p^2 + X_p^2}$$

Yes, it is a bit complicated, but when you've practiced by working out a few series to parallel equivalents and vice versa, it becomes just a bit of added arithmetic!

To minimise the maths, the equations for providing the matched conditions will be stated without giving proofs. Worked examples with arithmetical check will be given for each type.

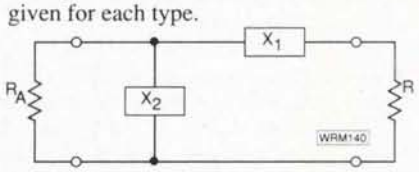


Fig. 20.5

Type 1

Both impedances purely resistive

The circuit of the matching network is shown in Fig. 20.5.

(i) let the higher of the resistance values be designated R_A and the lower value R_B regardless of which is source or load

(ii) Let

$$p = \frac{R_A}{R_B}$$

(iii) Let

$$q = \sqrt{(p - 1)}$$

(iv) Determine

$$X_1 = +(R_B \times q)$$

(v) Determine

$$X_2 = -(\frac{R_A}{q})$$

So X_1 is positive, i.e. an inductor, and X_2 is negative or a capacitor. Actual component values will depend on the frequency in use.

It's interesting to note that a match will still be achieved if the polarity of the two reactances are both changed so that X_1 becomes a capacitor and X_2 an inductor. Of course, the component values will be different although the numerical value of the reactances will be unchanged. This applied in general to all the types to be described. But, do watch the plus and minus or the arithmetic will be wrong!

Here's an example. A source of 75Ω is to be matched to a load of 300Ω at 14MHz.

$$R_A = 300\Omega \text{ and } R_B = 75\Omega$$

$$p = \frac{R_A}{R_B} = \frac{300}{75} = 4$$

$$q = \sqrt{(p - 1)} = \sqrt{(4 - 1)}$$

$$= \sqrt{3} = 1.732$$

$$X_1 = +(R_B \times q) = +75 \times 1.732$$

$$+ +129.9\Omega$$

$$X_2 = -(\frac{R_A}{q}) = -(\frac{300}{1.732})$$

$$= -173.2\Omega$$

Putting the appropriate reactance values in the circuit gives Fig. 20.6. The next move is to convert the reactance values into component values.

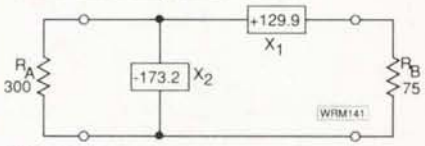


Fig. 20.6

(i) What value of inductance would have a reactance of +129.9Ω at 14MHz?

$$L = \frac{X_L}{2\pi \times f}$$

$$= \frac{129.9 \times 10^6}{2\pi \times 14 \times 10^6} \mu H$$

$$= \frac{129.9}{28\pi} = 1.48\mu H$$

(ii) Also, what value of capacitor would have a reactance of -173.2Ω at 14MHz?

$$C = \frac{1}{2\pi \times f \times X_C}$$

$$= \frac{10^6}{2\pi \times 14 \times 10^6 \times 173.2} pF$$

$$= \frac{10^6}{2\pi \times 14 \times 173.2}$$

$$= \frac{10^6}{15235.5} pF$$

$$= 65.6pF$$

The final network with component values is shown in Fig. 20.7.

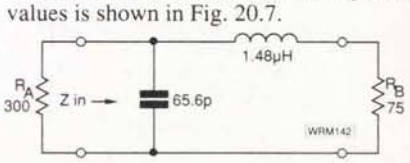


Fig. 20.7

We'll check that the arithmetic is correct by working out what impedance Zin is "seen" by the 300Ω looking towards the network as shown by the arrow in Fig. 20.7. If our values are correct it should be 300Ω!

(i) Find the parallel equivalent of the series connected 1.48µH inductor and 75Ω resistor at 14MHz

We known that the reactance of the 1.48µH inductor at 14MHz is +129.9Ω, so the parallel equivalent R' and X' will be:

$$R' = \frac{R^2 + X^2}{R} = \frac{75^2 + 129.9^2}{75}$$

$$= \frac{5625 + 16874}{75} = 300$$

$$X' = \frac{R^2 + X^2}{X} = \frac{75^2 + 129.9^2}{+129.9}$$

$$= \frac{5625 + 16874}{+129.9} = +173.2$$

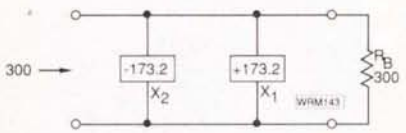


Fig. 20.8

Putting these parallel values in parallel with X_1 as in Fig. 20.8, we can see thatthe two reactances become a parallel tuned circuit. So, a very high value of resistance appears across the 300Ω leaving the 300Ω practically unchanged. It really works!

Type 2

One impedance purely resistive, the other comprising resistance and reactances in series. The pure resistance being a higher value than the resistive part of the complex impedance.

The circuit of the matching network is shown in Fig. 20.9.

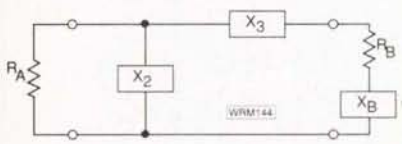


Fig. 20.9

(i) Let the higher value of the pure resistance be designated R_A and the lower value of the resistive part of the complex impedance R_B, regardless of which is source of load.

(ii) Let

$$p = \frac{R_A}{R_B}$$

(iii) Let

$$q = \sqrt{(p - 1)}$$

(iv) Determine

$$X_1 = +(R_B \times q)$$

(v) Determine

$$X_2 = -(\frac{R_A}{q})$$

(vi) Determine

$$X_3 = X_1 + (-X_B)$$

As an example let's match a resistance of 300Ω to a series combination of 25Ω and a reactance of +15Ω. All we have to do is to work out the values of the matching reactances.

(i) $R_A = 300$ and $R_B = 25$

(ii) $$p = \frac{300}{25} = 12$$

(iii) $$q = \sqrt{(12 - 1)} = \sqrt{11}$$

$$= 3.317$$

(iv) $X_1 = +(25 \times 3.317) = +82.925$

$$X_2 = -(\frac{300}{3.317}) = -90.44$$

(vi) $X_3 = +82.925 + (-15)$

$$= +67.925$$

The final network is shown in Fig. 20.10.

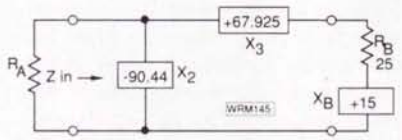


Fig. 20.10

As an exercise, the values will be checked as before in the Type 1 example. The impedance Zin (see Fig. 20. 10) should work out to be 300Ω

(i) Add X3 to XB

+67.925 + 15 = +82.925

(ii) Change R_B and $(X_3 + X_B)$ to parallel equivalents R' and X'

$$R' = \frac{25^2 + 82.925^2}{25} = 300$$

$$X' = \frac{25^2 + 82.925^2}{82.925}$$

$= +90.46$ (near enough to $+90.44$!)

X' in parallel with X_2 will be a parallel tuned circuit, i.e. a very high resistance. This very high resistance is itself in parallel with R' (300Ω) which leaves the 300Ω virtually unchanged. Again, QED!

In part 21, we will take a look at some more of the different methods of impedance matching.

ERRORS AND UPDATES

Phase Locked Loop for the Measurement of Adjacent Channel Noise - October 1989

The third paragraph which states "The loop should be able to lock v.c.o.s of gain 105 to 107HzV-1" should have read "The loop should be able to lock v.c.o.s of gain 10^5 to $10^7 HzV^{-1}$".

Also the mixer block labelled "TPM-2" in Fig. 2 should have carried the label "TFM-2"

PW Review Azden PCS-6000 144MHz Transceiver - November 1989

By now, you will have noticed there was an inconsistency in the text regarding the tone-burst on the PCS-6000. In fact, page eight of the manual devotes half its contents to setting the tranmit tone code and even includes a table of the different tones availble, including 1750Hz. The specifications page refers to the European version having a 1750Hz tone.

The transmit sub-audible tones are ready built-in the transceiver, you have to buy the receive decoder separatly. Apologies to both Waters & Stanton, the importers of the Azden, and any potential buyers who were confused by these errors.

The Enhancement of HF Signals by Polarisation Control, Part 1- November 1989

Under the heading "Two Hop" The sentence should read "Again circular gave the best average signals and leaving the control set at horizontal as with a normal installation was a distinct **dis**advantage." not advantage as was printed.

The last sentence above the heading "Computer Control" should have read." The ability to choose optimum signal to noise ratio instead of maximum signal strength may be the more effective choice, particularly when interference levels are high."

We do hope that this didn't spoil the article for readers and that they will enjoy the concluding part in this issue.

Packet Radio Update

Continuing his tour around the world, in Part 7, Roger J. Cooke G3LDI looks at packet radio in India and h.f. forwarding in the UK.

In order to assist the end-user I have tried to collate some information on h.f. forwarding as it presently exists from this country. When I first became active on packet in mid-1985, it was a relatively easy task to hold a QSO simply because of a lack of activity. Indeed, locally here in Norwich we used to telephone each other when an h.f. packet signal was heard. Little did we know what would ensue over the next few years. I first started forwarding with Jack Colsen W3TMZ, using my old Xerox system which worked fine, together with a real-time gateway, but the scene has changed somewhat since those halcyon days! I counted the number of BBS stations trying to forward to one another on one popular h.f. frequency early one morning. I stopped at 17, but guess if I had stayed there I would have counted a few more. It really is pandemonium, little wonder there are delays, retries and failures (this was on 14MHz). I also used to try some 3.5MHz work with approximately the same result. However, I have compiled this list of stations, after requesting the information @GBR, who are still actively engaged in h.f. forwarding, of several different types. Users of the system and sysops too, might like to make notes of who does what and with a bit of pruning of the forward files, might find a better path. If I have left out any h.f. BBS, I apologise, but I am including all who answered my request and a couple that did not, but who were found from the G4FQO listings.

Chris GU4YMV operates GB7GUR and forwards with the following:

OZ5BBS All EU mail and bulletins
F6ABJ All mail to France
IK4BLV All EU mail plus Stateside mail and bulletins
LA6CU Scandinavia and Germany
LA6HX Scandinavia and Germany
EA4DYX All EA
SV1IW SV and 4X

Chris forwards on both 14MHz and 3.5MHz

Peter G0BSX, operates GB7PLY and has no h.f. port open at present. However, he may run when he receives the official go-ahead.

Peter now acts as a link between GB7BNM in Bournemouth and GB7KVD in Taunton. GB7GUR forwards to Peter on v.h.f./u.h.f. Apparently, GB7BNM is now doing exactly what Peter was doing before he closed the h.f. port. One reason for the close-down was the practice of the BBS stations to all sit on the same frequency, using parameters for single pair links. This would support the urgent need for better band-planning and spreading the load somewhat, something that will have to happen on the other h.f. bands too, if any order is to be obtained for the chaos. There are two schools of thought on parameters. One says that we must be polite to other forwarding pairs and allow them to use the channel simultaneously. The other says - set the timing parameters really tight and get the session over quickly, thus allowing another pair to do the same.

Roger G3LDI operates GB7LDI and forwards as follows:

N4QQ-1: All USA/Canadian mail

World Wide
Recap by Countries
As of 06-20-1989
by K4NGC

The following is a computed recap of the World Wide WWPACKET.DBF file I maintain. It reflects the number and type of activities by country. If your area information is incorrect its only because a detail listing of Digipeaters and PBBSs have not been provided to me (to include frequencies). If you have any changes, additions, or deletions to this file please address them to K4NGC @ K4NGC. Please include call sign, city, country, frequency, and type of activity.

State	DIGI	PBBS	TOTAL	PERCENT
Argentina	0	8	8	0.17%
Australia	38	65	103	2.24%
Austria	5	5	10	0.22%
Belgium	0	9	9	0.20%
Canada	33	116	149	3.24%
Colombia	15	13	28	0.61%
Costa Rica	6	3	9	0.20%
Denmark	0	19	19	0.41%
Ecuador	0	1	1	0.02%
Egypt	0	1	1	0.02%
Finland	20	21	41	0.89%
France	9	41	50	1.09%
Germany, Federal Rep	63	26	89	1.94%
Greece	2	3	5	0.11%
Hong Kong	0	8	8	0.17%
Hungary	4	4	8	0.17%
Iceland	0	2	2	0.04%
India	1	1	2	0.04%
Indonesia	2	52	54	1.18%
Ireland	4	6	10	0.22%
Israel	0	5	5	0.11%
Italy	49	96	145	3.16%
Japan	6	165	171	3.72%
Korea, South	6	4	10	0.22%
Luxembourg	0	1	1	0.02%
Malaysia	0	2	2	0.04%
Mexico	16	22	38	0.83%
New Zealand	8	28	36	0.78%
Norway	52	25	77	1.68%
Peru	0	2	2	0.04%
Phillipines	3	29	32	0.70%
Portugal	0	2	2	0.04%
South Africa	13	14	27	0.59%
Spain	0	17	17	0.37%
Sweden	1	47	48	1.04%
Switzerland	0	6	6	0.13%
United Kingdom	2	168	170	3.70%
United States	1555	1579	3134	68.22%
USSR	0	1	1	0.02%
Venezuela	7	2	9	0.20%
Yugoslavia	18	7	25	0.54%
Total	2655	1938	4594	100.00%

The WWPACKET.DBF files are available on my LandLine Bulletin Board to all who want it. My LandLine BBS telephone number is 703-680-5970. These files are in Text, ARC and Dbase formats.

Don Bennett (K4NGC)
15016 Carlsbad Road
Woodbridge, Va 22193
(Home) 703-670-4773
(LLBBS) 703-680-5970
(Packet) K4NGC @ K4NGC

Fig. 1

plus South America, plus Bulletins to NA. I receive all UK mail plus AMSAT and ARRL bulletins.

W9ZRX: All USA/Canadian mail - UK mail in return

W3IWI: All USA/Canadian mail - UK mail in return

4X1RU: Middle East, Italy, Russia and Europe

SV1IW: Eu, Far East, Indonesia, Philipines

EK3AZO Russia

Paul G0DXX is in Evesham and operates GB7ERA. He forwards on 3.5MHz handling EU mail.

Dave G4WPT is in Bournemouth and operates GB7BNM. Dave also operates on 3.5MHz and handles traffic between himself and GB7ERA and also GB7GUR. Dave remarks that his equipment is available for any other h.f. use, should there be a need. He is open to suggestions.

Other stations that have h.f. capability are as follows:

GB7SEK, sysop Dave G4IDX in Ashford

GB7BNI, sysop Steve GI4XFN in Belfast

GB7KEV, sysop Malcolm G3KEV in Scarborough

GB7MAC, sysop Ian GM4AUP in Airdrie

I have no details of the schedules of these stations.

World-Wide Packet

Don Bennett K4NGC recently put out a very interesting piece of information giving the number of BBS and type of activities from various countries. This is shown in Fig. 7.1. From this, it can be seen that the UK came third in the league, being beaten by Japan with 171 to our 170, but the USA came in first place with an enormous 3134 PBBS stations. Don has been touting for information for some time now, so if you haven't sent him yours yet, just register as per the form in Fig. 2. This will enable him to bring the figures up to date and provide a clear picture of the increase in activity. I intend sending him the listings from Del G4FQO, who has gone to an extreme amount of trouble collating and providing us all with excellent lists of UK BBS, Nodes, Net-roms and if you haven't sent your details to Del, please do so. SP G4FQO @ GB7WOK will find him.

Sysop Seven Minutes

At the recent meeting of Sysop 7, held in Shrewsbury, the following decisions were made and, by now, have been implemented. Just to remind you should you not have seen any information:

Standardisation of the @field (in the UK)

Cease using SP SYSOP @ SYSOPS and implement SP SYSOP @ GBR

@ GBR for all inter UK traffic

```
                    World Wide Packet Radio Listing
                  Digipeater and  Packet Bulletin Board
                        Registration Form

The following information is needed in order for Digipeaters and Packet
Bulletins can be registered and listed in the World Wide Packet Radio
Listing.

CALL SIGN _____ SSID _____ ALIASES _____

Type  [  ] Digipeater  [  ]  PBBS

Activity Code _____ (Up to four are allowed) See listing below.

City _____ State/Provience _____

Country _____ Map Grid _____ Postal Code _____

Frequency _____ . _____ Mhz

Act Code - A - DIGI - TNC-1 or Clone (Dumb Digipeater)
           B - DIGI - TNC-2 or Clone (Dumb Digipeater)
           C - DIGI - Layer 3/4 Node (Network Node)
           D - DIGI - VC Switch
           E - DIGI - TEXNET
           F - DIGI - TCP Switch
           G - DIGI - TCP Gateway
           H - DIGI - KANODE (Without Gateway)
           I - DIGI - KANODE (With Gateway)
           J - DIGI - 9600 Baud TNC (Backbone Frequency)
           K - DIGI - 56 KB TNC (Backbone Frequency)
           L - DIGI - Packet Radio Repeater
           M - DIGI - 2400 Baud TNC
           N - DIGI - 1200/2400 Baud TNC
           O - DIGI - Converse Mode
           P - DIGI - G8BPQ NetWork BIOS
           Q - DIGI - This is a Backbone Frequency and users
                      are requested not to use it.
           1 - PBBS - BBS, Local User access with Mail Forwarding
           2 - PBBS - BBS, Forwarding ONLY (No Users)
           3 - PBBS - BBS, Local User access with NO Mail Forwding
           4 - PBBS - BBS, DX Cluster
           5 - MBOX - Personal Mail Box (Not PBBS)

Please let me know of any changes, deletions, additions or verifications to
the World Wide Packet Radio Listing. If you send in data please insure that
a seperate entry is sent in for each SSID/Frequency. Send them to me -
K4NGC @ K4NGC via one of the Packet Radio PBBS mailboxes or upload it to my
Land Line BBS at 703-680-5970. Any call signs listed on this list will be
purged if the update date exceeds 2 years, therefor verification is
necessary. When sending update data please make sure that you include Call
Sign, Type Activities, City, State/Provence, Country, and Frequency. Anyone
wishing a copy of the World Wide Packet Radio Listings please send me a 5
or 3 inch IBM formatted disk, disk mailer, and postage. Persons residing
outside the United states please send $5.00 American currency to cover
$3.00 postage, disk and mailer. Those sending American currancy please
indicate if you want 3 inch or 5 inch disk DS/DD or DS/HD. All disks must
be in IBM Format (MS-DOS).

73's Don Bennett -- K4NGC
     15016 Carlsbad Road
     Woodbridge, Va 22193 USA
     (Home) 703-670-4773
     (OPUS BBS) 703-680-5970 (Node 1-109/211)
     (PACKET RADIO) K4NGC @ K4NGC
```

Fig. 2

@ EU for all European traffic

@WWW for Whole Wide World traffic

@ZONEA for all bulletins destined for Zone A

@ ZONEB for all bulletins destined for Zone B and so on through Zone H

The @ WWW is very generalised and if you want to target a bulletin to any particular area outside the UK, I would suggest the following in addition:

@ NA for traffic to North America

@ SA for traffic to South America

@ ASIA for traffic to Asia

@ ZS for traffic to South Africa

@ AMEA for traffic to Africa, Middle East and Asia

It was agreed to minimise the message headers to reduce the amount of data sent when forwarding. I always have thought that they contained too much superfluous information. I reduced mine to just the locator information a long time ago.

It was also agreed to delete the SSID for BBS stations. Your local BBS will now be just a GB7??? with no -2.

That's about all that should affect the user except that the usual subject of advertising was discussed. Users were reminded that blatant advertising is NOT allowed, the sysop of the BBS is responsible for their very presence and as such puts himself in a very delicate situation. PLEASE do not send any adverts via packet, it's not what the system was intended for. *Radcom* is the place for that type of communication and it's the type that by dictionary definition is placed

Fig. 3

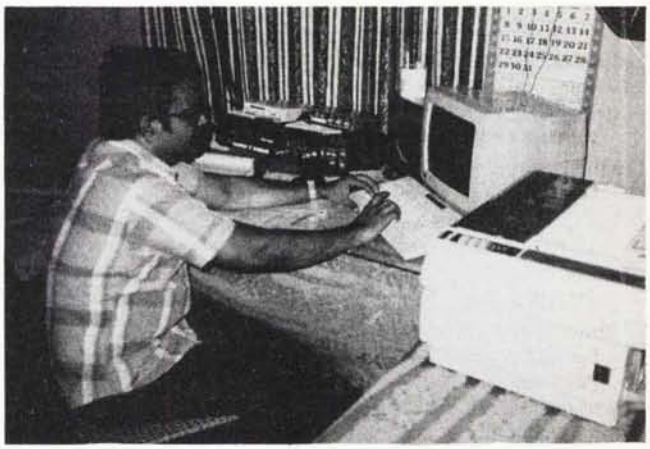


Fig. 4

"to offer for sale by public notice". The word "sale" being the offending word. I feel sure that most people would not like to see a BBS sysop lose his licence because of something like this.

Whilst I am on my "soap-box", please ask yourself if your bulletin to ALL @ GBR of whatever, is really necessary or informative. There are lots that are not, and only serve to clog an already over-worked network.

Packet In India

Packet activity is increasing in India and at the moment there are about five amateurs with packet capability with more coming along. One of the most enthusiastic must be Dr. M. E. Oommen, a consultant paediatrician at the St. Mary's Children's Hospital in Kerala. Dr. Oommen runs an MBL BBS on 14MHz and had lots of problems getting it going as he was working on his own with help from outside the country. Fig. 3. shows his station and Fig. 4 shows Dr. Oommen operating his packet station. He suffers badly from constant power failures and this makes operating the BBS very difficult. I must admit, that although we set up a forwarding link between us, it has been very unreliable over the last few months. However, Dr. Oommen hopes to overcome his problems soon.

Next Time

That's about it once again. Next time I hope to bring news about packet from "down-under" in VK, with some news on Texnet, AMTOR linking and packet-cluster.

73 de Roger G3LDI @ GB7LDI. Happy Packeting!

SWAP SPOT

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G-zero? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless*, Enefco House, The Quay, Poole, Dorset BH15 1PP, for inclusion in the first available issue of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only-no items for sale-and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have 12 valves QQV03-10 ex-equipment, would exchange for Denco coils B9A, or Octal , Blue or green all ranges. George (0529) 303247

Have Yaesu FT212RH 2m f.m. mobile, 45/5 watts out, latest model, will exchange for dual band H/H or solid state h.f. rig. Additional cash available, can collect. A. Mikol Mansfield (0623) 34863

Wanted-service information for Pioneer synthesized stereo receiver Sx-600L. Bernie Vaughan (0432) 267204

Have Yoko TVC-8M Multi-system 5" TV. u.h.f./v.h.f. TV Channels plus a.m./v.h.f. radio. 5months old Many continental stations logged, would exchange for s.w. radio/scanner/Microreader or w.h.y. Tel. (0253) 811648 (Blackpool area)

Wanted reel-to-reel tape recorder in super order. Have digital multimeter plus other instruments. G.W.Neil, St. Clair Cottage, Holm, Orkney KW17 2RZ.

Swap Trio TR310 valved radio receiver 3-29.5MHz a.m. & s.s.b., works well and in clean condition. Want frequency counter or oscilloscope. T. Jenkins, 47B Warneford St., Hackney E9 7NG.

Have 10GHz professional wavemeter, micrometer tuned, in WG16. Would exchange for 2m handheld. Mann, Cambridge (0223) 860150.

Have Wraase SC-1 s.s.t.v. tranceiver in good condition, also receives fax. Never been used to transmit. Would swap for Kenwood/Trio R2000 with v.h.f. or similar. J. Ferguson, Chatham (0634) 828952.

Have various items radio & electronics, mainly 2 and 4V valves, h.f. chokes, Variable capacitors etc. Would exchange for mains signal generator 100kHz to 30MHz. Mr. G. Coleman, 35 Ashfield Crescent, Lowestoft, Suffolk NR33 9BE. H191

Have QQVO 640A new, (2). Also QQVO 320A new, (4). Would exchange for valves T160L, 572B. G3WRD, QTHR, Bob Tel: 0787 280259.

Have Spectrum programs FAX + speed generator RX4 + interface. Would exchange for 144-167Mhz converter or good p.s.u. 13V 1amp w.h.y. G. McKendry, 31 Battery Place, Rothesday, PA20 9DU. Tel (0700) 5349.

Have another Ex-RAF R1155 receiver, rough and needs attention but working. Would exchange for a 12ft tank whip antenna with matching base. Interested also in 3.5MHz mobile antenna w.h.y? Callers only, letter first as shift worker. Heslop. 75 Alder Park, Brandon, Durham DH7 8TJ.

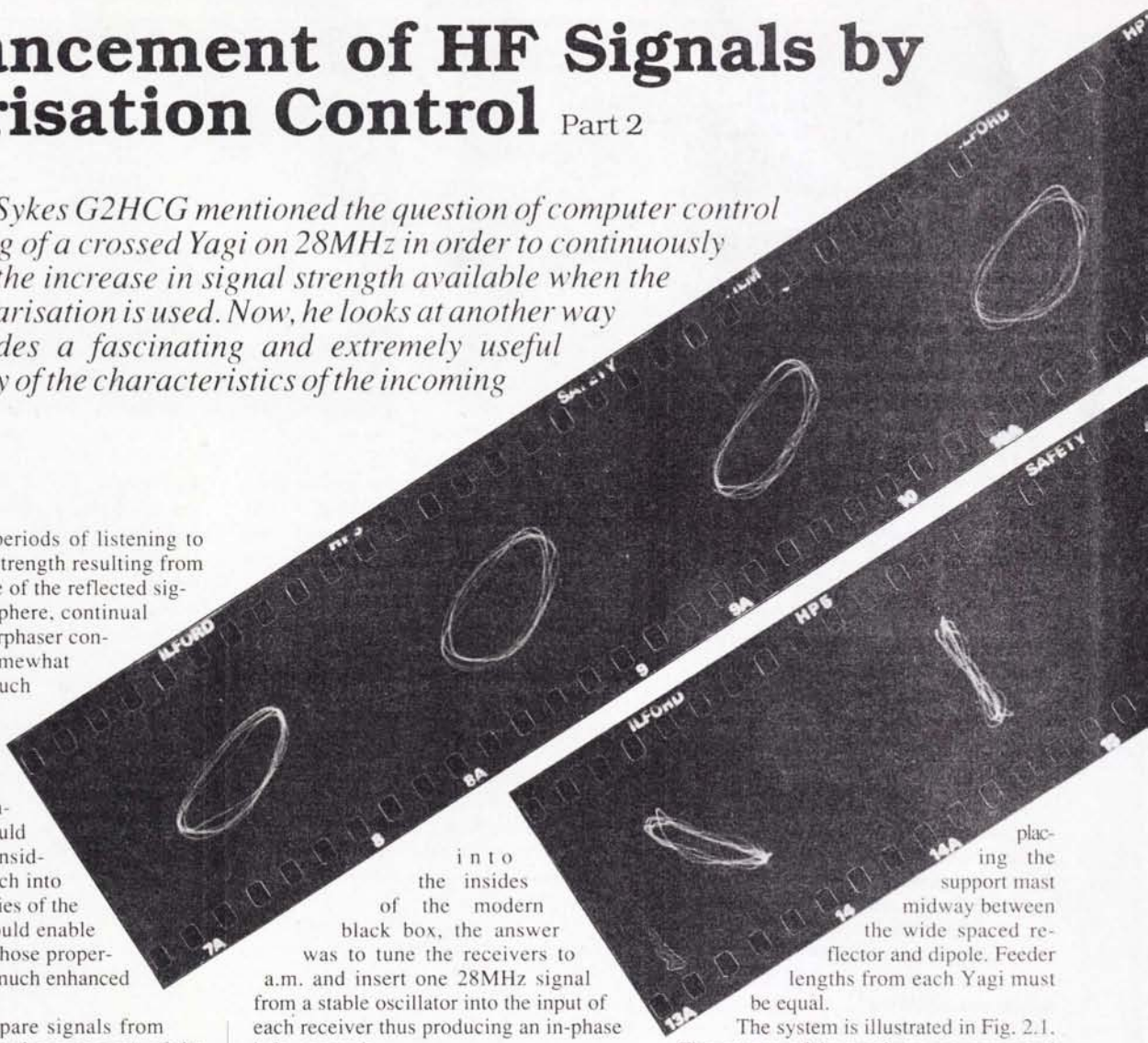
Have 144MHz hand-held, Icom IC2E with charger in good condition. Would exchange for 934MHz transceiver, Dressler ARA30 active antenna or w.h.y? Swapper collects. John. Tel: Camborne 716411.

Have two Bolex H16 16mm cine cameras in fitted cases, both with triple lens turrets plus Reflex zoom lens. Would exchange for Yaesu FT-101ZD and matching a.t.u. Must be mint. Swapper to collect. GW6LCR. Tel: 0792 894282.

Have Roland E-10 synthesiser, midi compatible, stereo, 61 full-size keys, rhythms, etc. As new, worth £500. Would exchange for PRO-2005, AR2002, 144/430MHz, dual band portable or w.h.y? Nick Stamp. Tel: Hull 505064 after 5pm.

Enhancement of HF Signals by Polarisation Control Part 2

In Part 1, B. Sykes G2HCG mentioned the question of computer control of the phasing of a crossed Yagi on 28MHz in order to continuously make use of the increase in signal strength available when the optimum polarisation is used. Now, he looks at another way which provides a fascinating and extremely useful visual display of the characteristics of the incoming signal.



During extended periods of listening to changes in signal strength resulting from polarisation change of the reflected signal from the ionosphere, continual turning of the Polarphaser control resulted in somewhat tired fingers. Much thought was given to achieving a method of displaying the polarisation of the incoming signal. This would not only allow considerably more research into the varying properties of the ionosphere, but would enable use to be made of those properties in the form of much enhanced signal strengths.

In order to compare signals from different sources in the same part of the world, two receivers were already in use with inputs in parallel from the Polarphaser connected to the two Y inputs of a double beam oscilloscope. This provided a means of seeing the variations in amplitude of signal resulting from changes in polarisation, but the actual polarisation could only be read from the dial of the Polarphaser.

Variations in polarisation input to a crossed Yagi result in variations of phase and amplitude between the two feeders, and it should be possible to display these variations on an oscilloscope. One receiver was connected to the 45 degree half of the crossed Yagi and the other to the 135 degree Yagi, the outputs of the receivers being connected to the X and Y inputs of the oscilloscope. Ideally the r.f. signal before demodulation would be used but the normal s.s.b. receiver beats the r.f. signals with a b.f.o. and if this oscillator is stable the resulting audio signal will contain the same phase shifts as the r.f. signal and will be much easier to display on an oscilloscope. First tests were unsuccessful as it was totally impossible to keep the two b.f.o.s in the two receivers in phase. One oscillator only, replacing the two b.f.o.s in the two receivers was obviously necessary. Not wishing, at this stage, to delve too far into the insides of the modern black box, the answer was to tune the receivers to a.m. and insert one 28MHz signal from a stable oscillator into the input of each receiver thus producing an in-phase b.f.o. on each.

Initially, a signal generator was used and the system worked first time. The first oscillators of each receiver were still in use, but the p.l.l. circuits held frequency and phase exactly constant at all times.

The optimum way to mount a crossed Yagi is with the elements at 45 and 135 degrees to the horizontal, this balances the antenna in relation to the support mast and feeders and avoids mismatch problems caused by proximity to the mast of the vertical elements. Although none of the elements are vertical or horizontal, polarisation in these directions can be generated electrically by altering the phase length of the feeders.

At first, the Yagis were mounted in this way, but oscilloscope X and Y plates are mounted at 0 and 90 degrees which has the effect of rotating the display by 45 degrees. Unfortunately, this cannot be corrected by altering the feeder lengths and therefore the phase to each receiver. There are only two ways of correcting the display, - obviously, to rotate the tube of the oscilloscope, which is preferable but not always possible, or to rotate the antenna by 45 degrees making the elements vertical and horizontal. This was done, the resulting unbalance between the two halves of the crossed Yagi being minimised by placing the support mast midway between the wide spaced reflector and dipole. Feeder lengths from each Yagi must be equal.

The system is illustrated in Fig. 2.1. The outputs of the receivers are connected to the X and Y plates of the oscilloscope, phase and amplitude are displayed directly on the screen giving an exact picture of the phase and amplitude of signal on each feeder and therefore showing the polarisation of the incoming signal. Signals being at audio frequencies, an expensive wideband oscilloscope is not required. Unfortunately, even oscilloscopes boasting 20MHz bandwidth on the Y amplifiers often only have 1MHz on the X amplifiers. This method of displaying polarisation requires two identical receivers with the audio taken from the output provided prior to the audio amplifiers and loudspeaker. Different receivers have differing audio characteristics resulting in audio phase shifts varying with frequency. This will not affect results on a constant carrier such as a beacon, but will prevent the polarisation of s.s.b. audio signals being shown.

The way in which the waveforms are generated on the oscilloscope is as follows:

Horizontal Polarisation is received only by the horizontal elements of the antenna and they are connected via receiver A, to the X plates of the oscilloscope. The display is therefore a horizontal line.

Vertical Polarisation is received only by the vertical elements and receiver B and

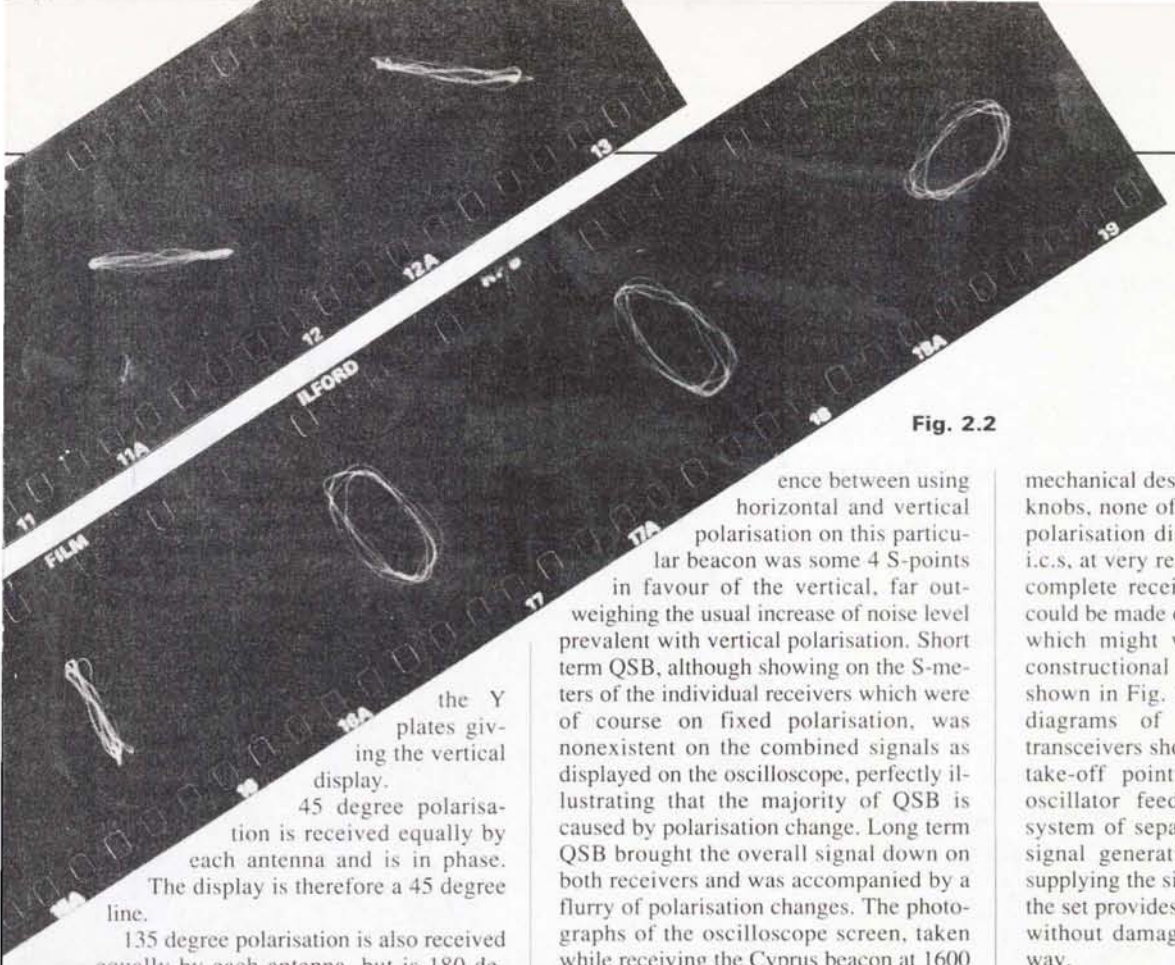


Fig. 2.2

the Y plates giving the vertical display.

45 degree polarisation is received equally by each antenna and is in phase. The display is therefore a 45 degree line.

135 degree polarisation is also received equally by each antenna, but is 180 degrees out of phase giving a 135 degree line.

Circular Polarisation is received equally by each antenna, but is 90 degrees out of phase resulting in a circular trace.

Discrimination between clockwise and anticlockwise is not possible, the spot forming the circular trace, although rotating in opposite directions in each case, is moving far too fast for the difference to be visible.

Using the equipment was quite fascinating and highly instructive. Stations in different parts of the world could be tuned to, and not only was the polarisation of the incoming signal immediately visible, but the rate of change of polarisation could be immediately seen and therefore the usefulness of polarisation control could be assessed. The various beacons in different parts of the world were particularly useful together with the constant carriers available from the American repeaters.

It was immediately apparent that the number of hops to the ionosphere and back was totally irrelevant. The polarisation of signals must therefore be controlled by the last hop, a conclusion drawn before when turning the Polarphaser knob, but very graphically illustrated now. The rate of change varied with the time of day and the degree of opening of the band. Generally the better the opening the slower the rate of change, but the initial opening of the band was always characterised by a very slow rate of change. The polarisation on the Cyprus beacon in the morning staying constant for periods up to a minute. The Brazil beacon on 28.270MHz which must be at least four hops was a particularly constant signal with a definite preponderance of vertical polarisation staying constant for minutes at a time. The difference between using horizontal and vertical polarisation on this particular beacon was some 4 S-points in favour of the vertical, far outweighing the usual increase of noise level prevalent with vertical polarisation. Short term QSB, although showing on the S-meters of the individual receivers which were of course on fixed polarisation, was nonexistent on the combined signals as displayed on the oscilloscope, perfectly illustrating that the majority of QSB is caused by polarisation change. Long term QSB brought the overall signal down on both receivers and was accompanied by a flurry of polarisation changes. The photographs of the oscilloscope screen, taken while receiving the Cyprus beacon at 1600 on 19 April 1988, can be seen in Fig. 2.2.

The polarisation of a Yagi antenna is only correct in the main beam and this is shown on the screen when receiving a local signal of fixed polarisation. Rotation of the beam results in rotation of the polarisation to the extent that a horizontal Yagi may show vertical polarisation off the back and circular at the sides.

The next thought is how, in practice, could use be made of this display. The requirement is not only to be able to see the optimum polarisation for the particular signal but to be able to use it for transmission and reception. Since the use of two receivers in addition to the one in use would be rather expensive, another means of obtaining the same result is necessary. The main cost of receivers these days is the sophistication of control provided by the microprocessor and the mechanical design of the case and control knobs, none of which are needed for the polarisation display receiver. Consumer i.c.s, at very reasonable prices, provide a complete receiver on one chip and use could be made of these. A possible system which might well be the subject of a constructional article at a later date is shown in Fig. 2.3. Perusal of the circuit diagrams of a number of modern transceivers shown that the provision of a take-off point for the common local oscillator feed is quite feasible. The system of separate boards for oscillator signal generation with coaxial feeders supplying the signal to the various parts of the set provides a simple connection point without damage or modification in any way.

Many hours spent watching the quite fascinating changes in polarisation of signals reflected from the ionosphere show that although the polarisation is often changing too rapidly for manual compensation to be feasible, there are many occasions when the ability to pick the optimum is very advantageous. Knowing the polarisation of an incoming signals is an entirely new facet of amateur radio and might even form part of the signal report. One thing is manifest, namely that a horizontal beam is not the optimum, circular polarisation from a crossed Yagi would be far better.

My sincere thanks are due to Bill Wheeler G3BFC, my near neighbour, for his extreme patience in providing low power local signals for calibration and for his assistance in the erection of the test antennas. **PW**

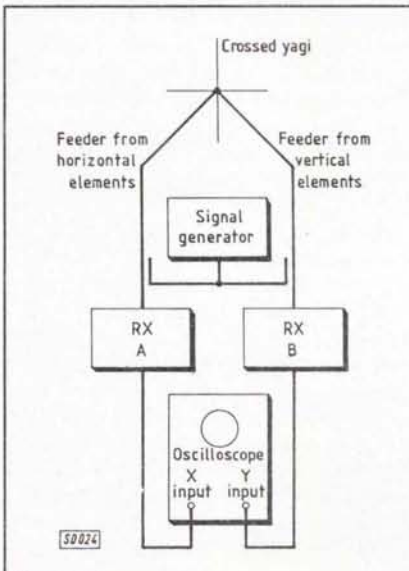


Fig. 2.1

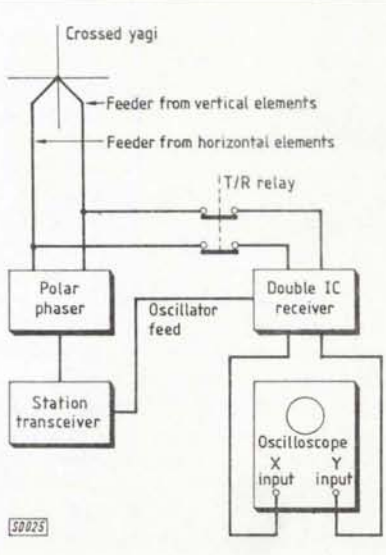


Fig. 2.3

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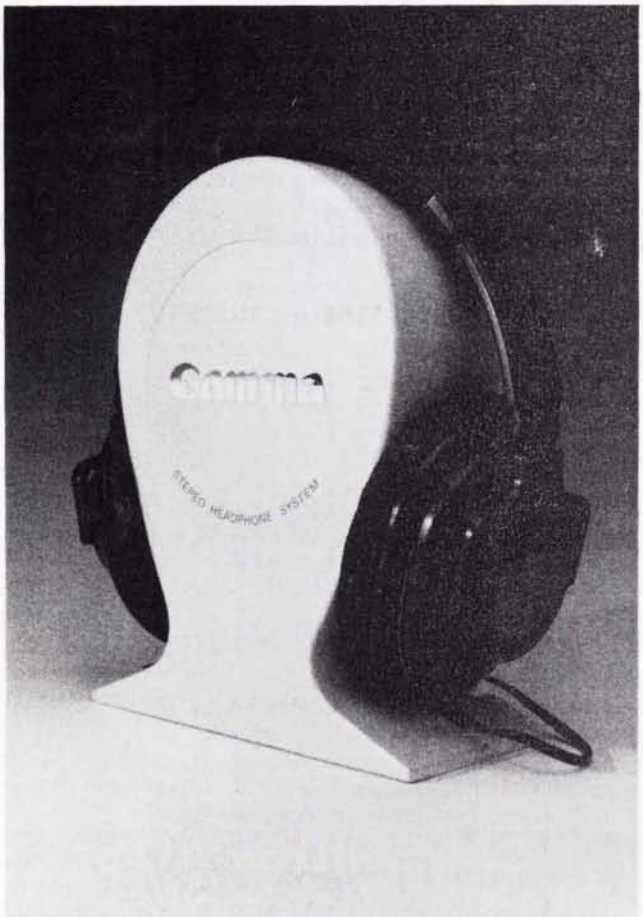

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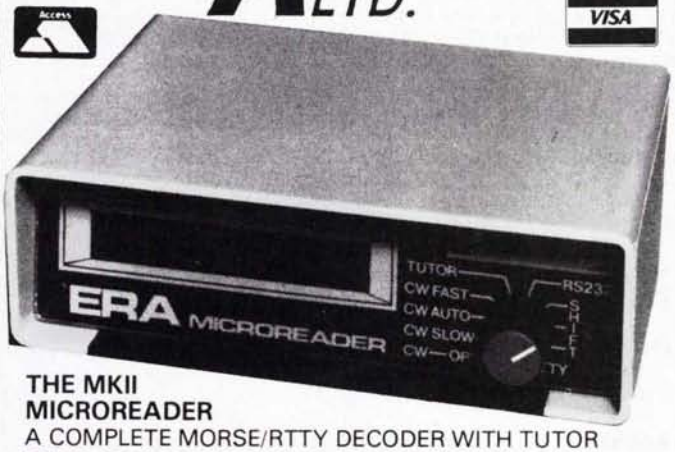

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A Future Lunar Radio Beacon and Transponder

Pat Gowen G3IOR puts forward an interesting idea for future communications

It has recently been announced that it is the intention of the USSR COSMOS space organisation to launch a Lunar Orbiter in 1992, and that part of the intended plan is to land a vehicle so as to obtain some samples of moonrock for research purposes. The USA is also displaying interest in a further similar mission, possibly as a joint venture. A NASA official recently stated that as part of the new "Golden Age of Space Research" NASA would "..schedule some 35 missions over the next 5 years, including probes to Jupiter and missions to Mars, Venus, Saturn and the moon, and that some of these would be co-operative ventures with the USSR..". In the light of this knowledge it has been proposed to the Soviet COSMOS, the USA National Space Agency and the University of Surrey UoSAT AMSAT group an inexpensive yet valuable experiment that could form a part of such a mission, which could involve non-commercial international co-operation to yield valuable data and communications possibilities.

Already the proposal has received enthusiastic as well as interested acknowledgement from both the USA and the USSR, and was welcomed with great interest when presented as a paper at the DATASPACE '89 conference at the University of Surrey, when financial backing for the project was generously offered by Junior de Castro PY2BJO, head of AMSAT Brazil.

Preamble and History

Radio amateurs around the world involved in scientific research have been experimenting in using the moon as a passive reflector of terrestrial v.h.f. and u.h.f. sources enabling world-wide 'e.m.e.' communications for the past twenty-five years. Up to now, the distance, the poverty of the reflectance and the dual path loss of over 250dB at u.h.f. has meant input powers of around one kilowatt to stacked monolobe antennas of at least 26dB gain, e.g. an e.r.p. approaching 0.5MW at 432MHz, and 10dB more at 129MHz. The advent of low-cost GaAs-f.e.t. pre-amplifiers and mixers has enlarged the possibilities for such communications to an extent that active experimenters no longer need to have such high powers and large dish antennas to permit and enable such communications. Simple antenna systems and low cost transmit-receive capability has now resulted in increasing the number of e.m.e. (earth-moon-earth) or Moonbounce stations to several hundred participants world-wide.The majority of these are using the 144MHz band, where, although the masking sky noise is greater, the path loss is some 10dB less. These stations are mainly in the first world, as suitable equipment is not readily available or affordable outside the USA and Western Europe. Even so, the poverty of signals returned by the moon are rarely sufficient to indicate strength levels, and unless an upgraded station is available, most contacts made are barely discernible through the noise level and extreme filtration, and are at levels so low that few path level variables can be properly investigated.

Lunar Variables

The propagation of the e.m.e. path is complex, and subject to critical irregularities, only some of which are calculable. One of these is the path distance involved, and therefore the path loss. Fig. 1 is a printout from the GM4IHJ Moontable Spectrum computer program. It shows the times of transit, maximum elevation, moonrise and set, and the angular diameter of the moon as seen from the UK from 14 to 31 October 1989. On October 14, the angular diameter is maximum at 16.7, but by October 28, due to the moon having changed its elliptical orbit from perigee to apogee the angular diameter has decreased to 14.7. When the moon is closest to earth at Lunar Perigee, as it will be seen by Fig. 2 from GM4IHJ's moontalk program, the returned signal should theoretically give an earth-moon-earth total path loss of -250.31dB at 432MHz when the moon slant range is at 353 447km. Two weeks later on October 28, as seen by Fig. 3, the moon will be at Apogee, a slant range of 403 698km, and the 432MHz path loss will then be 252.62dB, a further loss of some 2.5 decibels. In the first case, we are propagating through the magneto-tail, and in the second we are likely to see high noise levels from solar radiation. These variables make the difference between just getting readable echoes over the noise, or no echoes at all on basic systems.

Not only does the inverse square law huge dual path loss give such attenuation, but so does the poor reflecting surface of the moon, which absorbs more than 90% of the signal. That of the signal leaving earth which is captured by the small angular lunar diameter, averaging only some 0.5 degrees of arc, means the vast majority of the r.f. energy in any nominal beamwidth is lost to outer space, and that small amount which is reflected by the moon is not reflected directly back to earth, but widely scattered over more than 180 degrees. These path loss calculations do not always reflect the true practical case, as frequently echoes can be weaker at Lunar apogee than at perigee.

The frequent cause of total loss of the calculated expected signal can be considered to be due to a number of

LUNAR TRACKING DATA 14/10/1989

UTC	AZ	EL	EtoM km	AngDiam
2100	127.7	39.2	357448	0.55716
2115	131.7	40.9	357443	0.55717
2130	135.9	42.6	357438	0.55718
2145	140.3	44.1	357433	0.55718
2200	144.8	45.5	357428	0.55719
2215	149.6	46.7	357424	0.5572
2230	154.6	47.8	357420	0.55721
2245	159.7	48.7	357416	0.55721
2300	164.9	49.5	357412	0.55722
2315	170.3	50	357408	0.55722
2330	175.8	50.3	357405	0.55723
2345	181.3	50.5	357401	0.55723
0000	186.9	50.4	357398	0.55724
0015	192.3	50.1	357395	0.55724
0030	197.7	49.6	357393	0.55725
0045	203	48.9	357390	0.55725
0100	208.1	48	357388	0.55726
0115	213.1	46.9	357386	0.55726
0130	217.9	45.7	357384	0.55726

Fig. 1

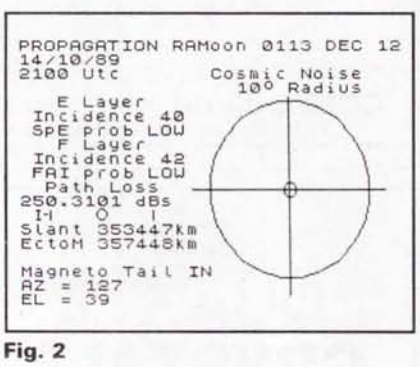

Fig. 2

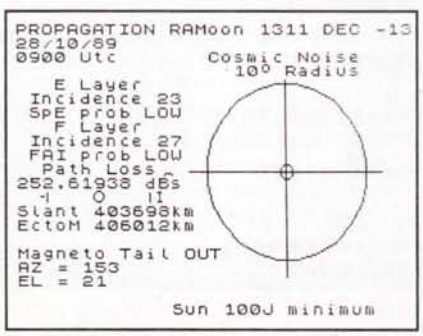

Fig. 3

factors. One is Faraday rotation, causing cross polarisation signal loss on linear antenna systems because of the circulation of the signal polarisation along the two way path due to the junction effect of the Solar Wind and the earth's magnetic field. The continuity of signals suggested by utilizing circular polarisation cannot be justified, as the signal-to- noise ratio required is invariably destroyed by the loss of the 3dB gain achieved by plane polarisation, and only extremely strong signals would come above this.

Cosmic noise, as stellar radio signal sources from radio-stars in the antenna lobe capture field give high background noise radiation that can mask and prevent reception of the weak lunar reflected signal flutter fading, brought about by in and out phasing of the signal by its reflection from the irregular lunar surface, differential absorption and reflection, refraction, and a number of other variables not yet fully investigated can result in considerable changes to the returned signal level on heard on earth.

Latest Findings

Recent work by radio amateurs have indicated that other more severe effects upon the reliability of otherwise dependable communications are exerted by both E layer and Sporadic-E absorption of the signal in earth's outer atmosphere, the slant range ion density seen when propagating at low elevation angles through the E and F ionospheric layers, and probable attenuation due to paths through and angular to the magneto-tail between earth and moon exist. This is believed to be evidenced by the fact that the radio path pointing accuracy of the narrow beam of radio antenna arrays to the moon for optimised signal is not always that of the visual pointing accuracy in terms of azimuth and elevation angles, particularly when the signal path to the moon passes through the auroral zone. Summing up, e.m.e. is a hit and miss affair, usually missing, and even when operative, giving signals often too weak for accurate assessment and measurement, they are usually deeply buried within the noise.

Justification

For the above reasons, it becomes evident that a radio beacon on the surface of the moon would be invaluable, as it would provide a known power (measured and telemetered by the beacon itself) from a standard earth pointing antenna of fixed polarisation that could be employed to evaluate the one-way moon to Earth path. It would further provide a means of accurate radio path lunar tracking, and a source of sufficient magnitude (as distinct from the weak reflected signal from earth located transmitters) to permit the accurate measurement of the variables of path attenuation, which could then be correlated to to solar and atmospheric phenomena. This could be used to provide valuable data in space physics terms of the effect of the solar wind, sunspot variables, plasma density, aurorae, etc., and additionally could evaluate the suitability of the moon both as a reliable permanent passive reflector and a re-broadcasting transponder for intercontinental wide band radio and television links at minimal cost when compared to those of multiple launched short lifetime geostationary satellites, etc.

Upgrading

A further viable step would be to provide the lunar module with a radio transponder that would not only be used to indicate the contrasting two-way path effects, e.g. the differences between the one way moon-to-Earth and the dual Earth-to-moon and moon-to-Earth paths, but also to provide adequate communications via low power links from earth stations for all of earth over elongated periods, and so produce the first antipodal transponder satellite contacts, e.g. between G and ZL.

The circuitry of the transponder need not differ greatly from that of existing amateur satellites, with a narrow bandwidth a.l.c. controlled transmitter on one band fed via a mixer/i.f. from a low noise receiver mixer/l.f. receiving upon an adjacent band. In view of the limited power from the lunar transmitter, and the path loss being lower by some 10dB on the lower band one third of the frequency, Mode B, 435MHz up to 145MHz down, or 1269MHz up to give 435MHz down would appear to optimize the capability of the system.

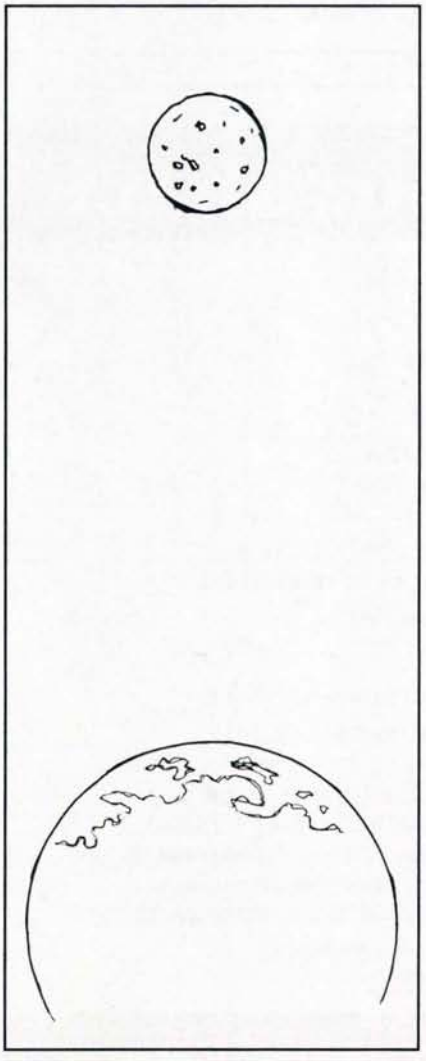

Fig. 4 Authors' original

The Experimental Package

The electronics of the beacon itself would consist of a simple low frequency phase lock loop oscillator followed by a frequency multiplier chain, with outputs at harmonically related phase coherent outputs at frequencies of 144.001, 432.003 and 1296.009MHz, amplified to give some 2 - 5 watts minimum (ideally 12 watts) of radio frequency power output at the antenna, which could be common fed at all frequencies. This would produce an adequate signal for nominal earth receivers to hear well above the noise level, so providing a maximum number of earth-based observers without the need for highly specialised equipment and antennas. The antenna should be linearly polarised so as to permit the measurement of Faraday rotation at each harmonically related output, and mounted above the solar-panel power source, which would act as an additional linear reflector, so eliminating any out of phase reflection variables from the irregular lunar surface.

Power System

The power would be provided from solar-cells via a power regulator, without even the need for a storage battery. NiCad batteries have a negative voltage temperature co-efficient, and are vulnerable to the large variations in temperature that would occur between the lunar night and day. They tend to short-circuit on failure, thus reducing the useful lifetime of the experiment. Furthermore, although special thermal insulation could be provided as possibly viable within the limitations of volume and the confines of the experiment, the risk of battery loss through freezing in the long lunar night is still very real. The absence of a battery would mean that a signal source was only supplied when the package was in full sunlight, although a minimal power source might be attainable even in earthlight by employing a sufficiency of the new higher efficiency GaAs solar cells. The switching on and off of the beacon would thus be determined by shadow, and so provide a very useful facility to earth astronomers, who could then investigate the irregular oscillations of the moon at lunar sunrise and sunset at the package placement point. Some insulation would definitely be needed, as circuit boards and components could also be materially adversely affected by the extremes of temperature envisaged.

Parameters

A further enhancement would be to provide the signal (between long periods of plain carrier to enable the accurate measurement of amplitude, phase, Doppler shift, polarisation changes, scintillation and libration fading) with telemetry modulation to indicate internal and external temperatures, solar panel voltages (so determining solar lighting variables and earth lighting additives), impact sensing piezo-electric points for micro-meteorite detection, solar radiation variables from conventional Geiger-Muller tubes and/or ionisation detectors, and even moving coil detectors for "moonquakes". A host of other possible parameters could be observed, many of these probably highly valuable to schools, colleges and universities, students and scientists, astronomers, siesmologists, physicists, and other faculties.

Building Testing & Funding

The entire package could be financed, built and tested under the auspices of the international AMSAT organisation. Facilities for this already exist within the USSR, in Germany, Hungary, France, the USA and here at the University of Surrey in England, where numerous highly successful orbiting satellites have been successfully constructed. The parts, electrical, electronic and mechanical, could be made available and integrated to a functional unit following suitable structure, thermal, electronic and electrical design by the joint activities of these centres of expertise, and could be funded by donations from radio amateurs from the world international community. It would provide an international non-profit making basis of joint expertise, and the results obtained from such an experiment would provide a host of valuable data to scientists engaged in many fields of activity, who would undoubtedly assist in the funding, particularly if an experiment of specific interest could be included as one or more parameters on the telemetry.

Whilst the both the local and the international AMSAT community have the means of design, construction and testing of the experiment described to a functional model, and assistive availability of launches of satellites into orbit, they do not have the resources to enable the soft landing or manual placement of such an experiment onto the lunar surface. Whether this becomes feasible is up to the respective launch agencies, the level enthusiasm we can stimulate, and the degree and level of scientific uses to which the package could be put. ***PW***

Proposal

It is proposed that as a part of the Soviet 1992 lunar expedition or any similar venture emanating from the USA, ESA or as a part of any joint venture, we ask that further consideration be given to the possibility of placing this pre-constructed tested experiment onto the surface of the moon. If practical interest is demonstrated it would then be possible to commence immediately on the planning as to the feasibility, and if this is positive, to then assess details as to the weight and dimensions of the package. Note that this proposal is a concept only, and not as yet an ongoing or defined future project. The viability and fruition will be to be determined by both the possibility of world-wide funding, the determined interest of supporters, and the probability of having the final functioning unit, be it transponder or beacon, delivered to the Lunar surface by any assured future mission.

QSOs covering half a million miles path range giving total earth coverage may become possible in the future for all of earth's radio amateurs if the plan can be brought to a practical level.

The G2BX

Antenna Clinic

Session 10

Quite a few queries have been received about seemingly unaccountable reasons for variations in transmission and reception, mostly at 145MHz, during what might be called "normal" conditions, i.e. atmospheric or line-of-sight propagation. One or two were concerned with the effect of so called "lift" conditions (tropospheric propagation) usually announced on TV "as being due to weather conditions". True perhaps, but only sufficient to satisfy the viewers! The subject of propagation at v.h.f. and u.h.f., including anomalies is one of some complexity, and would require several articles to deal with it completely. However, the following selected queries provide an opportunity of including a little extra about v.h.f./u.h.f. propagation over what is loosely termed "line-of-sight" distances.

Q "A station I work frequently and about 16km away is normally received at S9+ but on some days the received signals may be down to S2 or 3 and even into the receiver noise level. My signals to this station are always constant. What causes this to happen?"

A Since the "propagation" distance is virtually line-of-sight, it is doubtful whether occasional reduction or loss of received signal one way only is caused by other than some fault at either end. There might be some high ground, perhaps heavily wooded, between the two stations. Wet trees can absorb v.h.f./u.h.f. signals to a considerable degree but when the trees become dry the absorption is reduced to a level that otherwise has no serious effect. But this would almost certainly affect reception by **both** stations.

The line-of-sight distance to the horizon from an antenna at a given height can be found from:

distance to horizon (D) in km = $4.124\sqrt{H}$(metres)

where H = the height of the antenna

The maximum line-of-sight distance between **two** elevated antennas is equal to the sum of their distances to the point of the horizon as in Fig. 1.

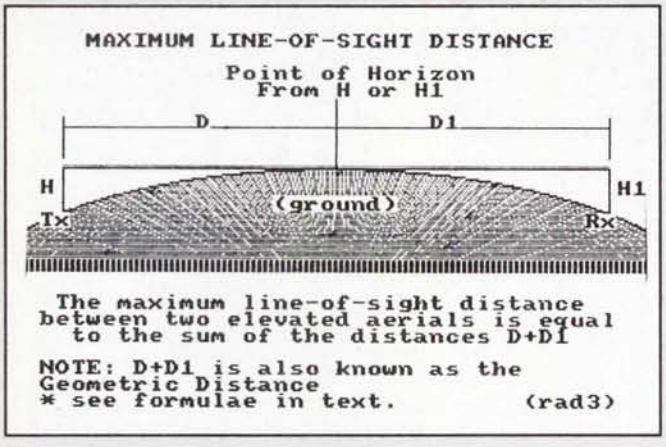

Fig. 1

Q "I frequently work a station about 35km away. The received signals, in either direction, average S8/9 but will often slowly fade to virtually nil and just as slowly return to average. One might expect this during 'lift' conditions with hot weather and a high pressure region over the area, but why does it occur when such conditions do not exist?"

A With an average height antenna, say 10m or so, propagation over 30 to 50km is "atmospheric" (sometimes called space-wave propagation). Signals that are otherwise fairly consistent in strength can be affected by changes in natural atmospheric refraction. At v.h.f./u.h.f. the "radio distance" is increased beyond the line-of-sight distance by normal atmospheric refraction as illustrated in Fig. 2. Average working distances from a transmitting antenna 10m high to a receiving antenna of given heights are shown in Table 1. Tables of this nature can be compiled from the formula given earlier.

Not all v.h.f./u.h.f. users appreciate "lift conditions".

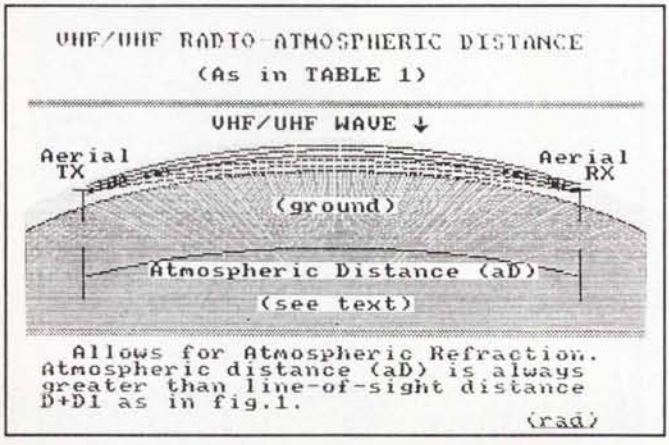

Fig. 2

VHF/UHF RADIO 'ATMOSPHERIC' DISTANCE

TRANSMITTING AERIAL HEIGHT- 10 Metres

RX Aerial Height Metres	Radio Distance Km * * *	RX Aerial Height Metres	Radio Distance Km * * *
1	17	13	28
2	19	14	29
3	20	15	29
4	21	16	30
5	22	17	30
6	23	18	31
7	24	19	31
8	25	20	32
9	25	21	32
10	26	22	32
11	27	23	33
12	27	24	33

rad2

Allows for Refractive Effect of of the Atmosphere

Fig. 3

Q **"Other stations in my area receive our local repeater station, distance about 48km, constantly and at good strength. To me, the repeater was barely readable and could not be accessed despite the fact that my vertical antenna is reasonably high. I say 'was' because with a horizontal antenna, the repeater station is S9+ and no problem to access. What is the reason because the repeater station has a vertical antenna?"**

A This anomaly was confirmed by a series of measurements made at one tome by the author which showed that complete, or partial changes, in the polarisation of a transmitted v.h.f. wave can take place. This can be due to ground reflection at some point between stations which causes the polarisation to become elliptical. For example, the original transmission is **vertically polarised**. If the reflected, and now, elliptical wave is predominantly horizontal then the received signal will be strongest when the antenna (receiving) is horizontal (or vice versa).

It has been found that changing the position of either the transmitting or receiving antenna can restore polarisation to whatever it should be. Generally, the polarisation of a "space wave" (propagation partly direct and partly ground reflected) remains constant and one reason why we orientate antennas accordingly in the first instance.

Finally. A problem arising from tropospheric "lift" conditions, favoured by radio amateurs but not appreciated by certain other v.h.f. users and which resulted in a frantic telephone call to the author from a certain large East Coast town main Police Station.

Q **"We cannot receive signals from the low power 'personal' transceivers used by policemen around the town because of very strong blanketing signals from the continent. We understand the reason is due to the hot weather but what can be done to overcome the problem?"**

A Three questions. Is the station antenna used for both transmitting and receiving, if so what kind of antenna is it and where is it located? (The answers were, yes to the first and the antenna is a multi-element colinear located on the station roof about 100m from the sea front were the other two replies).

There are two ways to solve the problem. Change the weather (not possible), so change the antenna. To what? Ball in your court readers, but no prizes!

Recommended reading: *VHF/UHF Manual* by Jessop. Chapter 2. Published by the RSGB.

Cirkit NEWS

NOVEMBER 1989

NEW CAT OUT NOW!

Over 3,000 product lines feature in the Summer 1989 edition of the Cirkit Constructors' Catalogue, available from most larger newsagents or direct from the company priced at £1.50. The latest books, an RF frequency meter, two new PSU designs and a 3.5MHz converter are among the innovative new kits this issue, while our construction project - a 2 Watt stereo amplifier - is bound to prove an absorbing activity for dedicated constructors. In the test equipment section there's a whole new range of multimeters, a bench DVM and a triple output PSU.

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On The Air
On The HF Bands

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

ON4UVW will be active as in previous years on the anniversary of Armistice Day, WWI, November 11. If you work them, bureau QSLs go by way of ON6PJ; the direct QSL route is to Danny Commeyne ON4ACB, Rozenlaan 38, B-8658 Dadizele.

Bouvet

The LA expedition to Bouvet (Club Bouvet) is still collecting funding at the time of writing, and hoping to operate in December. Their latest newsletter to hand, dated August 14, says that they have been in touch with two other groups, but that no-one has the necessary approvals for a 1990 visit to Bouvet, so they doubt if anyone else will manage it. However, there is now a press release from a second group, led by W9SU who intend to arrive around 2 February 1990. This group would appear to be fully funded, partly the by the *Saturday Evening Post* Society and the *Saturday Evening Post Magazine* of Indianapolis, plus member funding, to the tune of $120000. Equipment is by courtesy of Yaesu, and their Chip Margelli K7JA is a part of the 16-strong landing team. The same call 3Y0B may be simultaneously on several bands. The LA team were invited to join in but for various reasons have declined. The QSL address is: Joseph T Pinella WA9VGY, 6316 Greenleaves Road, Indianapolis, Indiana 46220 USA. The card will be a double fold-out full colour job with many black-and-white photographs of the island, the operators and so forth. There will also be an Award, available for any station or s.w.l. making contact on three or more bands. Either enclose QSLs or a list and covering note, to the address given above, along with a five-dollar bill. The award will be mailed pre-paid and flat with card protectors. The documents make it clear they aren't interested in partial calls, but they will use all bands including WARC. However, I note that, embedded within the 28-page press release put out by the US group, is a statement that the existing landing permit and operating licence covering the originally proposed 1989 date will be renewed during the month of October 1989. I deduce from all this that the LA group don't think that will happen, and the US group think it is a mere formality..... do I scent the beginnings of a busted flush, with neither group actually appearing?

Hurricane Hugo

This was the most destructive for a decade, and many people suffered. The *DX Bulletin* mentions that KP4A lost his giant three-element beam for 3.5MHz, while John Ackley KP2A lost five of the six towers and suffered much water damage when the hurricane broke most of the windows in his home. As for Montserrat, Hugo was the first hurricane to actually strike the island for 62 years, but it made up for lost time. Virtually all the native islanders lost their homes, the electricity station shut down, the airport was covered in tons of rock and mud. The editor of *TBDX*, Chod Harris VP2ML, lost his home, the Last Resort, made famous by various expeditions; it was totally destroyed.

More DX

OE2CHN is in the planning stage of a world trip starting September 29 and going through to February 1990; the planned itinerary includes VS6, XX9, BY1, BY4, JA, KH6, W6, XE, HK, HC, OA, CP, CE, CE0 (Easter Is), LU, CX, ZP, PY, YV, 9Y (Tobago), 8P, J6, FM, FG, V4, V4, KP2, KP4, HI, HH, 6Y, C6 and W4; there may be slight changes particularly in the Caribbean. I assume Chris will be active from as many of these spots as possible.

ZM7VS will be on from Chatham Is, January 16-30; mainly c.w., five kHz up from the band edge, with QSLs to home call ZL2VS, direct or via the bureau system.

By now the first A61AD activity, by WB2DND will be over; he designed and used the same computer logging program as N4NW used in Africa, so beware if you tried for insurance contacts!

Interested in sunspots? PA6SUN will be aired to celebrate the peak of the cycle, from Simon Stevin Laboratory in Hoeven; 0800-2100Z on November 11, 0800-1500Z on 12th. Look around 3675, 3775, 7075, 14.275, 21.275, 28.575MHz, and on 50.110 and 50.210MHz. There may also be some c.w. and RTTY operation on the h.f. bands, with a special QSL card; via the bureau.

Obituary

For many years the name of Eric Trebilcock BERS 195 (later BCRS 195) stood at the top of the s.w.l. ranks; to receive a report from Eric was often a surprise, since he seemed to pick on the weaker stations for his reports from Australia. To read of his recent death in *DX News Sheet* was indeed a shock, albeit a moment's reflection would show that Eric had been a well-known s.w.l. since at least the early thirties. Eric Trebilcock will be missed by many friends worldwide.

Congratulations!

To Fred Hall G3NSY. Fred is the only white stick operator I know of who has made it onto the DXCC Honour Roll, with 315/329 countries. Fred is also the active chairman of the Shrewsbury Radio Club. G3NSY's success he attributes to many things other than his own persistence but I know better. Congratulations G3NSY, and may you soon have your last few countries booked in.

WAB

I have mentioned this activity so many times thanks to John Fitzgerald's letters; but I should also mention the various Awards available, members' QSL cards, Record Books, all with the aim of helping disabled amateurs and s.w.l.s. WAB net/activity frequencies are: 1.93-1.95, 3.76, 7.060, 14.28, 21.32, 28.46, 28,66, 50.15MHz and above. Details from Brian Morris G4KSQ, Membership Secretary, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.

Reports - Top Band.

Just one report covering the band this month, from **G2HKU** (Minster) who mentions ON7BW on sideband, and ON4CW worked on the key. However, I could add **G3BDQ** (Hastings) who simply commented that on every occasion he had a sniff round the static was S9 or worse.

The 3.5MHz Band

On this band, let **ON7PQ** (Kortrijk) lead the way; Pat is a c.w.-only operator, who mentions OH6YF/OH0. UF6FBI. VE3BCH, UA9WOB, EK3LT, U0AG, KP4A, PZ1DV, KO0U, FY5EW, HK1AMW and JX7DFA.

SWL **Mike Davis** of Thornton Heath was recently laid low by an attack of chickenpox, so with nothing to pass the time an 80m direct conversion receiver was knocked up, and a study made of propagation texts, leading to some attempts at prediction using the details from the RSGB News bulletins. All this learning paid off when the little receiver produced s.s.b. signals from W3JOR and VE1RCMP; the latter took a while to find beneath the pile-up and then to positively identify, but by and large the operating standards were pretty fair.

Nice to hear that **Angie G0HGA** (Stevenage) has a bigger signal once again, thanks to having the rig back in the shack. However, a new a.t.u. has to be knocked-up to improve the matching level. On the QRP c.w., at 2 watts, she worked G3GFG, G4CWN, G3BRV, GW0FJT and DF3XN, while the higher power of about 20-30 watts added G3AGF, G3PDH, G4UZN, G2ACG, ON5NO, SP1JZR, DL1ECA, PA0GE/MM, DJ1FE, F6GCT, SP2HGG, OZ1EQC, FD1ONJ and DK7VW.

The 7MHz Band

For the twenty-odd years during which I have regularly written a DX column, 7MHz has been a band where the dab hands work their DX and keep quiet, while the less knowing ones have a quick listen, say "What a hopeless mess" and turn to another band. Even the 5BDXCC didn't really dent this image, and it holds to this day. However if one presses the button labeled "RF Attenuator" one finds the band a mite different!

G0LJB (Whitehaven) runs a KW Vespa, a 20m end-fed wire, and his c.w. managed FE5UH, DL5JF, F8MA, LA2CFA, PA3AAC, GJ4WRR, ON4AHQ, PA3ATA, DL1SCO, plus G contacts such G3ZQS, G4IXL, G0BYG, G0HGA on the club call G0IPX/P, G0ENV, G4ZGK and G4JIZ, all of these being fellows FISTS club members.

G4ZMI (Headless Cross) is a worried man.... on 7 MHz c.w. he raised UL7AM / UT9UQ in an almighty pile-up but he doesn't know why! At least that's what the letter says, but I think Neil actually meant that he didn't know what the Russian call was all about. Seriously, the number of these internal DXpeditions, and of Russians operating away from home seems to indicate a significant liberalisation of their licensing, which just can't be bad.

GM4XQJ (Falkirk) notes a disturbing new trend on 7MHz, where a s.s.b. net has started up on 7.035 under G3KCL, even when there is already a c.w. contact going on upon the frequency. All I can say is that

the call isn't in the current Call Book or recent issues, so perhaps the operator doesn't know about the Band Plan - will someone please tell him? GM3XQJ himself runs strictly QRP c.w. at two watts, with which he made it to DK6XM, EI6GU, F9)L/P, G3LP, G3PH, G3BGR, G4DMC, G4PNH, G4TKQ, G4VPM, GI4PCY, GM/DF2XR/M, GW3IVK, OY3QN and Y39RE/P.

Now to Pat of ON7PQ, who made his number on c.w. with JA5RH, VS6UO, VK2APK, KE9A/DU3, CE0GZ (JF Is), JE1JKL/9M6, SV0CR, JX7DFA, PZ1DV, UG6GAW, UB5MAL/UA1O (Franz Josef Land), VE8VFC (Victoria Island), VE7FPT, SV2/DK6AS/P, LU5HJD, VE7CC, VP2EXX, CO2VG, 4Z4DX, RV0YF for CQ Zone 23, HZ1AB, WL7E, JX7DFA and HC8/WA7EGA.

On 7MHz, G0HGA has been knocking them over like ninepins in her joy at getting the rig back on the bands; there are enormous numbers of Gs, far too many to list, but one notes such as G4EZF, and notably for me, G3RKJ, who used to be a dab hand on Top Band, plus GMs, GWs, GI4BBE, GJ5NO, GD0IDU and EI9BT. In addition, almost as many European stations, including Fs, DLs, Y24SD, ONs, PAs, an assortment of Is, UP2BOQ, UA4NAK, UC2LAW, UA3SDN, HA1RJ, LZ1RN, a couple of YUs, two OZs, two LAs and OY2H. Outside Europe there were K2SB, N2MM, N1FNN, WB4AJL, W3LT and N2UU.

Special Event

And special pleading too! On a weekend in April 1990 we will have a "sponsored" station operating for 24 hours from Brynderwen Lock on the Montgomery Canal. Funds raised by sponsorship (and donations, hint, hint!) will be devoted equally to the canal restoration funds, and to Powys REMAP panel, in aid of the disabled. The site will be very clearly visible on the east side of A483 (T) just north of Abermule, where road, canal and river are all side-by-side.

WARC Bands

G0HCZ (Newport IoW.) usually finds his spare time for operating at 2100Z or later, when the bands aren't always exactly popping. However, on 18MHz, Derek managed to hook JA8BWW, JA9BFN, JA9FCB, LU9DJD, OA4BUX, W5SAL, KA7MCX, K6LL/7, VE2AJS, VE3NYT and VP8BXL (Rothera Base, British Antarctic Territory).

Next is G2HKU who used his c.w. on 10MHz to hook VK3AUC, VK5FE, ZL4HB, FY/F3OA, HB0/DL1GK; on 18MHz there were s.s.b. contacts to HZ1AB and ZS8MI (Marion Island), plus c.w. to KB4T, I6BQI, JA4AO, HB0/HB9NL, WA4SNI; as for 24MHz, the only contact was with s.s.b. to ZS8MI.

The c.w. signal from G4ZMI was loaded up on 18MHz to collect up LU6XPA, VK3MR, ZD8VJ, VE5DCKP4BJ, D44BS, LU3HAN, TA2AU, JR4GPA, JG6MQI, JA6HW, JA4AO, LZ2DX, OH6GL, JA1IFP, EA5FNL, K2LV, LU9HGW, N3GZV, JA4CSH, JA2FJP and JQ1QKK.

The 28MHz Band

This band has been like the curate's egg. Sometimes bustin' out all over, other times a frying noise as of a tired band composing itself for slumber. However, G0HCZ, despite a shortage of time, managed to raise K4XS and VK6CI on s.s.b.

G2HKU took a peep at the c.w. end, and came away with UZ9SWW, RL9PYL, RA9JX, 5B4ES, UA9YNC, HL5BDS, W6TZD and HK3RQ.

Over to G4ZMI: Neil's keying was to attract the attention of LU2EPN and PU2LOK.

G3NOF (Yeovil) has been all but inactive thanks to an elusive and intermittent fault on his TS-940S since August 30 and still not cured. However on 28MHz s.s.b. contacts were made with BY8AC, P43WLP, TL8RM, XX9SW and ZS1IS (Walvis Bay).

G3BDQ says he was only on the band for a short while, but he did hook up with XX9SW, HL5BLT, JA5OVU and UM8MK.

GM4XQJ and his QRP rig made their number with DL3DRN, F6ESG/OD5, JA1PTR, JA6BIF, JH1AEP, KA1DXP, NB6G, RA4PM, UA8AWZ, UJ8JCM, UV9CC, UW3AA, VK6OE, W6PM, YC0MCA and YO4CPQ.

As for the c.w. of ON7PQ, Pat notes his contacts with TJ/IK1JLL, 9Q5UN, JAS assorted, VS6BG, ZS1IS, FP5DX, 3DA0BK, HL5BDS, KX6OI, TT8CW and 3B8CF.

The 21MHz Band

Probably the best compromise for anyone restricted to a single band, at least for the moment.

G2HKU stuck to key mode here, and managed HK3RQ, UZ9AWZ, UL7BX, KE8CF, UJ8JA, JA4YJA, N3RD, LU1EWL, UA9FXJ, PP2WV, LU1HNL, OH6NTO/CE3 and W2BAI.

Now to G3NOF who offers CI3XN, CI7RG, HL5FEE, KB0NL (N Dakota), UA0BDU/UA1O, UW0LAP, VK8NUE and 3D2RJ (Rotuma).

G3BDQ had himself a ball here. John attracted the attention of A22RA, CI1AT, CI1YX (both Canadian specials), CL7YC, D44BS, EL2WK, EL8BS, HL1AIW, JY5IN, SV8/I5DCE (Mykeros Is), T5MF (Somalia), VU2WAP, VU2WS, VE7FJE, YC2BMW, YC2GW, SM0OIG/YN for a rare 'un, Z21HD, ZD7DP, ZD7KM, ZS1IS, ZS3DM, 4S7PB, 5H3GB, 9Q5XX and a Gotaway in the form of 3X1SG. John wanted this one badly and waited 40 minutes while he finished a three-way contact.... the guy finished and immediately went QRT!

The QRP c.w. from GM3XQJ included JJ3JJL, JH7AKT, UA9KL, UZ9WWG, W2TC and YZ3BCA.

Now to ON7PQ, who found SU1EE, HC5AI, J52US, TZ0MAR, ZS1IS, JE1JKL/9M6, 5H3TW, 9Q5DX, KH0AM/KH2, UZ9OWA/UA0X, FK/JA1CMS and TT8CW.

SWL **Ron Pearce** (Bungay) has been playing with simple receivers, and he listened with his latest one-valver recently and heard VO1SA, JR1RCQ and 5B4TI.

Finally 14MHz

Where it is all represented, whether good bad or indifferent! G0HCZ made it on s.s.b. to 9N1MM (QSL via IK0GRS).

G4ZMI made a couple on the band, in the shape of JA0DWY and PY2PAR, and then seems to have hopped off to 18MHz.

It is indeed unusual to get such a short 14MHz list from G3NOF, but before he "broke the elastic" in the rig, he did make his s.s.b. presence felt with J37ZY, P40MA, VU2SMN, ZS1IS and 9K2YA.

Looking through the long list from G0LJB I have to note W1HRO who has been around since 1931, PP5AVE, K2QIL, K4YR, EA7BWW, N2DAN/4, W2AG (both RSARS members as is Paul), AD3N, W3TUX, VO1JX, WF9J, CE6NOT, EA7AQL, WT5K, KA3QOO (a YL), VE3KLM, HB0/HB9NL, W2EZS, N4ONR, HK6BTC, N4KER, AK1C, UB7VA, WA3PGQ, CO7PG, RW6AH, WT5K and shoals of smaller fry.

The GM4XQJ QRP made it on 14MHz to OH9VL/3, R4PWY, YU5ET and a mystery YH6SG.

Over to Pat at ON7PQ; on 14MHz he tangled with ZF2NZ, FO0MGZ, F6DYY/6Y5, K6RR/6Y5, J73A, ZS3AT, YB0DPO, 5W1IV, 9M6SDX, ZS1IS, UA1ANP, UZ9OWM/UA0X, VE8VFC, FK0AW, V31BB, FO5JR and ZL7TZ.

Ron Pearce's one-valver, just to show the way, was used to listen to 4X4DK, KD6USN, VK2PK, K1MAN, and W5ESI/MM which seems to be somewhere near world-wide coverage - so who needs to go commercial, he chuckles.

Finally, **Bill G4KKI**, who says he is still running the QRP and still enjoying it as much as ever. The HW7's two watts applied to 14MHz and a much bent centre-fed 33m connected him nicely to PY7HQ, VK3NM, VK2RAS, 3B8SN, NU3M, RV9FM, UD7KWA, 9H3KL, plus loads of other Russians.

VHF Up

David Butler G4 ASR
Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP

Aurora

The first reported aurora during the month occurred on September 15. **Jim Smith G1DWQ** (DOR) detected auroral signals, at 2015UTC, on the Irish TV carrier, centred on 53.757MHz. Signals from Swedish TV carriers were copied at 55A but no amateur signals could be heard.

This event must have been in progress for some hours, as **Paul Feldhahn G7CFK** (MCH) mentions that he first noticed the aurora, on 50MHz, at 1755UTC, but despite putting out a few calls, no contacts resulted.

A late night event, catching many operators out, occurred on September 18. **Eric Gedvilas G8XVJ** (CHS) first detected activity at 2230UTC, when checking the beacons DL0PR (144.910MHz) and GB3LER (144.965MHz). Both were fully auroral at this time. Despite using s.s.b. Eric made a number of good contacts. First up, at 2251UTC, was DG3HS (JO53) peaking 59A. From 2300UTC, contacts were made with SP2NJI (JO92), SP9EWO (JO90), both at 59A, and with a number of German operators in locator squares JO30, 31 and 52. At 2315UTC, OZ6TY (JO55), was worked. From 2320UTC, further Polish stations, SP5ATS (KO02) and SP8AOV (KO11) were contacted, Eric getting a report of 59A+ from the latter station. Other contacts included Y25WA and miscellaneous GM stations. The aurora disappeared at 0010UTC but returned around 0530UTC the next morning. Activity was quite low but even so Eric managed to work, between 0625 to 0645UTC, G8ESB, GM4CXM and PA3ECI. At 0700UTC the aurora had almost disappeared but even at this time DL0PR could still be heard aurorally.

David Shaw G8MDG (YSW) first detected the aurora at 2240UTC when

GW8ELR was heard at 57A on a beam-heading of 45 degrees. Moving the antenna to 70 degrees, s.s.b. contacts were then made, from 2250 to 2331UTC, with DC6SN, DG3HS, DG6BAK, DD9EN, DH9KAE, DK9OY, GW8OFX and SP9EWO (JO90). Gotaways included SP2NJI, SP4CJ and another Polish station working SM5NVF. The early morning aurora allowed David to work G7ENG at 0655UTC and G4YRY (DOR) at 0704UTC. Just like the report from G8XVJ, David noted that DL0PR was still 54A at 0700UTC but no other activity could be heard.

Jim G1DWQ was unable to participate in the event, being plagued by computer interference which wiped out the 50MHz band. He had more success the next morning when he heard GM3WYL 59A, on s.s.b. at 0615UTC. Contacts, on c.w. were then made with G3CCH at 0650UTC and G0JHC at 0658UTC.

Ela Martyr G6HKM (ESX) missed the start of the aurora, making her first contact at 2323UTC. Contacts were made, on 144MHz, with G, GI and GM stations.

Another aurora occurred on September 26. Unlike the previous event, this one was at a far more sociable hour. It started around 1600UTC, continuing for over 2 hours. A second phase, commencing from 2000UTC, burbled away, very weakly, for many hours.

Eric G8XVJ, concentrating on 432MHz s.s.b. worked G1GEY (TWR) at 1802UTC. Use had to be made of the second v.f.o. as the doppler shift was approximately 7KHz.

North of the border, **Mike Robertson GM0BQM** (CTR) went out and operated portable, on 144MHz, from a local hilltop. Using 60 watts and a 17-element Yagi, he worked stations in DL, F, HB, LA, OK, OZ, SM and SP.

I first noticed the event at 1630UTC, the beacon GB3RMK on 50.060MHz, being 59A at this time. Moving up to 144MHz, the only activity heard was GM3NHQ (TYS), this station being worked at 1643UTC. Moving back down to 50MHz, a 15 minute c.w. session, between 1650 to 1705UTC, produced contacts with OH2FQ (KP20), SM6CKU (JO67), PA0HIP (JO21) and GM3NHQ. Beamheading for all qso's on 50MHz was 20 degrees. Moving again, back to 144MHz, showed that the band had woken up to the fact that an aurora was taking place. Activity was much better and c.w. contacts, between 1715 and 1820UTC, were made with EI5FK, F6DBI (IN88), DJ2QV, DK2BJ, DK3UZ, DL5BAC, DJ6OL, DL6NA, DL7UK, DF9CY, DJ9YE, DL9LBH, OZ3ZW, PA2GER, PA2TAB, PA3DFG, PA3FJY and SP2HHX (JO94). The beam-heading for these contacts was between 50 and 60 degrees. At 1825UTC, as 144MHz signals were fading, a move down to 50MHz was instigated but signals on this band were also rapidly diminishing. A quick contact with GD3AHV (IOM) was completed before the first auroral phase disappeared. Staying on 50MHz, it was interesting to note that between 1845 to 1855UTC, auroral signals from GB3NHQ, GB3RMK and GB3SIX could be heard on a beam- heading of 310 degrees, but no one else had the initiative to try for qso's on this heading. A weaker second phase, detected at 2105UTC, produced 144MHz contacts with stations in DL and PA. The event finally fading out at my location, in Herefordshire, at 2125UTC.

Dave Lewis GW4HBK (GWT) stayed on 70MHz and worked, between 1730 to 1810UTC, GD6ICR, GM3WYL, G1SWH, G3UKV and G4JHA. The contact with GM3WYL in IO75 was particularly pleasing as he was only running 15 watts to an indoor HB9CV antenna.

Annual v.h.f./u.h.f. table January to December 1989

	50MHz		70MHz		144MHz		430MHz		1296MHz		
Station	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Total points
G1SWH	61	26	64	6	87	19	57	6	—	—	326
G8LHT	53	16	34	5	78	31	51	14	7	4	295
G6HKM	57	30	—	—	79	27	40	15	23	7	278
G0IMG	66	24	40	5	55	12	27	5	—	—	234
G1DOX	30	6	48	6	64	16	27	3	13	2	215
G6NB	57	30	—	—	56	15	23	3	—	—	184
GW6VZW	58	23	—	—	75	20	—	—	—	—	176
G4XEN	21	9	13	2	63	21	33	9	—	—	171
G8PYP	32	22	—	—	54	25	24	10	—	—	167
G4ZTR	10	12	47	7	56	24	21	7	—	—	162
G4LDR	43	10	—	—	44	14	37	9	—	—	157
GM4CXP	28	11	4	1	61	19	4	2	—	—	130
GM1SZF	33	11	—	—	57	16	5	6	—	—	128
G0EHV	—	—	44	5	62	16	—	—	—	—	127
G8XTJ	40	14	—	—	54	13	—	—	—	—	121
GD4XTT	34	8	—	—	49	10	11	4	—	—	116
G3EKP	25	15	27	6	25	7	5	4	—	—	114
G0EVT	23	19	—	—	33	26	6	6	—	—	113
G1VJP	15	4	—	—	74	12	—	—	—	—	105
G0FYD	—	—	—	—	82	22	—	—	—	—	104
GW1MVL	—	—	—	—	62	20	3	4	—	—	89
GW4HBK	—	—	58	6	—	—	19	3	—	—	86
G1TCH	17	14	—	—	34	12	—	—	—	—	77
G7CLY	—	—	—	—	57	14	4	1	—	—	76
G3FPK	—	—	—	—	51	19	—	—	—	—	70
G4VOZ	—	—	41	6	—	—	17	4	—	—	68
G7CFK	41	25	—	—	—	—	—	—	—	—	67
G1CEI	5	3	—	—	46	10	1	1	—	—	66
G1GEY	4	2	—	—	—	—	34	8	2	2	52
G0HGA	—	—	—	—	32	12	—	—	—	—	44
GM1ZVJ	4	3	—	—	22	14	—	—	—	—	43
G4AGQ	—	—	12	2	7	7	6	3	—	—	36
G6MXL	2	1	4	1	7	4	8	5	—	—	33
G0HOZ	—	—	—	—	25	4	—	—	—	—	29

Paul Baker GW6VZW (GWT) runs a 50MHz station consisting of an FT690, a 15 watt Nevada amplifier and a 3-element MET Yagi. He put this to good use during the aurora by working GM1XOG (SCD), G1RST (NLD) and a number of other stations in IO83/93. Stations in EI, GI, GM and SM were heard. Paul had to beam due north to work all stations.

A late report, regarding auroral activity in August, was sent in by **John Hilton, GM1ZVJ** (LTH). Contacts, via Ar, were made with GI4KIS (ATM) on August 17, GM6RGN (SLD) on the 21st. An event on August 23, gave John his first German contact, via this mode, when DL3LAB (JO44) was worked. A new locator square, IO81, was also worked, by contacting G0DKM (AVN) at 1730UTC.

As auroral activity will be prevalent for the next few months, some tips will not be amiss. Firstly, you must consider whether you want to use s.s.b. or c.w. Obviously, for some operators, there is no such choice and use must therefore be made of an inferior mode. Working weak signal auroral dx is infinitely easier on c.w. In fact any weak signal work, be it on tropo, meteor scatter or e.m.e. for example, justifies the use of c.w. Having chosen your mode you must then adopt a few techniques which help in enhancing the intelligibility of the received signal. Signals reflected from the auroral curtain exhibit some form of doppler shifting. Two problems are then encountered. The received signal is not on the same frequency as originally transmitted, and, especially on s.s.b., the signals can be pretty incomprehensible. To counteract the effect of doppler is a simple matter of ensuring that the receiver r.i.t. control is offset commensurate with the amount of doppler being observed. In some cases, 432MHz for example, the shift may be more than 10KHz and the use of a second v.f.o. is invaluable. Learning to copy c.w. as white noise is a fairly simple technique that requires little practise but a bit more care is required for s.s.b. The ball is really in the court of the transmitting station. If you adopt standard procedures then the contact is made that much easier. Above all speak slowly and use recognised phonetics. Restrict the contact to callsigns; report, using the format "Five Seven Aurora"; and locator. By using these techniques you should be able to make some form of auroral contact. This is fine until it dawns on you, that in every event, you are working the same old Scottish stations, time and time again. But why do you keep working the locals whilst other operators are always working the real dx? The answer is really quite simple. You are beaming in the wrong direction. Many operators will beam north, hear some GM's and keep the beam on that heading. The real dx will never be in the same direction. What you must do is to rotate the antenna approximately 40 degrees to the east of where the GM stations peak up. As a generalisation, stations in central England, will need to beam somewhere between 60 to 80 degrees. Once you discover this technique you will realise that in fact many auroral windows exist and by "looking" into each one, you will work stations situated in different areas of Europe. The situation during any particular aurora is very dynamic and you should therefore be prepared to move the antenna around throughout the event. Be imaginative and you will find the key to working DX consistently.

Co-incidentally, I recently received details from Cambridge Kits of their latest issue of *Kit News*. This newsheet includes some notes about forecasting auroras, by using their v.l.f. receiver, to monitor the strength of U.S.A. signals on 17.8 or 21.4KHz. It is claimed that you can get 30 hours of advance warning of impending auroras by using this method. The latest issue of "Kit News" also includes information about their 50MHz and 70MHz converters. If you want a free copy, send a 9" x 4" s.a.e. to Cambridge Kits, 45 Old School Lane, Milton, Cambridge, CB4 4BS, mentioning the Vhf-Up column.

The 50MHz Band

Conditions during September were pretty uninspiring although some lucky stations, most situated in southern England, were able to enjoy one or two openings to Africa, that were inaudible to the rest of the UK. There was, however, a good opening to Southern Africa on September 30. More details on this event next month. To keep the band ticking over, a number of minor scale auroras took place, allowing many European countries to be worked.

Jim G1DWQ sums up the lull in activity

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by reporting that September was the first month since November 1988 that he had failed to work anything outside of Europe. On September 2, the Gibraltar beacon, ZB2VHF, was heard briefly at 1910UTC. TV signals from Channel R1 were heard spreading onto 50MHz, between 2030 to 2115UTC, on September 7, but no crossband activity on 28MHz was heard. On September 10 there was crossband activity in the shape of OK3CM, at 1130UTC, but 50MHz propagation was not suiting Jim's location. The only African station to be heard in the month, G3GJQ/5N0, was copied from 1430 to 1510UTC, on September 17. Roy was quite weak to start with but as he built up in strength to 57, so a pile-up developed and with Jim's poor take-off to the south, that was the end of trying on that occasion.

Paul G7CFK has been listening tentatively every day and despite high flux numbers, peaking 305, on September 9, no DX was heard at his QTH. At this point, I must dispel the idea that high flux numbers automatically mean that the 50MHz band will be open. This is not necessarily true. It would be more correct to say that the band is most likely to be open after a period of many successive days of high flux numbers. Paul used the word "peaking", and it is this parameter that is important. An analogy is to try and imagine the F2 layer as being a battery which needs charging up. A continued period of trickle charging, from the sun, is much better than intermittent high voltage boosts. Another point to bear in mind is that the position of the sun relative to the earth at particular times of the year is very important. Certain times of the year will be unfavourable, for instance, mid-summer, whereas other periods, October through to March, will be much more productive. So, although the solar flux may be high, other ingredients are required in the propagation melting pot. Although this is a simplistic approach, it hopefully serves to illustrate the situation.

One of the few operators to work outside of Europe, during September, was **Dave Gregory G8JDX** (CNL). Earlier in the month, G3GJQ/5N0 and TR8CA were heard at good strength, but no contacts were made. In a classic, pre-auroral enhancement to the band, on September 18, Dave worked EL2FO in Monrovia. The Liberian station was first heard at 1526UTC on 28.885MHz, saying that he was hearing the GB3CTC beacon. Dave went straight on to 50MHz and made the first G to EL contact on the band at 1533UTC, receiving a report of 54. Alan, EL2FO (IJ46) is an American operator, expected to be active for some months. QSL's go via KN4F. After working G8JDX, EL2FO went on to work G3ZYY, G6ION, GD3AHV and PA3EUI. Later the same evening, G8JDX heard ZD8MB (II22) from 2007 to 2209UTC.

Another operator to hear and work some of the African stations was **Geoff Brown GJ4ICD**. On September 17, G3GJQ/5N0 was heard for 40 minutes, from 1440UTC, peaking 59+. TR8CA in Gabon was also heard but this station was much weaker. The next day, Geoff heard EL2FO at 1600UTC but no contact was made. However a QSO was made with ZS3KC at 1615UTC. Just after this contact both ZS3AT and ZS3E were heard.

Peter Scutt G3IBI (HPH) reports on a few notable events during previous months. August 19 was an interesting day. LU5EZT/MM located near the Canary Islands was worked on s.s.b. at 1724UTC. This was followed, at 1840UTC, by hearing

QTH Locator Squares Table

Station	1296	432	144	Total
G3IMV	48	124	429	601
G4KUX	—	120	372	492
G3UVR	82	135	246	463
G4RGK	50	124	284	458
GJ4ICD	59	119	263	441
G0DAZ	27	128	177	432
G3XDY	89	147	196	432
G3JXN	87	134	179	400
G1EZF	—	93	263	388
G4XEN	—	111	274	385
G6DER	78	110	183	371
G6HKM	45	107	215	367
G4RRA	—	80	255	335
G3COJ	44	103	186	333
G4DEZ	48	37	248	333
G4SSO	—	93	229	322
G4FRE	72	146	102	320
G1KDF	37	102	180	319
G4TIF	—	110	200	310
G1LSB	—	139	170	309
G4DHF	—	—	307	307
G1EGC	23	80	198	302
G8HHI	38	110	148	296
G6MGL	59	89	141	289
G8PNN	63	98	128	289
G4NBS	63	105	119	287
DL8FBD	—	—	280	280
G8ATK	45	91	143	279
G4MUT	31	93	153	277
G8LHT	10	88	177	275
G4PCS	—	3	258	261
G1GEY	11	77	168	256
G3NAQ	—	80	175	255
G0EVT	—	57	197	254
G6DZH	—	87	154	241
G4IGO	—	—	238	238
ON1CAK	—	33	204	237
G3FPK	—	—	236	236
G0EHV	—	75	160	235
GM4CXP	—	31	198	229
EI5FK	—	56	172	228
G6STI	24	69	130	223
ON1CDQ	—	32	182	214
G4MEJ	—	—	213	213
G8LFB	—	—	209	209
GW4FRX	—	—	204	204
G8MKD	—	49	150	199
GJ6TMM	—	48	151	199
G4YCD	—	—	197	197
G4DOL	—	—	186	186
G1SWH	—	53	128	181
GI1JUS	—	—	181	181
G4ZTR	30	45	91	176
G7ANV	—	—	153	153
G6MXL	16	45	91	152
GW6VZW	—	6	143	149
G4AGQ	1	42	104	147
G1WPF	—	29	97	126
G0FEH	—	24	101	125
G0FYD	—	—	121	121
G8PYP	—	21	98	119
G8XTJ	—	—	116	116
G1IMM	—	17	98	115
GW1MVL	—	20	95	115
GM0HBK	—	—	107	107
GI4OWA	—	—	103	103
GM0GDL	—	22	81	103
G1TCH	—	6	88	94
G1SMD	—	—	93	93
G6MEN	4	26	63	93
G1DOX	5	12	67	84
G4WHZ	7	—	76	83
G0HEE	—	—	73	73
G1CEI	—	1	72	73
GU4HUY	—	—	73	73
G0HDZ	—	—	64	64
G0ISW	—	12	52	64
G1NVB	—	—	58	58
GM0JOL	—	—	47	47
G2DHV	2	7	33	42
GM1ZVJ	—	—	40	40
G7CLY	—	—	38	38
G7AHQ	—	—	34	34

No satellite or repeater QSO's Starting date January 1 1975

LU1DMA, on 50.110MHz. To round off the evening, a contact with CX1DDO was accomplished, for a new country and continent. On September 8, the Icelandic keyer, TF6MM, was heard on 50.057MHz, from 1429 to 1445UTC. Peter tried to raise him on 28.885MHz but without success. He mentions that the keyer sends the callsign and locator, IP24KC. G3GJQ/5N0 was heard at 1440UTC on September 17, but there were too many Frenchmen getting in on the action. This was slightly annoying as G3GJQ/5N0 was operating on 50.110MHz, some 90KHz below the band allowed for French operators. On this note, I ask you to avoid as much as possible, contacting French stations below 50.200MHz. If you hear one in the low end of the band and would like a contact, first ask him to move to a frequency above 50.200MHz before completing the qso. Continued operation below 50.200MHz could cause French stations to lose all 50MHz operating privileges.

If you are on the grapevine, or subscribe to the RSGB S*ix Metre and Up DXer*, you would have known that TA4/G3SDL received a permit to operate on 50MHz from Antalya, Turkey. He was scheduled to commence operations from 2200UTC on September 30, but it was pleasing to hear via 28.885MHz, that on September 29, he was already active and working many stations in Southern Africa. Incidentally, it is worth while keeping an ear on either 3.718MHz, around 0700UTC weekdays or on 28.885MHz, at almost any time, if you want to hear the latest 50MHz gossip.

It was a pleasure to receive a letter from **Albert Ginaccarini VK3TU**, and interesting to note that *Practical Wireless* really has a world-wide readership. Albert passes on the information that the Australian Department of Communications has ruled in favour of amateur operators to have operating privileges in the lower portion of the 50MHz band. The previous situation was that some States were allowed to operate on 50MHz and some were not. All States, however, were allowed to operate from 52 to 54MHz. The new operating conditions are 50.000 to 50.200MHz with power levels of between 25 and 400 watts p.e.p. depending on the proximity to Channel 0 television transmitting sites. For the most part, this will allow a large majority of VK operators to use the full legal limit. Albert reports that in most cases Australian amateurs run at least 100 watts p.e.p. to antennas of between 4 and 8 elements.

If you managed to hear or work 9V0SEA recently, you may be interested to know that this special event callsign was the only legitimate Singapore station to be given 50MHz operating privileges. The station operated between November 17 to 19, from the South East Asia Hamvention. There is no likelihood that Singapore amateurs will be given 50MHz permits in the foreseeable future as Malaysian TV stations are still operating in Band I.

Peter Hall SM0FSK, the VHF Manager of SSA, the Swedish Amateur Radio Society, passes on the news that from September 19, the 25 holders of experimental licences for use on 50.0 - 51.0MHz, are now permitted to use the band on a 24 hour basis, ending on December 31 1989. In 1990 there will be a new period of experimentation with modified permit conditions. Further details on this will be released later.

With the solar flux heading through the roof, I urge you all to get on 50MHz c.w. or s.s.b. and catch as much dx as possible while the band is open. Remember to keep 50.110MHZ "CLEAR" so that we can all listen for DX stations. Please refrain from ragchewing or working locals between 50.100 to 50.130MHz. Remember that 50.130MHz and up should be used for s.s.b. contacts within Europe and that 50.200MHz should be used as the "dead-band" s.s.b. calling frequency. I don't want to hear any of you, incidentally, using 50.200MHz as a calling frequency when using c.w. The centre of activity for this mode is 50.090MHz. Great Britain is the vanguard of 50MHz operation in Europe. Please let us set a good example to the other countries within IARU Region 1.

The 70MHz Band

Although not blessed with the best of propagation conditions, the RSGB Trophy contest on September 17, certainly livened up the band somewhat. By the end of the 7 hour contest, a number of operators had

worked well over 100 stations, an indicator perhaps of the increased activity now taking place on the band.

Ian Harwood G8LHT (YSS) worked GM8XVJ/P and G4ADV/P (CNL) for two new squares and counties, bringing his score, at the end of September, to 5 countries and 38 counties.

The contest enabled **Jim Whittle G3EKP** (LNH) to work 2 new countries and 10 new counties. Among the stations contacted were GD6ICR (IOM), GI4ONL (LDR), GJ3TCU/P, GM1GEY/P and GM8XVJ/P.

At my QTH, contacts were made during the contest with GJ3TCU/P, GJ7AOG/P, GJ7DGJ/P, GM1GEY/P (DGL), GM4FRE/P (SCD), GM8XVJ/P (TYS) and G8PNN (NLD).

Dave GW4HBK mentions that the band has been very quiet since the flurry of activity during the Perseids. During that event he worked GM0FRT/P on the Shetland Islands. By the end of September, Dave had worked 6 countries and 58 counties on the band.

The 144MHz Band

Conditions during September can best be described as dull. Tropospheric openings were virtually non existent and even the increased European activity during the RSGB Trophy contest on September 2/3 seemed to have been missed by most operators. Although the auroras on September 18 & 26 were interesting, they will hardly go down in the annals as being earth shattering. It's at times like these that a v.h.f. columnist starts panicking!

Paul GW6VZW is located in Cwmbran at 50m a.s.l. and lives under the shadow of Mynyedd Maen. To the uninitiated, this Welsh mountain, although attractive to portable operators, stretches to 510m a.s.l. To compound his problems, Paul is restricted to using a 4-element Quad at 8m a.g.l. He was therefore very pleased to work a new country, Luxembourg, in the shape of LX/ON7RB/P, during the Trophy contest. Contacts were also made with the expedition group on Alderney and with a station in Lincoln.

Ian Wright GW1MVL, writes to say that 144MHz has been very quiet of late. The only tropo contacts worthy of note were F6CTT/P (IN88) and GU4APA/P (IN89), both contest stations being worked on September 2. ON1ABO (JO11) was worked on September 15, but very little else was heard during the month.

For some, who have only been on the band a relatively short time, September still managed to produce something worthwhile. John GM1ZVJ, made his first contact with Wales, by working GW4GFX/P, on September 2. Over the same period, G3CKR/P (IO93) and G4ARI (IO92) produced 2 new squares. On September 13, GM1SMI/P, located on the Orkney Islands was worked.

Ela G6HKM participated in the Trophy contest but found it very hard going with activity and conditions both being poor.

Angie Sitton G0HGA (HFD), reports that her Totsuko 144MHz transciever has finally packed up and is now beyond economical repair. When a suitable c.w. rig is obtained she will come back on the band with a more competitive signal. Using about 10 watts into a 4-element Yagi, Angie managed to work 12 countries, 32 counties and 132 different c.w. operators this year.

Annual c.w. ladder

Band (MHz) STATION	50	70	144	432	POINTS
G4ASR	82	7	265	1	355
G0HGA	—	—	192	-	192
G4OUT	—	19	155	-	174
G4XEN	7	—	144	9	160
GM4CXP	29	1	114	1	145
G0FYD	—	—	67	-	67
G3FPK	—	—	32	-	32
G0FYD	—	—	31	-	31
G4VOZ	—	27	—	4	31
G4AGQ	—	10	11	-	21
GD0ELY	1	—	14	-	15
GW4HBK	—	15	—	-	15
GW4VVX	—	—	9	-	9

Number of different stations worked since January 1

The 430MHz Band

Apart from the adventurous, who use their initiative, trying for contacts via aurora, the activity on this band is virtually dictated by the prevailing tropo conditions. As there has been a distinct lack of the latter, reports are very scarce this month.

Ela G6HKM managed to work a new county, Cumbria, by contacting G4MTR. This brings Ela's score, so far this year, to 15 countries and 40 counties. On the next band up, 1296MHz, Ela reports very little activity, apart from a recent contact, across the water, with Walt ON5NY.

Watch out for Jim G3EKP on the band. He now has a 48-element Yagi up on the mast and is raring to make up for his recent inactivity.

Ian GW1MVL, reports that he is hoping for many more contacts now, as he is going to install a 19-element Yagi very soon. The antenna is part of an Oscar 9/19 beam, with the 144MHz elements removed. It is certainly true to say, even more so on 430MHz, that the most vital component in your station is the antenna. There are far more dB's in antennas than there are in power amplifiers, even if the latter runs kilowatts.

VHF News

Jon Acton G1DOX (AVN), sends in the good news that his appeal for planning permission, against the local council, has with the help of the RSGB been won. He is delighted to report that he has been given permission for the use of a tower and that he hopes to have this supporting antennas for 50, 70 144 and 432MHz very soon.

Neil Underwood G4LDR (WLT), has appeared regularly in the annual v.h.f./u.h.f. table. Located near Salisbury, he is active on many bands. On 50MHz, he uses a Spectrum transverter, driven at 144MHz, a 20 watt amplifier and an HB9CV antenna at 15m. The 144MHz system consists of an IC275 transceiver running 25 watts, a mast-head pre-amplifier and a 14-element Yagi at 16m. For 430MHz, an FT780R transceiver running 10 watts, drives a 17-element Yagi at 17m. Apart from dx'ing, Neil is also interested in amateur television on 435MHz. He uses a home-brew 10 watt transmitter, built to the VK3ATY design, and a Microwave Modules upconverter for use on receive.

Dave Hilton-Jones G4YTL, requests QSL information for an operator, using the visitors call, EI3VQA/P. Dave worked this 144MHz station, operating from IO41, in August 1984.

Owen ZS2HZ, recently left Port Elizabeth to emigrate to the UK. Owen was an enthusiastic 50MHz and 144MHz operator whilst in South Africa and I have no doubt that once he establishes himself in this country, he will soon be heard airing a G callsign on the v.h.f. bands.

RTTY operators in various parts of the country are experiencing interference from telephony contacts taking place on 145.300MHz. This frequency is allocated, in the IARU Region One bandplan, to AFSK teletype. Phone operators are therefore requested to avoid the use of channel S12.

Meteor Scatter

There are a number of usable meteor showers during the Autumn/Winter period. The **LEONIDS** shower will culminate on November 16, the shower actually being encountered between November 13 to 19. The **GEMINIDS**, another major shower, will peak on December 12, although it can be quite productive anytime during the period December 6 to 14. Although not a major shower, the **URSIDS**, which have maximum activity on December 21, should not be overlooked. Looking ahead to 1990, the short lasting, but intense shower, the **QUADRANTIDS**, will peak on January 2. This shower always gives good results. Don't miss it.

Joachim Kraft DL8HCZ is making a study of long distance meteor scatter contacts. He is looking for any available information about QSOs or reflections ever made or heard over distances greater than 2000 kilometres. Details should be provided of Date, Time, Signal strength, Equipment, etc. Participants in the study will receive a free copy of the study results. Please send your information to Joachim at Grutzmulenweg 23, D-2000 Hamburg 63, FRG.

Beacon & Repeater News

After being off the air for some considerable time, the Cornish u.h.f. beacon, GB3CTC, on 432.970MHz, is now re-activated and providing invaluable service for those wanting to check propagation in a south-westerly direction.

Some of you may have listened to the GB3SUT beacon on 432.890MHz and been surprised to hear periods of very high signal strength, coupled with rapid drifting to a lower frequency. It is believed that this is not the beacon but an unidentified satellite. The spacecraft is transmitting a plain carrier on 432.880MHz and at times is very strong.

The Lakeland Fells 430MHz repeater, GB3LF, has now returned to service from its new site at Lancaster. Using channel RB14, reports would be welcomed by its keeper G8UHO.

Another u.h.f. repeater, returning to service from a new site, is the Salisbury unit, GB3SW, on channel RB9. Further information is available from G3YWT.

The 430MHz port of the Midlands AX25 Group's digital repeater, GB7AP, is now operational. The unit is located in Lichfield, Staffordshire. More details can be obtained from Bob Evans G8KHV.

The Kingston-upon-Thames packet mailbox, GB3KP, has recently inaugurated a new port on 432.675MHz, using the callsign GB7UT.

Down on the Channel Islands, the u.h.f. packet mailbox port, GB7GUR, on Guernsey, has now returned to service following an overhaul.

QRZ Contest!

This period of contest activity will be your last chance to catch up the leading operators in the various annual v.h.f./u.h.f. tables. On December 3, the RSGB 144MHz Fixed station and Affiliated Societies (AFS) Contest, run from 0900 to 1700UTC, will bring a tremendous amount of activity to the band. On the following

weekend, the 50MHz and 70MHz c.w. contests will be held. The 50MHz event will take place on December 9, with the 70MHz event scheduled for the following day. For the u.h.f. or microwave operator the following cumulative contests have been arranged. 430MHz events will take place on November 14 and 30. Combined 1296/2320MHz sessions will take place on November 22 and December 8.

Look out for Back Scatter next month, the NEW On The Air

RTTY

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

Having spent some time over the past couple of months describing the hardware and software necessary for operating the data modes, I though it would be interesting to run through some applications.

I shall not attempt to cover packet operation here as there are many good guides available and in fact most good dealers supply a free guide when you buy a TNC. Instead I shall concentrate on some of the other, perhaps less well-known, areas of data reception.

FAX

This mode is perhaps one of the most interesting - once you move outside the amateur bands. Most amateurs have an interest in propagation and will be aware that, particularly at v.h.f., the weather plays a significant role. An ideal way to study this aspect of propagation is by studying weather charts - the problem, of course, is getting hold of the charts for the right area. One of the most popular guides for FAX enthusiasts is the Guide To Facsimile Stations by Joerg Klingenfuss. This book is available from the *PW* book service if you're interested in getting hold of a copy. By using the FAX station schedules in this book, you can work out what stations are sending the information you want and the transmission time. This obviously saves a lot of time and effort.

I ought to add one word of warning before I proceed any further, regarding the legal situation when monitoring any non amateur or broadcast station. In simple terms you are only allowed to monitor transmissions that you have been authorised so to do. That rule effectively means that you can only monitor amateur and broadcast stations unless you have specific authorisation to receive other stations. Fortunately the situation is not quite as black as it might at first seem as the DTI have recently relaxed the requirements as far as the reception of weather transmissions is concerned. Provided the information is for amateur use and will not be passed on to a third party for profit, you are now allowed to monitor these transmissions. The reason for relaxing the rules is quite simply that they were un-enforceable and so ineffective.

I'm sure many of you have seen some of the very impressive satellite pictures that are available, clearly showing major weather systems. A lot of people think that these can only be received with expensive satellite reception systems - this is not true. One very good source of these pictures is Offenbach Meteo (DCF54) on l.f. 134.2kHz. This station transmits processed images from the geostationary Meteosat. The advantage with processed images is that not only is the image improved but the land mass boundaries are inserted making the pictures much easier to interpret especially when there is a lot of cloud cover. The transmission times for Meteosat images from Offenbach are as follows:

0103 Europe (infrared)
0144 Full disk (infrared)
0315 Europe (infrared)
0643 Europe (infrared)
0851 Europe (visual)
1225 Europe (visual)
1244 Europe (infrared)
1300 Europe (visual)
1539 Europe (infrared)
1843 Europe (infrared)

You will note of course that if you want to catch the full disk transmission, you will have to stay up rather late! The times given here are just the basic schedule and may change slightly from day to day.

This type of FAX transmission can be received by any FAX system capable of working with a drum speed of 120rpm and an IOC of 576. This should not be a problem as this is the most common mode and most amateur stations feature this mode. The amount of detail that you can resolve is rather dependant on the type of decoding system you have. If you use a conventional analogue FAX machine you should be able to produce very high resolution pictures as you have in effect an infinite grey scale. If, however, you are using a computer based decoding system the resolution will depend on the number of grey scales available. Some decoding systems do not provide grey scales at all, everything being interpreted as either black or white. Despite this seemingly serious limitation, you can still achieve very good results. My own FAX set-up comprises an ICS Electronics FAX-1 which was designed for weather chart reception and so treats everything as either black or white. I have received many excellent images from Meteosat using this set-up.

Although satellite pictures are very impressive, they are not necessarily the most effective source of weather information. By far the most useful, from a propagation point of view, are the pressure charts. This type of chart is probably the most common and as such is transmitted by virtually all weather FAX stations.

One common problem that often effects the quality of h.f. FAX charts is multi-path propagation. This manifests itself as very smeared or blurred lines and is virtually impossible to eliminate, unless you have multiple or steerable antennas! One of the most effective and practical ways to overcome this problem is to choose another frequency. Most FAX stations use a range of frequencies through the h.f. spectrum so that the user can select the optimum frequency for clear reception.

One station that transmits some particularly good charts which are ideal for the amateur is Rome Meteo. The frequencies used are:

4.7775MHz (IMB51)
8.1466MHz (IMB55)
13.597MHz (IMB56)

For monitoring in the UK, IMB56 usually provides the best signal.

Another very useful FAX station for more distant weather data is the Canadian Halifax Meteo (CFH).

The frequencies used are:

122.5kHz CFH
4.271MHz CFH
6.330MHz CFH
10.536MHz CFH
13.510MHz CFH

Best results in the UK are normally obtained on 10.536MHz or 13.51MHz.

In addition to all this weather information there are a few stations that still transmit press photographs using l.f. FAX though most of these have now migrated to satellite transmissions.

One of the easiest to receive of these l.f. FAX stations is DPA Frankfurt (DCF39) on 139kHz. The transmission mode is 120 rpm with an IOC of 288 and the transmissions run from 0300UTC through till 2300UTC, though you will probably find there are many long breaks with no picture information being transmitted.

RTTY

This mode is by far the most common and despite being rather "low-tech" by modern standards, continues to be used by many commercial organisations. This particularly applies to the Third World countries who are often using second-hand equipment that has been obtained from the main economic powers.

The same legal restrictions apply here as with FAX, though you are still authorised to receive weather transmissions without a licence.

Unfortunately for the casual listener, there are virtually no plain text weather transmissions on h.f. The standard system uses a five digit code to convey the data from the weather monitoring stations. It is possible to obtain information from these transmissions by manually decoding them using the tables supplied in the Air and Meteo Code Manual by Klingenfuss and various other publications. The process, although quite simple, is very long winded and not really very practical. The best way to process this information is by computer, but there are very few programs around to perform this function.

Probably the most popular commercial RTTY transmissions on h.f. are the Press stations, such as those in the Middle East and Russia. Most of these stations seem to use a common transmission standard of 425Hz shift and 50 baud which is quite convenient as most amateur stations can receive this mode.

The Russian TASS and APN stations seem to be particularly prolific and a few samples of frequencies and transmission times are shown here:

6.87MHz RTV55 0430UTC, 0500UTC, 1800UTC, 1900UTC, 2000UTC.

9.154MHz RDZ76 1400UTC, 1500UTC, 1600UTC, 2000UTC

12.085MHz RCB55 0430UTC, 0500UTC, 0700UTC, 0900UTC, 1300UTC

14.49MHz RNK36 0430UTC, 0500UTC, 0600UTC, 0800UTC, 1000UTC, 1100UTC, 1200UTC, 1300UTC, 1400UTC, 1500UTC

Moving to the other extreme, politically that is, the Voice of America transmissions can be heard according to the following schedule:

10.233MHz & 10.2343MHz 0100UTC, 0200UTC, 0300UTC, 2200UTC, 2300UTC

11.15MHz 1600UTC, 1700UTC, 1800UTC, 2100UTC
18.215MHz 1600UTC, 1700UTC, 2200UTC.

Of the Middle East stations IRNA Tehran on is probably the most easily received in the UK and transmits news in English and French according to the following schedule:
7.8MHz EPX9 1500UTC-1730UTC
7.96MHz 1500UTC-1730UTC, 1900UTC-2030UTC
8.05MHz 1900UTC-2030UTC
18.56MHz EPJ 1000UTC-1100UTC

ARQ/FEC

These error correcting modes are, as you would expect, very popular with commercial services, with the main use being for ship to shore Telex communications throughout the h.f. band.One rather interesting FEC transmission is the British Telecom NAVTEX service which operates on 518kHz using standard FEC at 100 baud with a shift of 170Hz. This service is designed to give shipping urgent weather and navigational information for the area in which they are sailing. The system works by using a number of radio stations all using 518kHz but with a dedicated time slot for their information. The messages are also headed by a station identifier and a message type code. The idea of this information is that the ships radio operator can set his automatic reception equipment so that it only receives particular message types for a defined area. From the amateur point of view, if you tune into these transmissions you will be able to receive all messages from all stations, providing of course they are in range.

A selection of stations that should be receivable in the UK are shown here along with the station identifier and transmission times:
Cullercoats G 0048UTC, 0448UTC, 0848UTC, 1248UTC, 1648UTC, 2048UTC
Land's End S 0018UTC, 0418UTC, 0818UTC, 1218UTC, 1618UTC, 2018UTC
Portpatrick O 0130UTC, 0530UTC, 0930UTC, 1330UTC, 1730UTC, 2130UTC
Brest Le Conquet F 0118UTC, 0518UTC, 0918, 1318UTC, 1718UTC, 2118UTC

So that completes a very basic run down of the alternative uses of your data decoding equipment, if you would like more information please drop me a line and I will do my best to oblige.

Contests

With the new year rapidly approaching it's time to think about the SARTG New Year RTTY contest. This contest comprises separate h.f. and v.h.f. sections with the operating rules shown here:

H.F. Contest.

0800UTC - 1100UTC January 1, 1990
Bands: 3.5MHz and 7MHz
Classes: Single operator, multi operator and short wave listener.
Message: RST, QSO number, Name and Happy New Year in your own language!
Points: 1 point for each QSO on each band.
Multipliers: One for each DXCC country and each LA, OH, OZ, SM and TF prefix number contacted on each band.
Final Score: sum of QSO points x sum of multipliers.
Logs: All logs to comprise separate sheets for each band with a summary sheet showing the scoring, class, your call, name and address. The logs should be sent to Bo Ohlsson (1) to arrive by January 31, 1990.

VHF Contest
1300UTC - 1500UTC January 1, 1990
Band: 144MHz only
Message: RST, QSO number, Name, QTH locator and Happy New Year in your language.
Scoring: 1 point for contact distances of 0 - 50km then 2 extra points for each subsequent 50 km.
Logs: same as for h.f.

The BARTG spring v.h.f. contest seems to have been rather poorly supported this year with apparently only eleven entries across all the classes and bands. This sort of response must surely put the future of this contest in question. As a general rule there is very little RTTY activity on v.h.f. these days, most operators preferring to use Packet. In view of this, perhaps the contest should be expanded to include a section for packet operators. It would be a shame to see the contest die, so if you have any suggestions for encouraging more entrants please write to BARTG or myself.

Moving on to a brighter note the BARTG Spring h.f. contest results show a very healthy number of entries, particularly in the single operator section. The winner of this section was TG9VT with an incredible 1,326,650 points. The highest placed UK station was G0ATX in seventeenth place with 501,594 points. Moving on to the multi-operator section the winner was HG1W with 1,282,320 points. There were no UK stations listed in this section, which is a shame.

Finally the SWL section was won by ONL383 with 898,950 points. Second place was secured by G6LAU with 303,016 points.

PK-232 Update

ICS Electronics(2) have just announced the latest firmware update for this popular multi-mode data controller. The firmware is combined with a daughter board which as well as adding to the current facilities will be used for later enhancements.

The new facilities are listed here:

Pakmail: A personal mailbox based on the W0RLI/WA7MBL commands which can store up to 15 messages. Third party mailbox facilities are provided which can be disabled by the operator.

Priority Acknowledge: This system designed by N7CL improves the throughput of both h.f. and v.h.f. packet. The system gives priority to packet acknowledgements for data that has already been received by a distant station.

Custom and Whynot commands added.

Seven character or Nine digit ARQ/SELFEC selcall structure.

TDM: The PK-232 can now receive commercial Time Division Multiplex transmissions which should appeal to short wave listeners. The SIAM mode will now identify the presence of a TDM signal and identify the baud rate and correct channel number.

The upgrade kit costs £69.95 including v.a.t. plus £2.50 post and packing. If you require a fitting service this is available for an additional £20.00 inclusive of v.a.t. and return postage.

PK-88 users will be pleased to know the upgraded packet features can be installed by fitting a new ROM which is available from ICS price £10.00 plus £2.50 post and packing.

(1) SARTG Contest Manager, Bo Ohlsson SM4CMG, Skulsta 1258, S-710 41 FELLINGSBRO, Sweden.

(2) ICS Electronics, Unit V, Rutherford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD

Amateur Satellites

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

This month, in order to give space to more topical news, we will miss out on RS-10/11, OSCAR-10, OSCAR-11 and OSCAR-13 operations, as all is "normal" with little or no important information to report since last month's column.

OSCAR-9 is on and active again, but is falling fast and warming slowly at the time of writing this column in late September. By the time that you read it, UoSAT-OSCAR-9 will undoubtedly be no more than falling space dust, having burnt up on entering earth's expanded atmosphere in early October.

Since last months news on the forthcoming JARL/JAMSAT satellite, progress and conformity testing with the coming JAS-1-b is excellent.

UFO-432

As briefly mentioned in last month's column, yet another non-amateur satellite has appeared on the 70cm band, this time in the beacon section of the band. Christened UFO-432 by it's discoverer, **Dave Rowan G4CUO**, it was first found in early September as a massive carrier commencing it's doppler shift curve adjacent and across the GB3SUT Sutton Coldfield beacon on 432.890MHz. A typical overhead pass takes it from 432.893MHz, past it's nominal 432.882MHz TCA frequency, right down to 432.871MHz at LOS.

It is almost a continuous plain carrier, which sounds slightly rough with a few pulses and some noise when listened to carefully, but sans all forms of recognizable modulation detectable by

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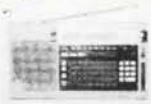

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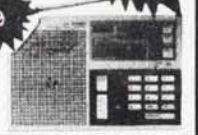

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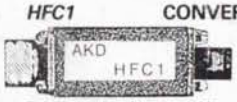

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Fig. 1

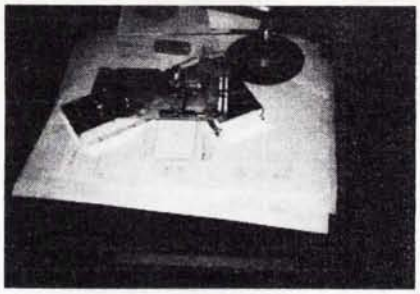


Fig. 2

Fig. 3

normal receivers. It is VERY strong, some 20dB over S.9 on a ground plane antenna.

The satellite's origin and purpose, as yet, remains a complete mystery, but Nico Jannsen PA0DLO has succeeded in spotting a very close match to a military Shuttle-launched boosted satellite known as 1980-52-c that does not "officially exist". He has had contacts with its would be controllers, who claim that the 70 cm transmission is the remains of the telemetry transmission, which cannot now be commanded off, as they had "lost control" of the system. Its data transmission was said to be "much higher in frequency", and may be on1 399.842MHz.

John Branegan casts grave doubts as to the claimed shuttle origin, and writes "No shuttle has ever orbited at an inclination above 57 degrees, and to put a vehicle into a shuttle even at this inclination with an intention of it becoming 96.61 degrees is simply not on!". John quotes "Murphy's First Law of Orbital Mechanics" as stating "If you wish to shift inclination more than a few degrees then it is cheaper in fuel to bring the satellite back to earth and re-launch it" (!).

It also would be quite remarkable that if it had been on since 1980, this powerful signal source would not have been spotted before, as there are many like me who often leave their receivers on GB3SUT for elongated periods.

Working from AOS, TCA, LOS times and doppler curves made by G3's CAG, ENY IOR, G4CUO and PA0DLO, a mutually agreed Keplerian element set has been evolved, which tracks the newcomer well. The latest 'MIR' set is added.

Satellite:	MIR	UFO-432
Epoch Year:	89	89
Epoch Day:	261.6779056	248.64965278
Inclination:	51.6202	96.61
Right Ascension:	254.6977	74.5
Eccentricity:	0.0014227	0.0035
Arg. of Perigee:	54.751	42.2
Mean Anomaly:	305.3935	321.7
Mean Motion:	15.60983135	12.8293
Decay:	0.00033854	3E-8
Epoch Rev./Orbit:	20574	Unknown

will have no trouble in hearing it passing by if you leave your receiver on 432.885MHz - in fact, you can't miss it! It was heard one evening by me at only S3 - the reason for the drop in signal strength became apparent when it was found that no antenna was connected, other than the 1mm protrusion of the BNC connector socket! We now await terrestrial user reports that GB3SUT is drifting, and that by some incredible effect of escalating solar flux is being heard in W, VK, ZL, etc! The advantages of the presence of UFO-432 are greater than the singular disadvantage of intrusion into the beacon band, as the strong source will be an excellent indicator of polar front passage and current variable ionospheric effects, and a further means of looking for inverted doppler for the dedicated followers of anomalous UHF propagation.

UoSAT D and E

Progress at the University of Surrey has been rapid, and the microsats engineering model was quickly completed and tested, with integration complete, and full thermal vacuum system testing underway at the time of writing. Whilst I was at the University of Surrey I was shown round the UoSAT centre by Engineer Victor Vanderzel G7DKN, and some photographs were taken of the construction and testing operations. The constructing of the control boards by Ralph Lorenz is shown in Figs. 1 and 2, and the attach ring fitting and the spring that ejects the spacecraft from the launch vehicle final stage is depicted in Fig. 3. That which at first appears to be a spaghetti dinner for the construction crew shown by Fig. 4 is in fact the complex wiring harness in preparation. The clean room with the model under test is depicted by Fig. 5. Each spacecraft, measuring 345 x 345 x 600mm and weighing some 40kg will consist of a stack of eleven module boxes internally, with the 18% efficient gallium arsenide cell solar panels mounted on all four sides. At the top, a gravity gradient boom extending to 6 metres in length when deployed is stowed, and at the base the v.h.f. and u.h.f. antennas will be mounted.

On UoSAT-D two transmitters will be flown, giving one continuously operating with a power switchable between 1 and 2 watts, the other between 5 and 10 watts, to be used for short burst transmissions. The transmitters were designed by Dr. Martin Sweeting G3YJO, and Mark Allergy G7DSY, who also built them.

Satellite	UoSAT-D
International Designation	Yet to be given.
Object Number	Yet to be designated.
Element Set Number	Provisional.
Epoch Year	1989
Epoch Day	313.08025463
Inclination	98.73 degrees
Right Ascension of Ascending Node	.24.3439
Eccentricity	0.001362
Argument of Perigee	167.3130
Mean Anomaly	240.6300
Mean Motion	14.23617560
Decay rate or Drag Factor	1.00000E-006
Epoch Orbit Number	1
Semi-Major Axis	7187.6900km.
Apogee Height	826.4796km.
Perigee Height	806.9004km.
Beacon Frequency	435.070MHz.

A provisional set of Keplerian elements for UoSAT-D has been provided for us by Craig Underwood G1WTW, for the point of injection into orbit. On the proviso that the launch had taken place at the time and point planned, e.g. 0155:34 UTC on 9 November 1989 (the very day that your

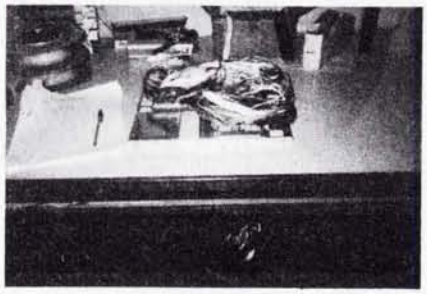


Fig. 4

Practical Wireless comes out) and that the expected parameters were followed, these could have been used to track the satellite until a later refined Laser RADAR measured set were available.

The new exact launch date is unknown, but is expected to be in early December at the earliest. This has been caused by computer detection of a staging problem on the ARIANE V-34 launch planned for October 5, but now delayed. Our multi-launch is the V-35 mission, delayed in turn. The set may not now give a good fit, but will serve to show similarity for tracking from similar injection, as the main SPOT launch is critical to emplacement.

The uplink primary frequency is 145.975MHz, and the secondary 145.900MHz. The downlink for both is set at 435.250MHz, and tests have shown that this is likely to be fairly precise, the oscillator possessing excellent thermal and mechanical stability under test.

Packsats

John Branegan GM4IHJ writes from Saline to ask if we have considered the terrific mix-up of frequencies, band widths, speeds and modes of the Packsat multitude. He writes "There are enormous pitfalls for the unwary purchasers of equipment, and, as to use 9600 or 4800 bps, one needs to go directly to and from transceivers discriminators in order to avoid bandwidth clipping, the need to make major internal modifications is apparent".

Whilst John recognises the necessity to go to higher keying speeds now, he suspects that not many will be prepared to delve into their equipment to obtain the advantages. Hence, the numbers of users will be few until such time that commercially built "black boxes" are available. These would need to feature simple multi-channel packsat mode capabilities of a.f.s.k., f.s.k. and b.p.s.k., plus auto frequency control, plus wide band reception and transmission facilities, all available at a reasonable price that the average amateur can afford. He points out that the current range of multi-mode Japanese manufactured transceivers are totally inappropriate, and thus we have a "chicken and egg situation" e.g. present

available rigs are either of no use or are too expensive to get into packsats, so few people get onto packsats. If few people are shown to be on packsat, then the manufacturers are most unlikely to provide design, testing and large scale production of the needed equipment that reduces the price, thus, few people get onto packsats!

The five new packsats and the coming new RUDAK have the following tracking, frequency and mode requirements:-

AMSAT-NA Packsat, Polar Orbit: Uplink frequencies 145.9, .92, .94, .96MHz, 1200baud f.s.k. initially; may change later to 4800baud as and when suitable modems become available. Downlinks 437.05, .025MHz, 1200b.p.s.k..

LU-SAT, Polar Orbit: 145.9, .88, .86, .84MHz uplinks, 1200b.p.s.k initially, then as AMSAT-NA Packsat; Downlinks 437.15, .125MHz, 1200b.p.s.k.

WEBER-SAT, Polar Orbit: 145.9MHz uplink 1200b.p.s.k., with other channels on 144.3 to 144.5 MHz. Downlinks on 437.1 and .075MHz, 1200b.p.s.k.

UoSAT-D, Polar Orbit: Uplink as already given in UoSAT D and E column above, 9600 f.s.k.. Downlinks as also given, 9600 f.s.k..

UoSAT-E, Polar Orbit: Similar to above, e.g. like UoSAT-D.

JAS-1-B, Mid-Latitude Orbit: Uplinks 145.85, .87, .89, .91, 1200MHz f.s.k.. Downlink, 435.91MHz 1200 b.p.s.k.

RUDAK-2, Polar Orbit: Uplinks 435.1MHz, 1200 f.s.k. and 435.15MHz 4800 f.s.k: Downlink 145.99MHz 1200 b.p.s.k.

John advises on the simplest minimum packet station that will be needed to access the coming cluster as consisting the following:-

Antennas for both 145 and 435MHz , probably equipped with cavity filters to avoid self blocking from own uplink.

A 145MHz f.m. TX with some 25 watts of r.f. output.

A 435MHz s.s.b. RX system capable of tuning 437MHz with an up/down button frequency control to use the modem a.f.c..

A 1200 f.s.k. up and 1200 b.p.s.k. down Fuji-Oscar type modem. (A p.c.b. for constructing G3RUH's excellent system is available from AMSAT-UK, whilst Electromail, P.O. Box 33, Birchington Road, Corby, NN17 9EK, UK can supply the RS range of components for the above G3RUH modem).

A terminal node controller. (Most of these work well with the G3RUH modem, but do please check first).

A micro-computer, plus suitable packet radio software.

As these satellites are imminent, and most will be overflying with regularity very soon now , with less than an hour between passes, station planners will need to start considering the above issues.

Satellite	**OSCAR 9**	**OSCAR 10**	**OSCAR 11**	**OSCAR 12**	**OSCAR 13**	**RS10/11**
International Designation	81-100B	83-058B	84-021B	86-061B	88-051B	87-054A
Object Number	12888	14129	14781	16909	19216	18129
Element Set	698	424	495	167	46	859
Epoch Year	1989	1989	1989	1989	1989	1989
Epoch Day	238.07702662	236.59138263	236.19637961	226.01332023	236.21624695	240.08329316
Inclination	97.5435	25.9512	97.9950	50.0170	57.1440	82.9279
RAAN	296.9933	247.9351	293.0130	120.5753	193.9712	185.0491
Eccentricity	0.0002805	0.6046765	0.0014068	0.0011692	0.6782436	0.0010883
Argument of Perigee	199.2864	70.4682	103.4570	131.9903	210.0914	185.0491
Mean Anomaly	160.7756	343.0354	256.8205	228.1928	82.4649	153.2884
Mean Motion	15.77118266	2.05881119	14.63900495	12.44401109	2.09696448	13.71999359
Decay Rate	0.00174952	-0.00000029	0.00002291	-0.00000025	0.00000444	0.00000007
Orbit Number	43994	4662	29249	13660	914	10925
Nodal Period	91.366962	699.2	98.426358	115.652535	686.6	105.015389
Period Drag	6.431e-04	-	1.053e-05	1.866e-07	-	3.907e-08
Increment	22.834960	175.3	24.607467	29.239370	172.2	26.379710
Increment Drag	1.619e-04	-	2.649e-06	4.625e-08	-	9.768e-09
Beacon Frequencies	14.002/21.002/ 29.510/145.825	145.810/145.987	145.826/435.025/ 2401.5	435.797/435.913	145.812/435.651	29.357/.403/145.857 .903/29.407/.453 145.907/.953
Reference Equator Crossing	31 August 1989	31 August 1989	31 August 1989	31 August 198	30 August 1989	31 August 1989
Orbit	44072	4676	29349	13872	927	10965
HHMM.MM	0033.61UTC	0922.35UTC	0045.31UTC	0057.51UTC	0956.45UTC	0000.56UTC
Degrees West	45.18	233.40	50.86	285.33	294.58	156.39

Satellite	**NOAA9**	**NOAA10**	**NOAA11**	**SALYUT 7**	**MIR**
International Designation	84-123A	86-073A	88-089A	82-033A	86-017A
Object Number	15427	16969	19531	13138	16609
Element Set	417	267	120	723	18
Epoch Year	1989	1989	1989	1989	1989
Epoch Day	236.29838342	234.59593425	237.33737890	241.10277788	240.98557231
Inclination	99.1492	98.6363	98.9429	51.6099	51.6223
RAAN	224.5978	263.8220	181.0413	319.6677	358.7945
Eccentricity	0.0016122	0.0014679	0.0013299	0.0001137	0.0010563
Argument of Perigee	119.9415	60.2100	40.9173	358.5661	330.7147
Mean Anomaly	240.3360	300.0538	319.2992	1.5274	29.2816
Mean Motion	14.12132883	14.23136353	14.11117542	15.44467151	15.59445059
Decay Rate	0.00000773	0.00000765	0.00000704	0.00008233	0.00043161
Orbit Number	24206	15338	4722	41945	20251
Nodal Period	102.029780	101.242369	102.103501	93.174395	92.278768
Period Drag	3.958e-06	3.826e-06	3.612e-06	3.214e-05	1.637e-04
Increment	25.504833	25.310758	25.525001	23.675842	23.455356
Increment Drag	9.958e-07	9.627e-07	9.088e-07	7.910e-06	4.027e-05
Beacon Frequencies	137.620	137.500	137.620	19.953	143.625=Voice/166.125=Data
Reference Equator Crossing	31 August 1989	31 August 1989	31 August 1989	03 Sept 1989	01 Sept 1989
Orbit	24301	15458	4802	42021	20299
HHMM.MM	0042.46UTC	0047.15UTC	0014.07UTC	0029.07UTC	0128.25UTC
Degrees West	118.33	78.87	155.98	53.91	18.93

Satellite	**METEOR 2/15**	**METERO 2/16**	**METEOR 2/17**	**METEOR 2/18**	**METEOR 3/02**
International Designation	87-001A	87-068A	88-005A	89-018A	88-064A
Object Number	17290	18312	18820	19851	19336
Element Set	285	308	146	69	248
Epoch Year	1989	1989	1989	1989	1989
Epoch Day	239.52441403	239.72110695	239.59256195	239.63232780	239.61293416
Inclination	82.4671	82.5589	82.5404	82.5278	82.5462
RAAN	96.5777	162.8683	223.7984	102.3494	125.1506
Eccentricity	0.0014299	0.0013190	0.0018590	0.0015648	0.0017277
Argument of Perigee	62.5437	3.1523	69.2235	105.8332	331.7733
Mean Anomaly	297.7156	356.9717	291.0919	254.4562	28.2369
Mean Motion	13.83756435	13.83506405	13.84191644	13.83835160	13.16860688
Decay Rate	0.000000230	0.00000219	0.00000097	0.00000117	0.00000391
Orbit Number	13348	10240	7956	2496	5231
Nodal Period	104.123146	104.142082	104.090539	104.117315	109.408715
Period Drag	1.251e-06	1.192e-06	5.273e-07	6.365e-07	2.468e-06
Increment	26.160194	26.164223	26.151482	26.158271	27.480917
Increment Drag	3.128e-07	2.980e-07	1.318e-07	1.591e-07	6.171e-07
Beacon Frequencies	137.850	137.400	137.400	137.300	137.850
Reference Equator Crossing	31 August 1989	31 August 1989	30 August 19891	31 August 1989	31 August 1989
Orbit	13397	10286	7990	2543	5276
HHMM.MM	0137.18UTC	0108.92UTC	0112.36UTC	0044.06UTC	0046.00UTC
Degrees West	269.77	196.19	134.46	250.55	227.95

SATGEN Weekly Updates

For those active on the packet radio network, a source of latest space information in weekly updated bulletins called SATGEN is now being put out from Scotland by John Branegan GM4IHJ every Wednesday. It will contain the latest news, data, frequencies, modes hints, tips and general points of interest on all space and satellite related matters. Whilst John is unable to answer feedback and enquiries by mail, he is happy to do so by the packet radio system itself. Soon now a new book by John on Amateur Radio in Space will be published, which will provide a much needed "bible" for enthusiasts, be they space fans, scientists and experimenters, transmitting activists or Short-Wave Listeners, or, indeed, any combination. Having seen sections, I can thoroughly recommend it to readers.

Keplerian Elements

Birger Lindholm again provides the latest set of NASA originated via AMSAT elements for all the main satellites. He points out that the nodal period and the increment given are for the day of the epoch, and that if a negative decay is indicated, the P- (drag on the period) and the I-Drag (drag on the increment) are calculated using a positive figure.

This prepared set of Keplerian elements should work well into the new year, but if your program does not have automatic annual sidereal time correction "built in" it will be necessary for you to put the new figures into your listing when the next set is published in two months time.

Change the year to 90 (or 1990) and the sidereal time to .27610467, and all will work again. The following years sidereal time corrections, i.e. from 1991 on read .27544157, .27477847, .27685328, .27619018, .27552708, .27486399, .27693880, .27627570, finishing up with that for the year 1999, .27561260.

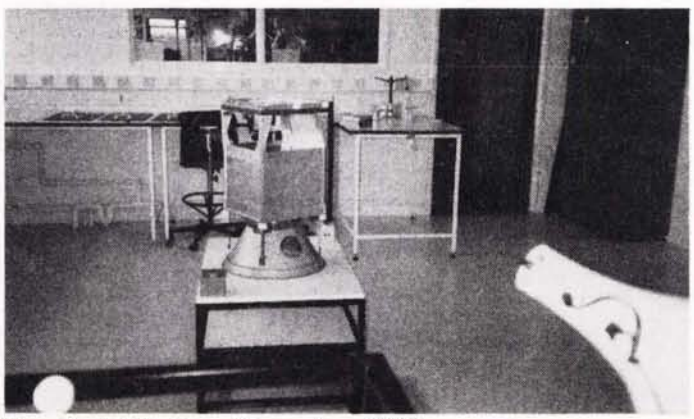


Fig. 5

Propagation

Reports to Ron Ham
Faraday, Greyfriars, Storrington, West Sussex R20 4HE

Radio enthusiasts have known for a long time that the rapidly decaying trail of ionised gas left by a meteor particle in the earth's atmosphere provides a temporary reflector to radio signals which cross its path.

Therefore, it follows that if these reflections were counted over a long period, by a receiver and a recording instrument, then a comparison could be made from this sample between the number of random meteors entering the atmosphere each day and the increase as the earth passes through a meteor shower.

Back in 1970, I realised that counting meteors by radio was an interesting proposition and could be carried out with a reasonable amount of equipment. However, to be meaningful the observation would have to be consistent over a few years.

The Receiver

The first requirement was to find a distant signal that could not be heard in Sussex under normal atmospheric conditions and would be on air for long periods. For this purpose, I used the broadcast transmitter at Gdansk which operates daily on 70.31MHz with a likely range of about 100km.

Fortunately, this frequency is normally clear with me which made it ideal for detecting tiny fragments ("pings") of the Gdansk signals each time they were deflected in my direction by meteor trails. I installed a 3 element beam facing the north east and built a crystal controlled converter with an i.f. output of 2-3MHz. This was fed to the antenna socket of an Eddystone communications receiver and the frequency of 70.31MHz was selected by tuning the Eddystone's dial to 2.31MHz.

By using this system the "pings" were heard through the loud-speaker and by amplifying the d.c. voltage at the receiver's detector with a 709 chip, a corresponding spike was drawn on the chart of a pen recorder. I ran the chart at 12mm per minute and the spikes were counted by hand at the end of each observational period. Even then chart was expensive, but running costs have to be accepted with any experimental project and offset against possible earnings.

Early Tests

Throughout a 32 day test in 1971, July 15 to August 15 inc., the equipment ran for five hours each evening from 1800 to 2300UTC, Fig. 1. Although this adds up to a total observational time of 160 hours, 10 of these were lost to interference (seven to Sporadic-E (E) and three to thunder static (S)).

The former meant that Gdansk was being heard continuously and the pen was against the upper stop and the latter was putting a multitude of spikes on the chart and making a true count impossible. However, the total number of "pings" recorded in the remaining 150 hours was 32,953 giving an hourly average of 219.

The observation shown in Fig. 1, required nearly 7 rolls of recording chart (about 140m) and the results were very time consuming to count. After this I decided to build an electronic counter, but more about that next time.

Hourly rate of meteor 'pings' recorded by Ron Ham, on 70.31MHz, see text.

UTC July	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
18/1900	196	134	115	225	E	214	192	134	256	177	223	183	218	104	201	219	180
19/2000	155	115	127	280	214	133	343	192	194	164	257	142	204	120	188	202	184
20/2100	164	102	212	218	282	95	326	223	222	170	312	128	248	141	183	199	239
21/2200	183	156	169	216	201	124	354	250	230	191	376	130	270	126	253	370	243
22/2300	207	167	220	220	376	149	430	177	251	203	393	181	348	225	307	S	315
Total	904	674	752	1269	1073	715	1645	976	1153	905	1561	784	1288	716	1132	990	1161
Hourly Average	180	134	150	249	267	143	329	195	230	180	312	156	257	143	226	198	232

UTC August	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
18/1900	138	152	182	229	220	181	E	193	216	218	297	312	181	169	93
19/2000	158	S	140	277	186	125	E	213	199	242	242	215	184	175	86
20/2100	191	283	175	226	220	145	E	244	223	334	324	257	223	188	70
21/2200	257	326	227	243	274	191	E	220	387	383	257	228	183	121	
22/2300	298	S	256	247	320	222	E	267	198	448	322	244	196	203	123
Total	1042	761	1188	1262	1220	864	-	917	1056	1629	1568	1335	1012	918	493
Hourly Average	208	253	198	252	244	173	-	183	211	325	313	266	202	184	98

Fig. 1

Solar

"The monthly mean sunspot number for August was 167 with a daily high of 337 on the 5th," wrote **Neil Clarke G0CAS** from Ferrybridge. Neil also provided the computer print-out, Fig. 2, showing the solar flux variations throughout the month with a mean of 218 units.

In Edinburgh, **Ron Livesey**, using a 2.5in refracting telescope for projecting the sun's image, identified 6 active areas on the 1st, 7 on the 22nd, 8 on the 4th, 15th and 31st, 9 on the 5th, 11th and 12th and 11 on the 7th. **Ted Waring** (Bristol) counted 6 sunspots on August 28 and 90 and 34 on September 7 and 9 respectively.

Despite the hindrance of cloud, **Cmdr Henry Hatfield** (Sevenoaks), used his spectrohelioscope to observe the sunspot groups , filaments and quiescent prominences listed in Fig. 6. In addition he recorded individual bursts of solar radio noise on August 24, 28, 29,September 1, 2, 3, 5, 7, 11, 13, 14, 19 and 25 on 136MHz and August 24, 28, 29, 30, September 1, 2, 3, 5, 7, 11, 14 and 19 on 1297MHz, plus a continuous noise storm on September 3 and 4 at the lower frequency.

However, between 1600 and 1620 on the 31st, Henry, with his spectrohelioscope, located two sub-flares and one small flare and entered in his radio log, "1606-1609 small burst on 1297. 1606-1616 few small bursts on 136. 1617-1625 another small burst on 1297. 1648-1649 small burst on 136." My thanks are due to Henry for the photographs he took during that observation of the sunspots, Fig. 7 and the activity around them, Fig. .8

Ern Warwick (Plymouth) heard variations in the background noise on 14MHz on August 28 and September 4 and on 28MHz on the 28th, 29th, 30th and 31st and September 1 and 8. **Fred Pallant G3RNM** (Storrington) reports hearing solar noise on 28MHz at midday on September 10 and possibly around 1630 on the 19th while the band was completely dead.

The progress of the very large sunspot group was observed and plotted by **Patrick Moore** at his observatory in Selsey during the first few days in September, Figs2, 3 and 4

Readers wishing to explore the v.l.f. region when the sun is active can obtain details of a converter kit, covering 10-150KHz, by sending a 9in x 4in s.a.e. (overseas add two IRC) to Cambridge Kits, 45 Old School Lane, Milton, Cambridge CB4 4BS, for their catalogue.

Auroral

Ron Livesey, the auroral co-ordinator for the British Astronomical Association, received reports of auroral "glow" from the weathership *Cumulus* for the overnight periods on August 4, 5, 8, 11 and 12 and of "ray bundles" on the 10th and 14th. "Homogeneous arcs" were reported from north-Scotland on the 16th, "ray bundles" from northern England on the 14th and 15th and Denmark, Nova Scotia and north-Scotland on the 28th, "active storm, movement of forms, flaming and flickering" from north-Dakota on the 14th, Kirkwall on the 13th, northern England and Scotland on the 9th, 23rd and 27th and "half sky or coronal forms" from Scotland on the 14th.

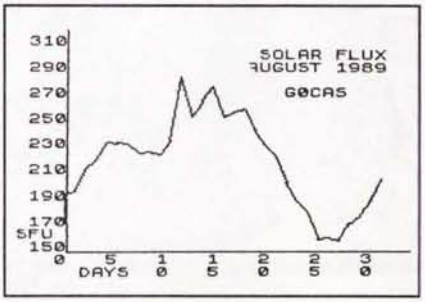
In Wishaw, **Doug Smillie** noted fading on the 7MHz band on August 6, 16 and 22 and weak auroral reflected signals on 144MHz on the 21st and 23rd. Ern Warwick reports "echoy" signals, sometimes accompanied by sharp fading, on 28MHz at 1030 on August 26, 1832 on the 27th, 1359 on September 2 and 1200, 1243 and 1640 on the 6th. **Simon Hamer** received a very distorted picture, most likely auroral, on Ch. R2 (59.25MHz) on the 24th.

Magnetic

In addition to providing the Ap index graph for August, Fig. 5, Neil Clarke reports that the month was mostly unsettled with 3 minor storm periods, the first on the 10th and 11th, the second from the 14th to the 23rd with the 15th being the stormiest day and the last on the 29th. The Hall effect magnetometer used by Doug Smillie, the Fluxgate instruments operated by Karl Lewis (Saltash) and David Pettitt (Carlisle) and Ron Livesey's "Jam-Jar" magnetometer, between them recorded activity on days 1, 4, 5, 6, 8, 9, 10, 14, 15, 18, 20, 21, 23, 24, 27, 28 and 29. Ron also received reports of magnetic storms recorded by NOAA on August 10/11, 14/15, 15-17, 21-23 and 27/28.

Sporadic-E and Meteors

I counted 12 East European f.m. broadcast stations between 66 and 73MHz, plus weak television synchronising pulses on Ch. R3 (77.25MHz) during a mild Sporadic-E opening at 1900 on August 31 and, on August 16 and 17, Simon Hamer



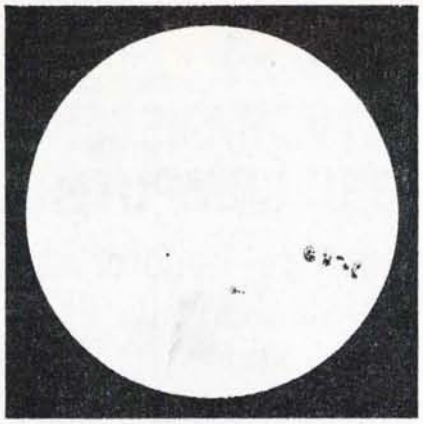


Fig. 2

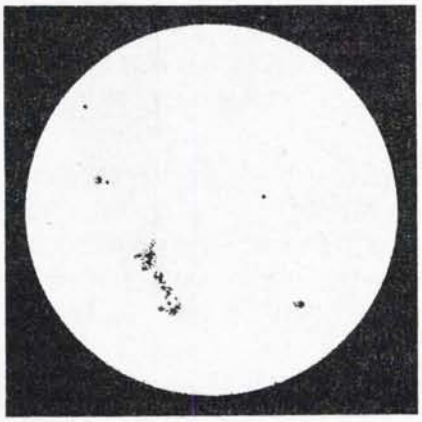


Fig. 3

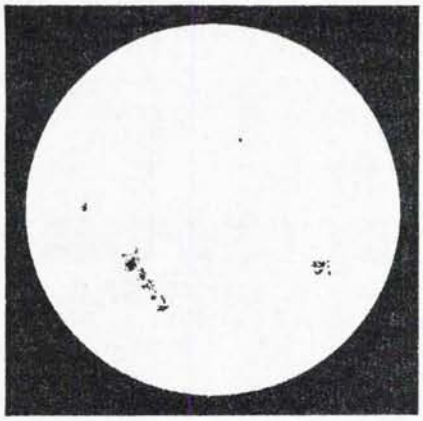


Fig. 4

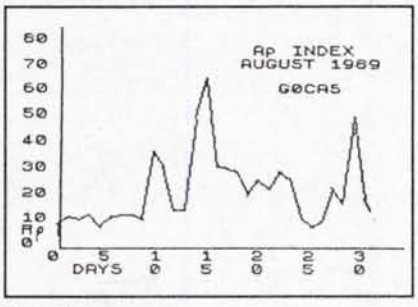


Fig. 5

(New Radnor) received "pings" of pictures, via meteor scatter, from television transmitters in Finland, Poland, Scandinavia and the USSR on Band III.

The 28MHz Band

"Total communications blackout on all AR bands above 14.350MHz until around 2100UTC", reported **Greg Lovelock G3III** (Shipston-on-Stour) on September 19. Our beacon chart, Fig. 9, adds weight to that Greg.

Among the DX heard on 28MHz by

Date	Groups	Filaments	Quiescent Prominences	Notes
22.08.89	2	22	5	
23.08.89	2	26	7	two small flares
24.08.89	2			filaments & quiescent prominences not counted
26.08.89	2	27	12	cloud hampered observation
27.08.89	2	30	9	
30.08.89	1	28	13	
31.08.89	1	25	10	two sub-flares, one small flare
01.09.89	1	25	10	group still very angry
02.09.89	2	28	cloud	cloud, medium flare and eruptive arch filament. Group 22 degrees long
03.09.89	cloud	cloud	cloud	four small flares
05.09.89	4	27	10	small flares and medium ribbon flare
07.09.89	4	34	10	
13.09.89	3	cloud	cloud	
18.09.89	3	30	7	
19.09.89	3	30	7	sub-flare and ribbon flare declining
20.09.89	3	23	7	
21.09.89	2	20	10	
23.09.89	1	15	3	cloud hampered observation
25.09.89	1	20	8	short life sub-flare

Fig. 6

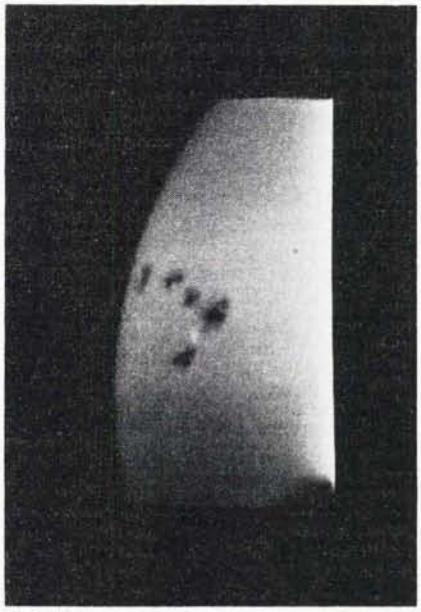


Fig. 7

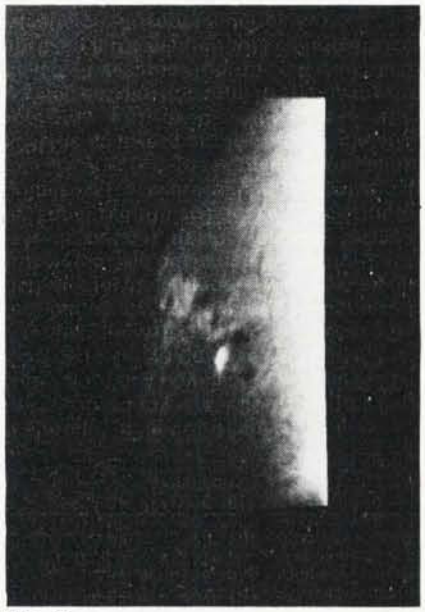


Fig. 8

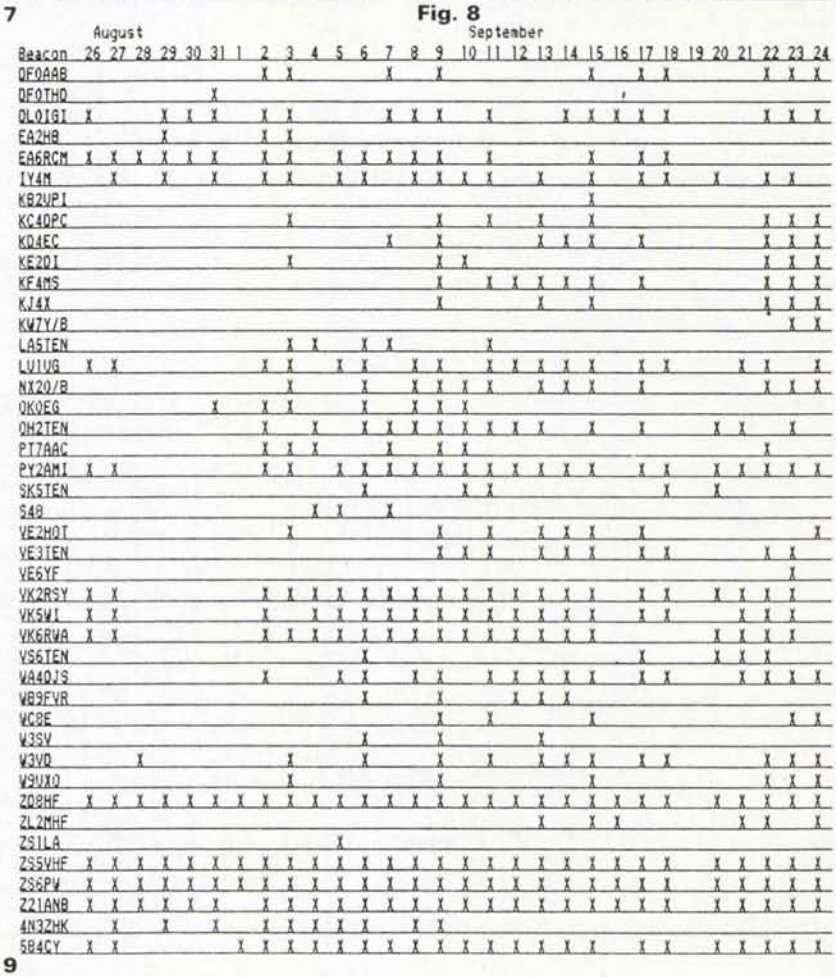


Fig. 9

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John Levesley G0HJL (Bransgore) was signals from stations in Japan on August 28, Australia and South America on September 17, South America on days 20, 21 and 24, Australia and Japan on the 23rd and Japan on the 24th.

Propagation Beacons

As usual, my thanks to **Mark Appleby G4XII** (Scarborough), **Chris van den Berg** (The Hague), **Vaclav Dosoudil OK2PXJ** (Kvasice),Henry Hatfield, John Levesley, Greg Lovelock, **Ted Owen** (Maldon), Fred Pallant, Ted Waring and Ern Warwick, for their detailed 28MHz beacon logs from which I compiled our master chart for the period, Fig. 9.

Ern Warwick heard S48 on 28.272MHz at 1248 on September 4 and Greg Lovelock said, "it appears to emanate from South East Asia." Greg also reported that KF4MS is now on 28.301MHz, Henry Hatfield said that ZS6PW was "very loud and clear" on September 22 and Mark Appleby copied "KW7Y/B KW7Y/B MARYVILLE WASH 5 WATTS" on 28.223MHz at 1850 on the 23rd.

Fig. 10

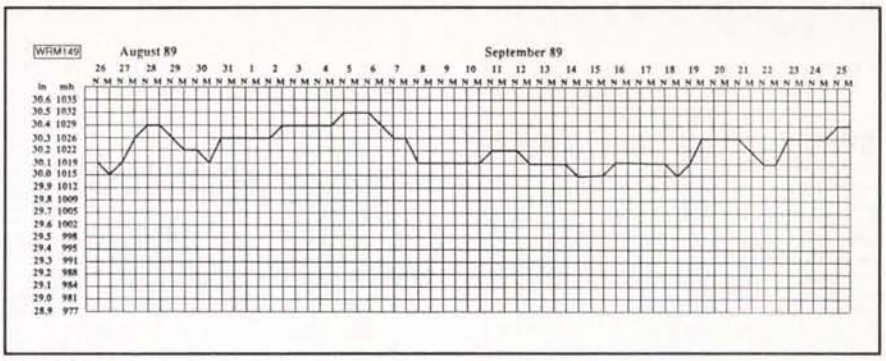

Fig. 11

I had the pleasure of meeting Ted Owen, Fig. 10, when he visited the Chalk Pits Museum (Amberley, Sussex) in August. Ted is an ex-Marconi man with a wide experience of engineering and operation in the world of wireless communications.

Ern Warwick logged signals on most days from IK6BAK and PY2AMI on 24.915 and 24.931MHz respectively, OH2B, LU4AA, ZS6DN/B, 4U1UN/B and 4X6TU/B on 14.100MHz and DK0WCY on 10.144MHz. In addition he sometimes heard PY2AMI on 18.100MHz and CT3B and KH60/B on 14.100MHz

Tropospheric

The slightly rounded atmospheric pressure readings, Fig. 11, were taken at noon and midnight from the Short and Mason Barograph installed at my home in Sussex.

While conditions were good, Simon Hamer received BBC Radios Devon and Cornwall, Radio Ulster, ILR Downtown Radio (Belfast) and Ireland's RTE FM 1, 2 and 3 on August 20 and the Benelux countries, France, West Germany and Scandinavia on the 21st.

A variety of continental f.m. broadcast stations added interest to Band II early on the 30th and, at 1045, while the weather was changing from the west, I logged a test card from Ireland's RTE in Band III. This opening carried on for most of the day because I found negative pictures from France in Band III and several strong French stations in Band II, using my Plustron TVR5D with its own rod antenna, while parked at a couple spots in Sussex at 1320 and 1601. Tropo-conditions were good again on September 6 when, around 1030, I logged negative pictures from France in Band III and several French broadcasters in Band II and although parked under trees during the afternoon, these French stations could still be seen and heard.

At the u.h.f. end on 934MHz, John Levesley UK-627 received signals from GY-186 in Guernsey at approximately 160km on August 27 and 29 and September 17 and 20.

Broadcast Round-up

Peter Shore

With the evenings drawing in, it is now the time to sit down at the receiver and tune around the world. The first round of frequency changes has ended, with a smaller set due in November, but otherwise it has to be said that the world of international broadcasting continues to be rather quiet, with no startling developments, other than the usual complaints from broadcasters of lack of funds.

Radio Canada International, which I have reported in previous editions is in dire financial straits, managed to offer a brief reprieve to its German language service which was face with imminent closure when a "new and novel initiative" from outside the station was announced. It is not known how successful this will be, and whether other language sections within RCI will be able to benefit. But anything that keeps such a station on the air has to be good for listeners everywhere.

The Voice of America meanwhile has failed to renew its relay agreement with Radio Costa Rica. VoA has broadcast five and a half hours of its programmes over Radio Costa Rica since 1985.

The Caribbean island of Montserrat was in the news when Hurricane Hugo caused massive devastations. The island has also suffered with the closure of the Deutsche Welle relay there at the end of June and the planned withdrawal of all DW's financial and technical support at the end of this year for Radio Antilles. This may also affect the relay facilities of the BBC, VoA and Radio Canada International.

A North American religious broadcaster, the High Adventure Ministries, which runs stations in California, KVOH, and in Lebanon will soon be reaching out to the Pacific. Based in Guam, the new station will start operating in late October or early November, if all goes according to plan, using a 100kW sender with the callsign KHBN.

With continued tension between Turkey and Bulgaria, TRT broadcasts are being jammed. Reports from the Turkish capital suggest that in excess of 30 jamming stations have been established during the summer, based on Soviet equipment, bring the estimated total number of jamming facilities to around 250. Turkish sources suggest that the jammers may also be used against West European broadcasters' Bulgarian services.

Reception of the BBC World Service in West Africa and South America improved at the start of October with the introduction of two new transmitters together with a comprehensive new antenna system. A new morning service to Africa will provide extra choice for listeners between mainstream WS in English and regional alternatives. Then, when Africa sleeps, the new transmitters will serve South America during the prime evening hours. There is also a new morning service to South America for the first time.

European Stations

All times UTC (=GMT)

English language broadcasts from BRT Brussels are now:

0800 on 6.035 (Monday-Friday to Europe), 21.815 & 11.695MHz (Monday-Friday to Asia/Australia)

1000 on 26.05 & 21.81MHz (Monday to Friday to Africa)

1330 on 21.81 (Monday-Saturday to N. America) & 21.815MHz (Monday-Friday to Asia)

1630 on 17.58 & 21.81MHz (Monday-Saturday to Africa)

1830 on 11.695, 5.915 & 1.512 (daily to Europe)

2200 on 5.91, 1.512 (daily to Europe) & 9.925MHz (daily to N. America)

0030 on 9.925MHz (daily to N. America)

Belgium's French language service, RTBF, has a French DX programme on Sunday at 1130. The frequencies used are 9.925 to Europe and 25.545MHz to Africa.

The Voice of Greece has moved from 9.905 to new 9,395MHz, in parallel with 11.645MHz for English news at 1920.

The new schedule for Iceland's Rikisutvarpid to Europe is:

1215-1245 on 13.745, 13.79, 15.676 & 15.78MHz

1855-1930 on 9.268, 13.83, 13.855, 15.767 & 15.78MHz

and to North America

1410-1440 on 13.79, 13.855 & 15.767MHz

1935-2010 on 15.767, 15.78 & 17.44MHz

2300-2335 on 13.855, 15.767 & 15.78MHz

Italy's commercial IRRS station which is heard on Sundays had moved to

9.86MHz. A station called World News and Information Radio, WNIR, based in the American state of Maryland, is heard at 0900. Programmes from the United Nations are carried by IRRS.

Radio Sweden's moose mascot has donned a warm scarf for the winter schedule and has told us that the broadcasts in English through until March are:

Europe
1530 on 21.655MHz
1800 on 7.265, 6.065 & 1.179MHz
2100 on 11.705, 9.655 & 1.179MHz
0000 on 1.179MHz
Asia
1230 on 21.57, 17.74 & 15.19MHz
1400 on 17.74 & 11.905MHz
0100 on 9.64, 7.225MHz
North America
1530 on 21.61 & 17.88MHz
0230 on 11.705 & 9.695MHz

Latvian broadcasts continue from Radio Sweden at 1745 on 6,065 and 1.179MHz daily.

Swiss Radio International's European English language transmissions are now at 0730, 1300, 1830 and 2230. Frequencies used from SRI's European transmissions are 3.985MHz between 0600 and 1100, 1330 and 2045; 6.165 and 9.535MHz between 0600 and 2045; 12.030MHz between 1100 and 1330.

Intercontinental English transmissions are:

0200 on 17.73, 12.035, 9.885, 9.725, 6.135 & 6.095MHz
0400 on 12.035, 9.885, 9.725 & 6.135MHz
0630 on 21.520(s.s.b.), 17.57, 15.43 & 12.
0830 on 21.695, 17.67, 13.685 & 9.56MHz
1100 on 21.77, 17.83, 15.57 & 13.635MHz
1330 on 21.695, 17.83, 15.57, 13.635, 11.695 & 9.62MHz
1530 on 21.63, 17.83, 15.43 & 13.685MHz
1830 on 11.955 & 9.885MHz
2100 on 21.705 (s.s.b.), 15.525, 13.635 & 9.885MHz

It is interesting to note that s.s.b. transmissions continue to be made by Swiss Radio - it is probably the only broadcaster which still does use s.s.b. for mainstream broadcasting (as opposed to feeders to relays).

Vatican Radio still transmits in Nordic languages at 1915 on 11.715, 9.755, 6.185 & 1.611MHz with Norwegian or Danish on Monday, Swedish on Tuesday, Wednesday, Thursdays and Saturday and Finnish on Friday and Saturday.

African & Middle Eastern Stations

Radio France International has been heard on 3.305MHz presumed to be from Gabon, between 1900 and 2100.

Radio Jordan's English service for Europe, and carried simultaneously in the Kingdom, is heard 0500-1420 on 13.655 and from 1420 until 2200 closedown on 9.56MHz.

The Arabic Service may be heard:
0330-0630 on 11.955, 11.94 & 11.81MHz
0630-1600 on 11.81MHz
1600-2330 on 15.435, 11.81 & 9.835MHz

Radio RSA's current schedule for English is:
0200-0300 on 11.935, 9.615 & 9.58MHz
1100-1200 on 25.79, 11.90 & 11.805MHz
1200-1300 on 21.59, 11.805 & 9.585MHz
1300-1400 on 21.59, 17.73 & 11.805MHz
1400-1600 on 25.79, 21.59, 21.535 & 11.925MHz
1800-1900 on 21.535MHz
1900-2000 on 21.535, 17.765 & 7.295MHz

The *DX Corner* programme can be heard on Sundays at 1440, 1835 and 1935, and on Mondays at 0230.

The Voice of Turkey is heard with English for Europe three times each day at 0400, 2000 and 2200, all on 9.795MHz.

At 2200 additional frequencies of 9.445 (for North America), 7.76 (for South East Asia) and 9.665MHz (for the Middle East) are also used.

The General Arabic service from Damascus is on the air:
0500-1100 on 12.085MHz
1100-1630 on 15.095 & 12.085MHz
1630-1730 on 12.085MHz

Asian & Pacific Stations

All India Radio's General Overseas Service in English transmits:
0000-0115 on 17.725, 15.11, 11.745, 11.715, 9.91 & 9.535MHz
1000-1100 on 17.74, 17.387, 15.335, 15.155 & 11.86MHz
1330-1500 on 15.335, 11.81 & 9.565MHz
1800-1845 on 15.36 & 11.935MHz
1845-1945 on 15.36, 11.935, 11.62 & 7.412MHz
1945-2000 on 15.36, 11.935, 11.86 & 9.755MHz
2000-2045 on 11.86 & 9.755MHz
2045-2230 on 11.715, 11.62, 9.91, 9.55, 7.412 & 7.265MHz
2245-2400 on 15.11, 11.745, 11.715, 9.91, 9.535 & 7.215MHz

Hindi to Europe from AIR is broadcast at 1945 on 11.62, 9.91 and 7.412MHz

Radio New Zealand's transmission between 0300 and 0730 now uses 17.705 and 15.485MHz, whilst from 0900 until 1205, the channels to check are 11.78 and 9.85MHz. The evening broadcast at 1830 to 2105 is on 15.485 and 11.78MHz.

English from Radio Pakistan uses:
0230-0245 on 21.49, 17.725, 17.66, 15.115 & 9.545MHz
0715-1120 in 21.575 & 17.565MHz (includes Urdu)
1600-1630 on 21.74, 21.48, 17.895, 17.565, 15.605 & 13.665MHz
1718-1800 on 15.20, 11.57 & 4.79MHz

FEBC in the Philippines now uses 15.45MHz at 0000-0200 instead of 15.465MHz.

Radio Veritas Asia, also in the Philippines, broadcasts at 0130 on 15.22 and 15.36MHz and at 1500 on 9.525 and 15.445MHz.

The Voice of Free China in Taiwan has introduced a West German postal address. It is Postfach 200553, 5300 Bonn 2, West Germany.

Voice of Vietnam English transmission are at:
1100-1130 on 9.732 & 7.425MHz
1330-1400 on 15.01 & 9.84MHz
1545-1600 on 12.037 & 10.01MHz
1600-1630 on 15.01 & 9.84MHz
1615-1630 on 12.037 & 10.01MHz
1800-1830 on 15.01 & 9.84MHz (also at 1900, 2030 & 2230)

Central, Southern & North American Stations

Radio Havana Cuba with Spanish to Europe is noted at 1800 until 2000 on 21,67, 17.71, 15.295 & 15.23MHz.

Radio Nacional del Ecuador uses the facilities of HCJB in Quito for Spanish on 15.27MHz at 1730 for thirty minutes daily.

Radio Educacion in Mexico City can be heard on 6.185MHz if propagation is good after 0610 once Vatican Radio clears the frequency. The Mexican station is on the air from 1200 until 0700 daily. The address is Angle Urraza 622, 03100 Mexico.

ATV

Reports to Andy Emmerson G8PTH
71 Falcutt Way, Northampton NN2 8PH.

Ireland is different! The Republic is of course a component part of the British Isles and has much in common with the rest of Britain. And then again a lot that is not.

The differences are subtle but refreshing. If you haven't been there yet, don't wait: I really recommend a visit. You'll love the hospitable welcome, the Guinness, the green letter boxes, the road signs that look familiar but not quite the same ...

Amateur radio in Eire is different too. For a start there's less of it, simply because there are fewer people in Ireland. Also, there's no amateur licence - honestly! Instead people who pass their test get an experimenter's licence, which is subtly different.

Experimenters do not have an automatic right to all amateur bands and modes: on the other hand they are not entirely bound by amateur regulations. If they could put up a good case for operating on a non-amateur frequency (perhaps even a Band IV/V frequency for a TV repeater output) this might well be permitted. Some people are of the opinion that a move to true amateur status would be beneficial.

There are around 1200 experimenter licences in Eire: the original ones had single letter callsigns (!) and some of these are still active. It is estimated that some 250 amateurs are regularly on the air.

There is plenty of interest in amateur radio, with field days and a few rallies. Amateur radio equipment, where it is sold, is about twice the UK price (crippling VAT, import duties and so on). As a result many people build their own - or have it sent from England.

There are two amateur radio societies in Ireland, the premier being the IRTS or Irish Radio Transmitters Society. It was founded in 1932 but has its roots in the Dublin Wireless Club, which was founded in 1913.

The IRTS is the member society for Ireland of the IARU and represents the amateur fraternity to the Department of Communications (which issues and controls licences). There is another, breakaway group called the Amateur Radio Society of Ireland or ARSI. I was unable to find anyone who could tell me much about this.

So much for the background. You want to read about ATV and that's what the rest of this article is about. ATV, it appears, used to be a permitted mode in Eire until some twenty years ago. Then, as now,

certain enterprising individuals were relaying

British broadcast television signals, and apparently when questioned, some of these people said they were entitled to do this under the terms of their amateur, sorry experimenter's licence.

The authorities took a different view, naturally, and withdrew the right to transmit ATV. This ban did not extend to slow-scan, however, and the video fraternity built up a net of SSTV stations. All the same this was not real ATV, and gradually pressure built up to be allowed to transmit fast-scan amateur television.

The political situation in Ireland is somewhat different to Great Britain's and is far too complex to explain here. Suffice to say, direct approaches to politicians are possible and in this case a bit of pressure in the right place brought about the legalisation of ATV once more.

This happy event came to pass in November 1988 and ATV is now allowed to Irish experimenters, though only to class A licensees. The permit is provisional and on an annual basis. Portable operation is not allowed, and effectively operation can be on 70cm only. Most ATVers are on 436 or 437MHz and there is a net every Tuesday at 20.00, with contact on 144.500. The SSTVers meet daily at 1330.

With this renewed interest the British Amateur Television Club (BATC) thought it would be a good idea to attend one of Ireland's major rallies and give the ATV community a bit of support. At the same time the club could display its wares and perhaps recruit a few more members. Thus it came about that three of the BATC's top team (and Paul's wife Jill!) made a visit to Dublin at the end of September.

The rally is held in the Grand Hotel at Malahide, a seaside spot close to Dublin. Grand is the word for the large ballroom used for the rally: lots of room around the tables and no crowding at all. They were expecting around 400 visitors, so this was not on the same scale as your average UK rally; all the same, any shortage of visitors was made up by enthusiasm. Most people stayed to the end of the show, when much of the unsold items were auctioned to the the highest bidder. The Fingal Radio Club EI2FRC is the organiser of the rally, by the way, Fingal being the name given to a district north of Dublin.

The BATC occupied two tables and showed a large selection of books as well as our smart new pictorial display boards. Business was good: we recruited eight new members, signed up three renewals and did a brisk trade in books. In addition we were able to make new friends, renew old acquaintances and learn all about ATV in Ireland.

Here then is a list of ATVers in Eire:

EI2EM	Charlie, Swords, Co. Dublin.
EI3CZ	Rod, Dublin
EI3DM	Bill, Dublin.
EI3FW	Craig, Greystones, Co. Wicklow.
EI4BB	Brendan, Dublin.
EI4N	James, Dublin.
EI5GG/GI0CJ	Michael, Dundalk.
EI6AS	Albert, Clondalkin, Co. Dublin.
EI6EV	Donal, Portmarnock, Co. Dublin.
EI6GU	Edward, Dublin.
EI7CL	Mike, Dublin.
EI7CZ	Tom, Dublin.
EI7DF	Rod, Swords, Co. Dublin.
EI7GM	Paul, Dublin.
EI8GB	Ben, Dublin.
EI9GL	Paul, Dublin.
EI9P	Phil, Trim, Co. Meath.

In addition EI7GT and EI9CJ expect to be on the air in Dundalk by the time you read this, and EI9ED is receive-only in Kells, Co. Meath. All ATV activity is therefore concentrated around Dublin and the surrounding counties, but there is a possibility of an ATV repeater in Waterford. This, if it went ahead, would have its input on 70cm and output hopefully on a spare channel in Band IV or V.

The day following the rally our team had to wend its way home, but not before we had visited the TV transmitter on Mount Kippure high up in the Wicklow Mountains and the studios at Donnybrook (thanks to Radio Telefis Eireann and the kind people who showed us around). Kippure is a really isolated spot, with a snowcat for emergency escape. If this fails there is a set of skis and finally a week's food rations. Not the place to get stuck in winter, though our visit was on the most glorious of days. A most pleasant memory and indeed a most agreeable and successful trip. We look forward to seeing some of our Irish friends at the next BATC convention and it won't be long before we visit Ireland again.

As a footnote, it is interesting to note the lengths to which people in Eire go to receive British television. Virtually every house in Dublin has a monster antenna on a tall pole: some people use 96 X-element German Yagis, others use a box of four multi-beams and some use 2.1m parabolic dishes with a gain of up to 20dB. Not surprisingly there is no planning authority necessary to erect this kind of array. Dublin now has a cable TV system which relays BBC, ITV and satellite channels but other parts of the country will be without these until the 2.5GHz MMDS (multi-point microwave distribution service) is installed. In the interim unlicensed re-broadcast systems are allowed to proliferate, on the understanding they will be closed down once MMDS comes along. One of these re-broadcast systems at Dunmore East, near Waterford, uses a 10m parabolic to pick up signals from across the Irish Sea. Frequency changers and a.g.c. circuits then feed these signals to Band IV/V transmitters, using 40 watts per channel! There are several of these systems, mostly with powers of between 10 and 40 watts per channel; some also relay satellite television. Simpler systems pick up Preseli, pass it through a distribution amplifier and relay it on the same channels but with vertical polarisation. The operators recoup their costs by supplying subscribers with a Colour King antenna and a pre-amp: the charge is £50 a year and some systems have subscriber bases of several thousand. Amazing!

KEEP SENDING IN YOUR REPORTS TO THE ADDRESSES AT THE TOP OF EACH COLUMN

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