

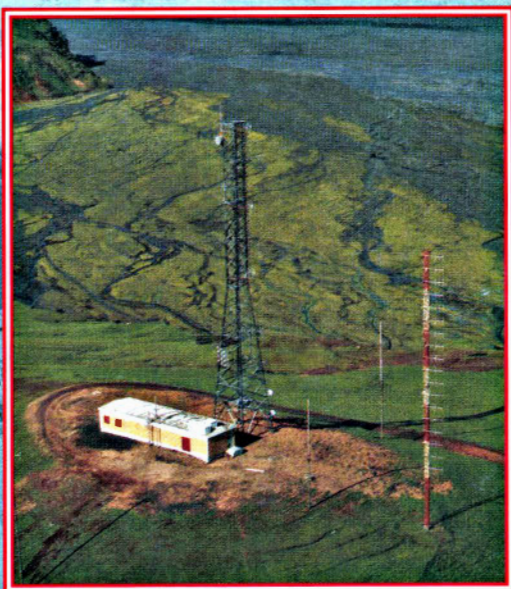
PRACTICAL WIRELESS... THE RADIO MAGAZINE

70cm Repeater Datacard Free With This Issue

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**Special Offer -  
Buy A Kenpro KT-44 UHF  
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**Build The PW Beaver 50MHz  
AM Transmitter-Receiver**



**Five Bells Go To Iceland -  
A Country Of Contrasts**

OCTOBER 1991  
£1.60

ISSN 0141-0857



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THE NEW

# FT-1000

FOR DYNAMIC DX

The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed six microprocessors and five Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.



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Prices and specifications are subject to change without notice



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'Mathematics For The RAE' has been held over this month.

Icelandic front cover scenes courtesy of: Icelandic Photo & Press Service (Mats Wibe Lund) PO Box 8575, 128 Reykjavic, Iceland.

Five Bells Group front cover inset picture: Front row G4YHF (left) G4PIQ (right), back row (left) G4DHF, G4YTL (centre), G4NPH (right). *Photo Rob Mackie.*



# DUAL-BAND

## IC-W2E Dual-Band FM Handheld

ICOM have produced the hand-held with the perfect combination of size and features. This exciting new transceiver is one of the smallest in it's class yet contains so many functions you'd think it would burst!

### IC-W2E features include:

- Optional pocket beep and tone squelch for quiet standby.
- High speed scan and priority watch.
- Full 5W output power with external 13.5-16V power supply unit
- 24 hour clock with ON/OFF timer.
- 1750Hz tone call to access repeaters.
- Programmable offset frequency.
- Monitor function that allows you to check repeater input frequency.
- External DC power jack.
- Memory mask to hide seldom-used channels.
- Memory transfer function.
- PTT lock function.
- Keypad and tuning control lock.
- Automatic power save.

The ICOM logo is displayed in a large, bold, sans-serif font. The 'O' is stylized with a small circle above it, resembling a radio antenna or a speaker grille. The letters 'I', 'C', 'O', and 'M' are stacked vertically below the 'O'.



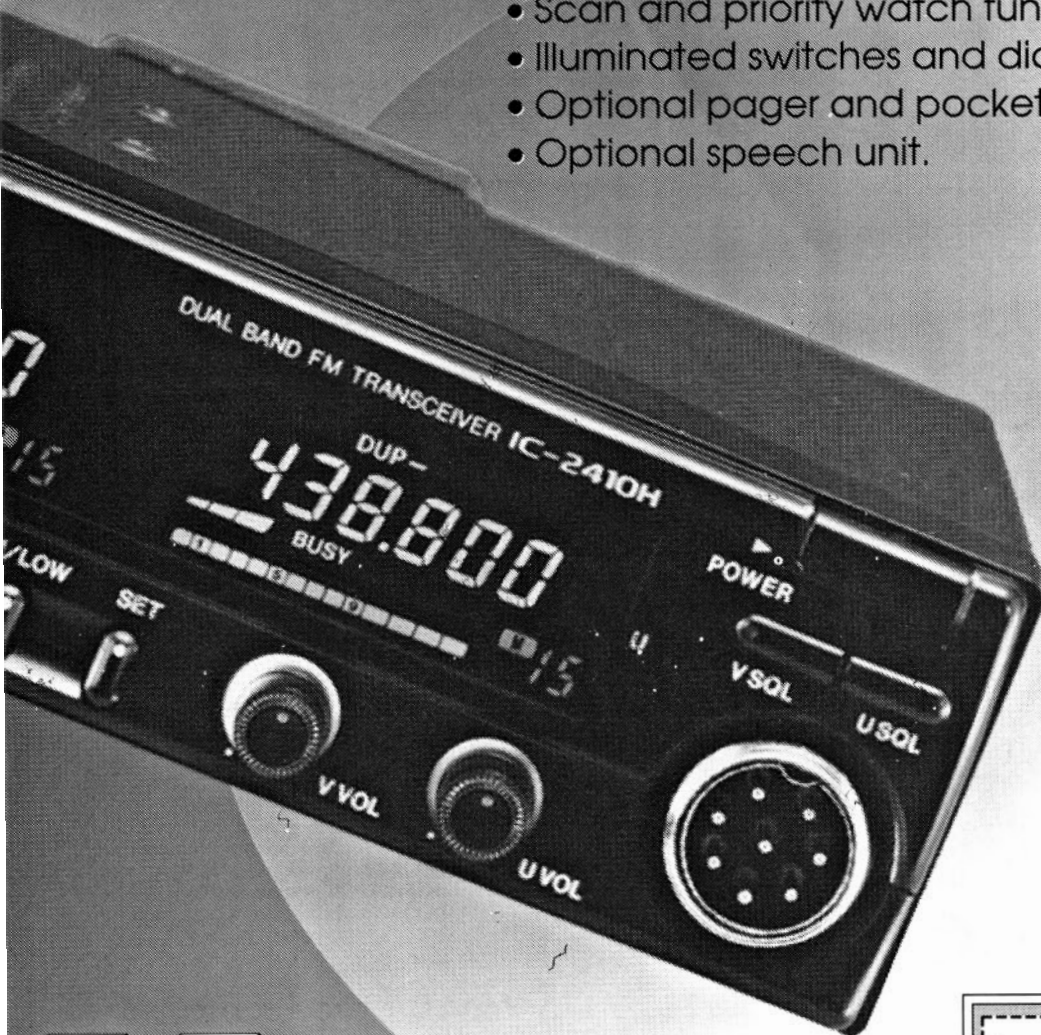
# SUPERIORITY

## IC-2410E Dual-Band FM Mobile

ICOM introduces simultaneous reception of two frequencies in the same band!, combine this with simultaneous dual-band receive and you have a breakthrough in features not found anywhere with any other radio. Compact design fully utilises the latest technology while using a minimum of knobs and switches. One-touch controls activate both primary and secondary functions, this ease of operation makes the IC-2410E especially safe when in mobile use.

### Outstanding IC-2410E features include:

- Independent volume controls and squelch setting.
- 20db RF attenuator effective against strong signals.
- Built-in duplexer for easy dual-band antenna connection.
- Scan and priority watch functions.
- Illuminated switches and dials for night ops.
- Optional pager and pocket beep for selective calling.
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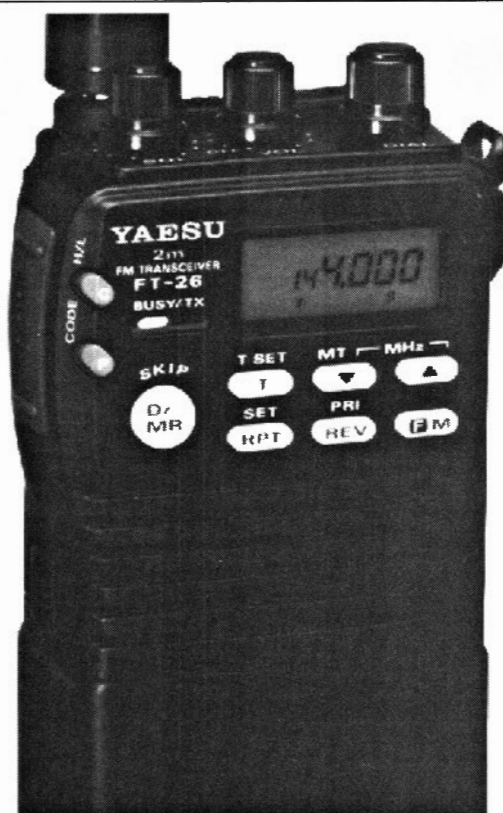
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## CONTINUING THE TRADITION ...

THE FT990 ALL MODE HF TRANSCEIVER,  
The FT990 carries all the hallmarks of its renowned  
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- ★ General coverage RX
- ★ Up to 100W p.e.p. RF output
- ★ Automatic internal A.T.U.
- ★ Internal mains P.S.U.



## ULTRA COMPACT HANDHELDS

Based on a long line of outstanding handhelds, the FT26 and FT76 offer a vast array of features made possible by the very newest manufacturing miniaturisation techniques. The diecast alloy rear cast/heat sink and the thick high impact polycarbonate front panel provide the ruggedness demanded by constant day to day use.

Up to five different user selectable power levels are available (with 12VDC) battery) and an external DC jack is provided on the top panel to power the transceivers from a 5.5-16V DC external source.

The large LCD has selectable lighting mode, shows a full six digits and has a bar graph for signal strength and power output.

Vox circuitry is included to enable hands-free operation with the optional YH2 headset.

Battery saving functions are standard with a constantly updated battery save facility based on past operation history. Automatic power off can be selected for 10, 20 or 30 minutes.

Other features include 53 memories, 5, 10, 12.5, 15, 20 or 25kHz + 1MHz steps are available along with an optional CTCSS unit and many other matching accessories - see below.

<b>FTS17A</b>	CTCSS module	<b>NC18C</b>	Charger for NFB27
<b>FBA12</b>	6 x AA cell case(empty)	<b>NC28C</b>	Charger for NFB25
<b>FNB25</b>	7.2V 600mAh nicad	<b>NC34C</b>	Charger for FNB26
<b>FNB26</b>	7.2V 700mAh nicad	<b>NC42</b>	Desktop quick charger
<b>FNB27</b>	12V 600mAh nicad	<b>MH12A2B</b>	Speaker/microphone
<b>E-DC-5</b>	DC adaptor c/noise filter	<b>MH18A2B</b>	Mini speaker/mic
<b>MMB49</b>	Mobile bracket	<b>MH19A2B</b>	Earpiece c/w mini mic
<b>CSC53</b>	Vinyl case for FNB25	<b>YH2</b>	Headset
<b>CSC55</b>	Vinyl case for FNB26/27		

Both the FT26/FT76 come supplied complete with FNB25, NC28C and CLIP3 as standard.

**Southampton** (0703) 255111  
SMC HQ, School Close,  
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- ★ PSK & JAS-1 B modes for satellite packet.
- ★ Auto doppler shift tuning.
- ★ Message storage facility.
- ★ Neat compact design.



**TNC Micro  
£209**

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- ★ AX25 Level 2 Protocol.
- ★ Message Board.
- ★ Supplied NiCad & Charger.

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## SMC FOR ALL YOUR ACCESSORIES

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COMET produce arguably the best quality base and mobile antennas available today on the amateur radio market. Discerning radio amateurs will appreciate the stunning combination of amazing performance and aesthetically pleasing styling of some of the latest range of antennas available from COMET via SMC, the authorised UK distributor. New additions to the range, which will be available soon are the:

B10	2m/70cm Mini Dualbander (Black) 0.3m long	CF-520	2m/6m Duplexer c/w flying leads
B22	2m/70cm Dualbander (Black) 0.89m long	CA-14HR	20m Monobander 2.1m long
RS-9	Mini Trunk Mount (Black)	CA-21HR	15m Monobander 2.1m long
CX-702	6m/2m/70cm Tribander 2.1m long	CA-50HR	6m Monobander 2.1m long
CA-7HR	40m Monobander 2.1m long	CA-285	6m/2m Dualbander 1.32m long

### TOKYO HY-POWER



#### BALUNS

CBL-30	1:1	1.7-30MHz, 1kW P.E.P.	£18.95	A
CBL-2000	1:1	0.5-60MHz, 2kW P.E.P.	£25.50	A

#### HANDHELD ANTENNAS

CH72S	2m/70cm BNC 0dB/3.2dB 2m/70cm	£12.25	A
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#### MOBILE ANTENNAS

CA2x4MB	2m/70cm 4.5dB/7.5dB 2m/70cm	£38.50	C
CA2x4KG	2m/70cm 6.0dB/8.4dB 2m/70cm	£40.75	C

#### DUPLEXERS

CF-305	50/144 Duplexer UHF conn.	£25.00	B
CF416MN	144/430 Duplexer UHF/N conn.	£26.00	B
CFX-514	50/144/430 Triplexer UHF conn.	£36.75	B
CFX4310	144/430/1200 Triplexer UHF/N conn.	£36.75	B

#### MOUNTS

TBR	Adjustable trunk mount	£11.50	B
RS17	Mini trunk mount	£12.75	A
RS16	Mini Gutter mount	£12.75	B
CK-3LX	Mini Cable Assy for RS16/RS17	£16.25	B

#### MINI MOBILE ANTENNAS

CHL21J	2m/70cm 0dB/2.15dB 2m/70cm	£14.75	B
CHL23J	2m/70cm 2.15dB/3.8dB 2m/70cm	£17.35	B

#### BASE ANTENNAS

CA350DB	6m/10m 2.15dB/6.5dB	£139.00	D
CA2x4WX	2m/70cm 6.5dB/9.0dB	£80.72	C
CA2x4MAX	2m/70cm 8.5dB/11.9dB	£102.12	C

#### FILTERS

CF-30MR	HF Cut off 32MHz 1kW P.E.P.	£38.75	B
CF-50MR	6m Cut off 54MHz 1kW P.E.P.	£38.75	B
CF-30H	HF Cut off 32MHz 2kW P.E.P.	£80.75	A
CF-30S	HF Cut off 32MHz 150W cw	£19.35	A
CF-50S	6M Cut off 57MHz 150W cw	£20.35	A
CF-BPF2	2m Band Pass 150W cw	£31.65	A

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CD-160H	1.6-60MHz 20/200/2000W	£90.85	B
CD-270D	140-625MHz 15/60/200W	£79.65	B

#### COAX SWITCHES

CSW-20	2 way DC-1000MHz SO239	£26.50	A
CSW-20N	2 way DC-1500MHz N	£45.95	B

#### ACCESSORIES

CEP-M2	Earphone 3.5mm jack	£1.28	A
CES-M2	Mini Clip on Speaker 3.5mm jack	£5.62	A
CHM-M4	Mini mic + PTT 2.5mm jack	£9.15	A

#### TUNERS

HC400L	160-10m 350W P.E.P.	£203.00	C
HC2000	160-10m 2kW P.E.P.	£365.00	D

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED

AS FOLLOWS:

A = £1.75	D = £10.00
B = £4.00	E = £15.00
C = £6.00	

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HT120	20m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HT180	80m Transceiver 10W P.E.P. SSB/cw	£305.50	C
HP100S	Power Supply for HT series	£99.00	B
HC100	A.T.U. 80-10M 5 band 200W P.E.P.	£109.00	B
HCF100	CW Narrow filter HT series	£39.85	A
HNB100	Noise Blanker HT series	£19.95	A
HBK100	Mobile Bracket HT series	£10.20	A

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HL2K	160-10m HF Linear 2kW	£1450.00	E
HL1K	160-10m HF Linear 1kW	£899.00	D
SAGRA-600	2m 25w drive 600w output	£815.00	E
HL100B/10	10m 10W in 100W output P.E.P.	£182.00	C
HL100B/20	20m 10W in 100W output P.E.P.	£182.00	C
HL100B/80	80m 10W in 100W output P.E.P.	£182.00	C
HL66V	6m 10W in 50-60W output	£131.75	C
HL166V	6m 3/10W in 80/160W output	£255.00	C
HL37V	2m 3W in 32W output	£90.95	B
HL62V	2m 10W in 60W output	£137.95	C
HL110V	2m 2/10W in 100W output	£220.00	C
HL180V	2m 3/10/25W in 170W output	£299.00	C
HL36U	70cm 6/10W in 25/30W output	£138.00	B
HL63U	70cm 10/25W in 50W output	£220.00	C
HL130U	70cm 3/10/25W in 120W output	£397.00	C

#### TRANSVERTERS

HX240	2m to HF 80, 40, 20, 15 & 10m 2.5W/10W in 30-40W P.E.P. output	£254.50	B
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2 Metre Handheld  
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Features include; 40 memories, digital message display, triple power outputs, 5 Watts capability, vox facility, remote control facility, 6 way scan modes, Auto power off, battery save, illuminated keypad, 5 - 25KHz steps, Tone encoder option, etc.

If you want the full story of why ALINCO is now leading the field in handheld technology send for the colour brochure.

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- 30 Memories
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- Pass and delay functions
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## FAIRMATE HP200



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• UHF Antenna • UK Spec.  
• DC charger/adaptor  
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## AR2000 HANDHELD



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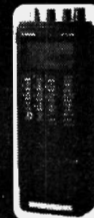
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- BUTTERNUT
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- ICOM
- KENWOOD
- HYGAIN
- MFJ
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- YAESU

## MVT7000 HANDHELD

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**£289**



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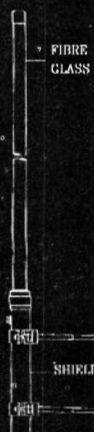
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This aerial covers everything from long-wave to VHF. It is no larger than a conventional mobile aerial measuring just 29.5" long, fits any standard mobile mount and comes complete with cigar lighter lead and matching box with RF gain control.

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Kenwood R5000 HF Receiver 100kHz - 30MHz

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Icom R72 HF Receiver 30kHz - 30Mhz

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Yaesu FRG8800 HF Receiver 150kHz - 30MHz

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## AR2800 SCANNING RECEIVER WITH SSB



AR2800 Scanning Receiver with SSB 500kHz - 1300MHz

**£395**

**KW Communications Limited**

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# MARTIN LYNCH

G4HKS

**THE AMATEUR RADIO EXCHANGE CENTRE**

286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081 566 1120 Fax: 081 566 1207

## MARTIN IS ONE YEAR OLD TODAY!

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Saturday, September the 14th is the day. Open from 8 o'clock in the morning, until 8 o'clock that evening, I have got special bargain offers across the board - NEW and USED, a massive saving and unbelievable offers on trade-ins you would not believe. First come first served, I have stocked up to the ceiling with all the major brands including all the latest models - I am not going to list them - you are invited to the largest display of bargains ever offered!

Food and drink is on offer all day - whether you are buying, selling or just browsing, come along and do you and your pocket a favour. It is a celebration for me and all the Lynch Mob, that includes Valerie, Graeme George and John. Customers old and new are welcome, but hurry - this is the only first Birthday Party, I cannot afford to repeat this again! If you cannot make it on Saturday, then visit us at the B. A. R. T. G. Rally on Sunday the 15th, at the Sandown Race Course - I cannot guarantee I will have anything left, but it will be worth a visit to the stand!

73 MARTIN G4HKS



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# Castle Electronics

Tel: 0384 298616

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**MAJOR SERVICING/REPAIR  
CENTRE FOR ALL AMATEUR,  
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RADIO EQUIPMENT...**

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Castle Electronics are a fully equipped DTI approved radio engineering company based in the West Midlands, who specialise not only in PMR equipment, but in land and marine based HF communications equipment of all types.

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# Keylines

Many enthusiasts enjoying the radio hobby today, were helped to start off by someone kind enough to donate time, lots of radio bits and much experience. In American amateur radio mythology, this kindly character is known as an 'Elmer'.

The 'Elmer' is normally pictured as a retired, wise old chap looking as if he's straight out of the TV programme 'The Waltons', complete with 'bib and brace' overalls.

Every radio enthusiast needs an 'Elmer' at one time or other. My personal 'Elmer' was an electrician working for British Railways. His name was Ding Coombes, and funnily enough, he wore 'bib and brace' overalls in the same way as the American Elmer!

I met Ding Coombes when I was a railway-mad (second only to radio!) schoolboy on holiday in the mid 1950s. Ding was equipping Botley railway station with electric light. He and his assistant David quickly adopted me as part of the team.

Every day throughout that long summer I was there to meet the train bringing Ding and David to work. Without fail, strapped to the back of Ding's ancient bike would be a parcel, which would then be transferred to my bike.

The parcel usually contained radio chassis, components, valves, headphones and precious magazines. Not only was Ding trying to help me start off, he was making sure that he did so in a positive way.

Tea-breaks meant sitting in a small shunter's cabin, heavily laced with the smell of ripe strawberries. The fruit

was being prepared for the overnight train journey to Glasgow, Liverpool and other seemingly far-away places (but many didn't make it!). The breaks also meant it was time to sit and have a radio lesson.

Invariably Ding also gave up his lunch break to help me. He gave a lot of his time, much of his experience and a great deal of his 40-odd years of radio collecting to help a youngster. Ding Coombes may never have been a radio amateur, but he was certainly an Elmer!

Although he never knew I'd eventually become editor of *PW*, he and I met years later when I was on the electrical engineering side of BR. I thanked him for his trouble, knowing full well that I must of been a terrible nuisance at times. His only comment was that in the 1930s he'd been helped in the same way.

## Continuing Tradition

So the tradition continues. Ding Coombes helped me, and gave me my first large collection of *PW* back numbers. At the end of the summer holiday he also gave me the most treasured part of his collection, which as it turns out, must have been some sort of omen.

On the very last day of my holiday, Ding presented me with a copy of *Practical Wireless Circuits* by F. J. Camm. He said that the book would really put me on the right course for success in the radio hobby.

Although I don't have that

copy now (I loaned it out and lost it years ago) I've no doubt is doing a good job in helping others, dated though it is! The book helped me, and I've enjoyed our hobby ever since.

## Letter From Glasgow

A couple of months ago I received a beautifully written letter from 12 year-old Gavin in Glasgow. This young man's letter brought memories of Ding Coombes, Botley station and my early days in the hobby flooding back to me.

Gavin, despite encouragement from his parents was having some problems. Although he was keen, and despite buying *PW* for quite a while, he was at a loss on how to start. Gavin needed an Elmer, and quickly!

Ideally of course, Gavin really needed a MacElmer in the Glasgow area. However, the next best thing was for me to provide him with a postal-Elmer service!

Soon the letters were flowing back and forth. I looked out some components and he built a radio using the delightful little ZN414 i.c. (it worked).

I've sent him some more parts, and the letters have been replaced by an audio cassette tape. He's now got a corner of his room for a shack, and very soon his dad is going to sort out the cellar for a permanent workshop.

Gavin is keen to build radio receivers and would like to get his Novice Licence. He's already sent off to the RSGB for information on the Novice scheme.

But now Gavin needs his local 'MacElmer', and to know where to go to meet similarly interested youngsters. To help him, we need a national list of people willing to help. Perhaps we should organise a 'Dial-A-Ding' system in tribute to people like Ding Coombes?

## Help A Beginner

If you're willing to help a beginner, whether you are involved with a club or not, please drop me a line. Many people starting off in the hobby just need advice, some bits and pieces from your junk box and some of your time. You don't have to be retired to qualify for this unpaid job!

We get quite a few requests from beginners in the hobby. Often we can put them in touch with someone able to help. Can you help Gavin in Glasgow or others like him? We get quite a few enquiries from people starting off, particularly after the publicity that the launch of the Novice scheme generated.

You could help someone start off in a hobby which we know and love. Without our help they may well never realise what they're missing.

Don't forget that nowadays, it's far cheaper to go out and buy a ready-made radio than build one for yourself. But with our help, the spares in our junk boxes, and a willingness to help, many more beginners will discover the fascination for the radio hobby. There are many more

budding constructors, listeners and transmitting amateurs out there than we can possibly imagine.

## Friedrichshafen And Dayton

Many of you will know that our trip to the Dayton 1991 HamVention was a real success. You may also know that our 1992 trip to Dayton is already planned, and is now beginning to fill.

Don't miss this opportunity. It's a marvellous holiday, and for the 1992 trip we're allowing more time for sight-seeing. There's so much to see that many readers who went on the 1991 trip (yes - they want to go again!) wanted more time to look round.

So, come and join us on the Dayton '92 trip. Your first step to Dayton '92 starts when you contact *PW*'s Roger Hall G4TNT, on 071-731-6222.

Finally, I've just got space to mention our 1992 Friedrichshafen trip. This holiday, taking place over the last weekend in June, includes staying in the best Hotel in Friedrichshafen and the return trip by luxury coach.

As we are strictly limited in the number of Hotel rooms for Friedrichshafen 1992, we offered first refusal of the seats to readers who flew to Dayton with us this year. However, we've just got a few places left on this tour, so book now as I'll enjoy your company to the largest European amateur radio show.

*Rob Mannion G3XFD*



Dear Sir

Having read about the new novices radio licence in your magazine I duly contacted the RSGB for full details of the course and a list of tutors in my area, only to find upon reply no sign of licence conditions or frequencies of any description, only a reference to June 1990 *Radcom*. I made enquiries about this and was told nothing in this issue, so at this stage I don't know anything about them.

I also found that there was only one tutor in my area. I contacted the tutor on the list, only to be told that he can only take two people at a time. I can understand this as he utilises his home and spare time, to help people like myself.

The instructor said that it would most likely be next year before he could take me at the earliest, unless there was a cancellation and I'm hoping this will happen. It seems to me that the RSGB are at fault as they have introduced a course to bring new blood into the hobby without providing enough tutors to give the training. Come on RSGB, please provide a proper service that you would expect from any other business!

**Ralph Hickman**

**Walsall**

**West Midlands**

**Editor's comment:**  
Sorry to hear about your problems Ralph. Inevitably, when schemes such as the Novice Licence get going, there's bound to be problems. The RSGB are short of instructors, and I urge anyone who can help, to volunteer their services. I feel sure that the system will get going properly soon, and that the main problem with the lack of instructors will improve rapidly. We will gladly publish any request from the RSGB to help reduce the shortfall of instructors. The Radiocommunications Agency now have a useful guide, it provides all the information needed on the Novice Licence and is available from: Waterloo Bridge House, Waterloo Road, London SE1 8UA.

# Receiving You...

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

Dear Sir

May I ask your indulgence to amplify the point I made too briefly at the end of my previous letter (August issue).

Project YEAR and the Novice Licence scheme aim to develop practical skills and a working knowledge of electronics, with emphasis on home construction. For the home constructor the logical starting point in amateur radio is surely c.w. on the low h.f. bands, with progression to a.m. and higher frequencies as more experience is gained. To put it in *PW* terms, beginning at 'Getting Started' and going onto the '1.8MHz Chatterbox'.

Building equipment for more sophisticated modes and the higher v.h.f. bands demands more skill and knowledge than the novice qualification implies, one is 'building by numbers' from a kit.

Putting novices on v.h.f. and u.h.f., and treating the Morse test as an initiation ceremony for joining a self-considered elite on h.f. is surely standing logic on its head.

**Phil Mayer GOKKL**  
**Parkstone, Poole**

Dear Sir

I was very pleased to read the *PW* review of the AKD 2001 mobile transceiver. I have always wondered why new amateur equipment could not be more moderately priced, and AKD are showing that it is possible.

Perhaps these reasonably priced rigs will encourage more mobile activity on the 144MHz band in this area. I'm looking forward to reading your review of their 50 and 70MHz rigs when they are available.

**M. J. Emm G7GMH**  
**Fordingbridge**  
**Hants**

Dear Sir

I'm dropping you a line today to tell you that British can be best. I'm lucky enough to have an Altron 4-element beam and Heatherlite Hunter linear amplifier, driven by a Trio TS520S.

During my two years of holding an A licence, I have had the pleasure of working 217 DXCC countries. I am amazed when people say there is no DX on the bands, it's just a case of looking for it and I've had some surprising contacts.

I'm very pleased by the quality of my British equipment and I am sure it's as good as anything Japanese.

**Stuart Perry GOLRX**  
**Sanderstead**  
**Surrey**

**Editor's reply: It's good to hear comments like these from Stuart Perry and G7GMH. We've many UK manufacturers advertising in *PW* and it's good to see that despite the financial climate, they're still making headway.**

## ★★★★★STAR LETTER★★★★★

Dear Sir

Having sat the C&G exam and eventually being awarded the certificate for radio amateurs, I decided to go the 'whole hog' and sit the Morse test before applying for a licence.

I recently passed the Morse test. Now it's with a feeling of anti-climax, that I sit here as a class 'A' licence holder with really nothing to show for the effort.

In all modesty, I do have various other certificates as evidence of a certain level of competence in the field of radio technology. But Radio Amateur? No! Perhaps the DTI or the RSGB could be persuaded to offer a special certificate to successful radio amateurs, whether class A or B licence holders?

This illuminated scroll, nothing less will do, could then be placed in a prominent position in the shack for all to see!

Finally, I would like to give my support to the inclusion in *PW* of valued equipment articles. Perhaps a 1.8MHz transmitter feature using valves - perhaps a Chatterbox Mark II construction project?

**Andy Dyson GOPAV**  
**Greenford**  
**Middlesex**

**Editor's reply: The *PW* team send their congratulations Andy, and we're pleased you're on air! Perhaps you'd like to frame your £10 voucher? But, in all seriousness I agree that a handsome certificate with your new call sign would look good. We were hoping to introduce a suitable little certificate for 'What A Good Idea' contributors (they're known as WAGIs in the office) but the beautifully produced 'Worked All GI' award beat us to it!**

Dear Sir

Just a few lines to add to Mr Ellis Evans's comments on CBers becoming Hams. Count me as one, I started on CB radio in 1981 and am an A licensee of three months (April 91).

There are good and bad operators on CB as there are on h.f. and v.h.f. To become an amateur, all it takes is a deep interest in radio. The CB service is, after all radio communications, although amateur radio is a little more serious and complicated.

Anyone who has the determination can also become the proud owner of an A class call sign, as I've done. I also thought it was beyond me, but it's not as difficult as many think it is. So I suggest that you have a go, I'm glad I did!

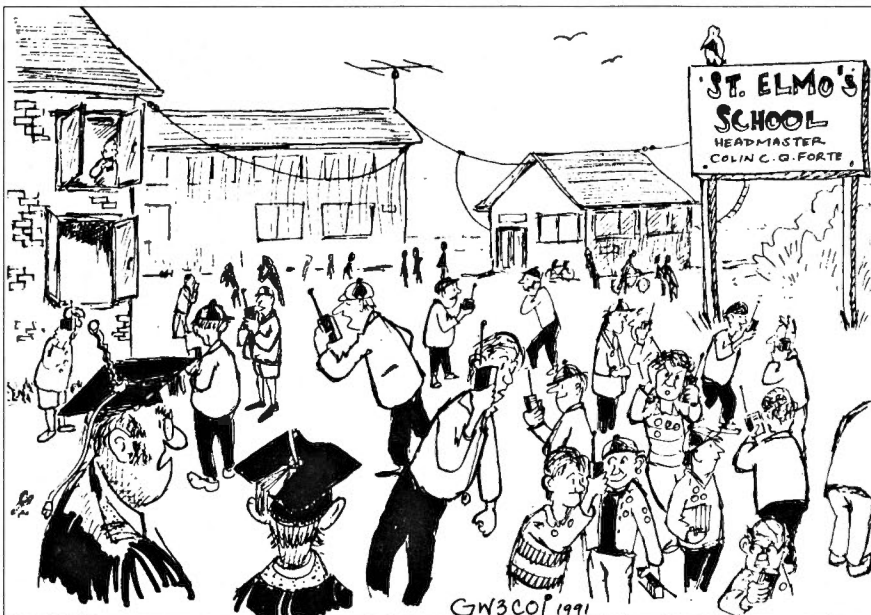
**Martin Williams**  
**GW00UV**  
**Mid Glamorgan**  
**South Wales**



# Competition Corner

## Services

PLEASE NOTE THAT FROM NOW ON WE WILL ACCEPT PHOTOCOPIES FOR COMPETITION ENTRIES. (PHOTOCOPIES MUST BE ACCOMPANIED BY THE 'FLASH' ABOVE).



# SPOT THE DIFFERENCE

## PRIZES...PRIZES...PRIZES

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

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

Circle the 12 differences, fill in the form below and send your entry to PW Publishing Ltd., October 1991 Spot The Difference Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Closing Date 25 October 1991.

The Editor's decision on the winner is final, no correspondence will be entered into.

Name .....

Address .....

.....

.....

.....

Postcode .....

☐ Subscription

☐ Vouchers (please specify)

### Queries

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

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

### Back Numbers & Binders

Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing.

Binders, each holding one volume of *PW*, are available price £4.50 each (£1 P&P for one, £2 for two or more).

Send all orders to the Post Sales Department.

### Subscriptions

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

### Constructional Projects

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

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

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

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

Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP KITS, both of who advertise in the magazine. The printed circuit boards are available, mail order, from the Post Sales Department.

### Mail Order

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

### Wireless Line

This is an information service for the radio enthusiast, updated each Friday. Calls cost 48p per minute peak time and 36p per minute off-peak. The number to ring is: (0898) 654632.



# Newsdesk '91

## Minister Meets Novice Amateurs

Seven Novice radio amateurs met John Redwood the Department of Trade and Industry's Corporate Affairs Minister, when he presented their licences during a ceremony in London on July 25.

Following a short speech John Redwood presented two Class A and five Class B Novice Licences. The newly-licensed operators were **Robert Cherry** from Kingston who is 14 years old, 11 year-old **Victoria Foster** from Grimethorpe near Barnsley, 15 year-old **David Hull** from Telford, 12 year-old **Simon Kahn** from Manchester, 13 year-old **Hugh McNeill** from Preston, 16 year-old **Jonathan Page** from Poole and **Natasha Weir** from Oxford who is 12 years old.



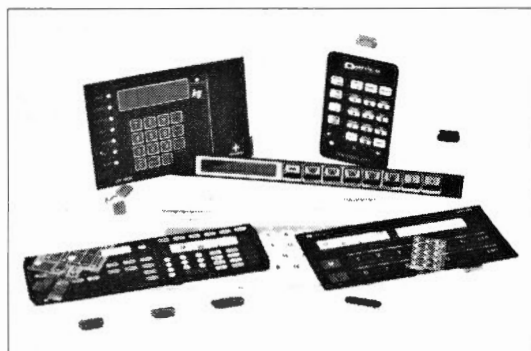
## Graphic Overlay Panels

Diametric Technical Limited are manufacturing a new range of quality graphic overlays, for use as front panels of electronic/electrical instruments and equipment. They are designed to customer requirements, and not only enhance appearance but increase ease of operation.

The products are available in plastics or aluminium with the plastics items being designed with translucent colours or clear window areas for i.e.d. and l.c.d. displays. Overlays can display secret-until-lit legend areas, and be laminated to thicker aluminium substrate or steel support panels incorporating studs or stand-offs.

An extensive computerised graphic design visual service is available for customers who wish to see the overall effect prior to artwork origination.

For further information and samples, contact the sales department of **Diametric Technical Limited. Tel: (0489) 896433.**



## DIY Radio By Subscription

The Radio Society Of Great Britain recently launched a new subscription-only bi-monthly full colour magazine, *D-i-Y Radio*. The magazine is aimed at those with little or no prior knowledge of the subject.

Each edition includes radio construction projects, equipment reviews, news stories, a wall poster, competitions and special offers.

*D-i-Y Radio* is available on annual subscription only, at the price of £9 inc. p&p. This includes a joining pack comprising a badge, a pen, a plastic wallet to keep copies safely, a large map and special offer vouchers worth £2.

For more details, contact **Marcia Brimson on (0707) 59260.**

## A Course For Morse

A Morse code course for the RAE will be starting on September 23 and will run for 10 weeks, at Boundstone Community College, Lancing, West Sussex. The course fee is £32, and the enrolment date is September 16 at 7pm. The course number is AB045. Full details are available from the college on **(0903) 755895.**

## London Satellite Link

National Transcommunications Ltd. (NTL) has provided satellite downlink facilities to a London cable television operator to enable the first continuous public TV service from outside Europe to be offered on UK cable networks.

Acting as sole agent for the Egyptian Radio & Television Union, NTL is using its technical know-how to obtain broadcast quality signals by satellite from Egypt. The Egyptian Satellite Channel is being received from Arabsat, which is designed to cover North Africa and the Middle East. The satellite is in an inclined orbit. As the UK is outside the nominal 'footprint' NTL has installed state-of-the-art electronics to give reliable pictures and sound for distribution to homes on London cable networks.

The new service was inaugurated on July 25 at the Egyptian Embassy, by President Mubarak during a State visit. Coverage of the opening was fed back to Cairo by satellite.

The service is initially available on Videotron cable systems in Kensington, Chelsea, Ealing, Hammersmith, Fulham, Lewisham and Thamesend.

Further information from **Bruce Randall on (0962) 822582.**



## Open Day

Earlier in the summer of 1991, Waters & Stanton held their first Open Day. Their new premises provided ample space for visitors and in addition to their ground floor sales area, they also opened up their first floor for Bring & Buy, Junk stall and antenna farm. Over 400 visitors attended and enjoyed free refreshments throughout the day.

A much larger stock of products can be displayed than is practical at rallies. Waters & Stanton already have plans for a much bigger event in 1992. So, if you missed it in 1991, don't miss it next year. Watch this space!

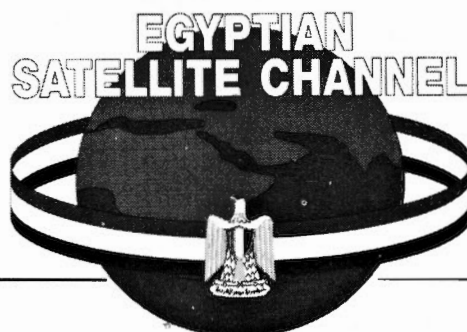
## West Wilts On Air

Trowbridge & District ARC activated GX2BQY/P as part of the West Wilts '91 exhibition held on July 11, 12 and 13.

The station operator's were sponsored and it's

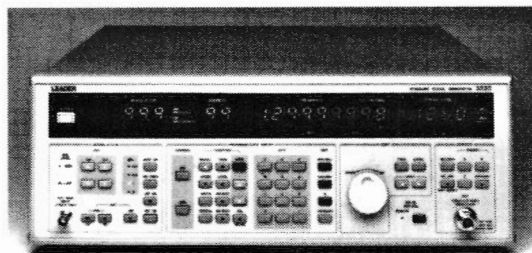
expected that over £100 has been raised toward a music centre for the young musicians of Wiltshire.

During the three day event, over 900 contacts were logged in some 61 DXCC countries, including Z21, 9M2, 7Q7, HK0, VP2, V44, 9K2, FO and TU2.





# Newsdesk '91



## Standard Signal Generator

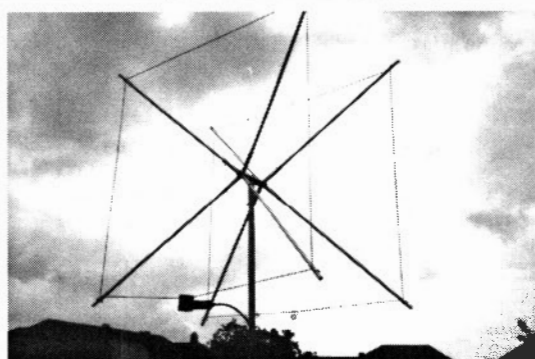
The 3220 is a synthesised a.m., f.m., d.c.-f.m., standard signal generator. It has a fully programmable non-volatile 100 point memory of frequency, modulation factor and output level. The instrument offers a frequency range of 100kHz to 1300MHz, with an output of -20 to 126dBu.

Operation of the 3220 is via the keypad entry, with displays showing modulation, address location (in memory) and frequency. A GPIB option is also available.

For full information on the 3220 and other generators in the range, contact:  
**Thurlby-Thandar Ltd.**  
2 Glebe Road  
Huntingdon  
Cambs PE18 7DX.  
Tel: (0480) 412451.

## Brighton RAE Course

Brighton College of Technology, Pelham Street, are running an RAE course from September 17. Two evening classes are available; Tuesdays 6-9pm covers the theory necessary to pass the City & Guilds RAE and Wednesdays 6-9pm for Morse and practical project building. Further details on (0273) 667788 ext. 605 or 730.



## Nelson Boomless 50MHz Cubical-quad Antenna

Ernie Quinell G4JEV, of Portsmouth area based Nelson Electronics, proudly claims that you 'can see no boom' with the cubical-quad antennas he's designed. The Nelson range of h.f. quad antennas has recently been extended to include a 50MHz version, which has considerable space-saving advantages over the usual beam types.

With a weight of only 3.6kg and a turning circle of less than 2m, the 50MHz quad will prove very useful for operators with space problems for the usual much larger antennas on this band. With a measured forward gain of 7.1dB compared to a dipole, the antenna has a minimum front-to-back ratio of 15dB.

Details and price on this antenna, soon to be joined by a single-band model covering 144MHz, and multi-band versions covering 70 and 144MHz and a 50, 70 and 144MHz model can be obtained from (callers by appointment) **Nelson Electronics, 36B The Green, Stubbington, Fareham, Hants. PO14 2LE. Tel. (0329) 668080. FAX (0329) 668068.**

## Orkney On The Air

With considerable help from the Radiocommunications Agency and with the support of the RSGB, the Orkney Wireless Museum is now the holder of the special call GB20WM on a permanent basis.

It's intended to activate a station from the Museum between September 20 and 26th, which coincides with the 'Orkney Science Festival'.

Operation is planned on the h.f. bands using s.s.b. and possibly c.w. Skeds can be arranged, and there's also the possibility of 144MHz operation. Contact **Bill Wright GM3IBU, 'Crosslea', Berstane Road, Kirkwall, Orkney KW15 1SZ.**

## Jamboree On The Air

From October 19-20th, Kelvedon & Feering Scout Group are taking part in Jamboree on the Air, at the Scout HQ, St. Marys Road, Kelvedon. Colchester RAC will also be lending a hand. Locator JO 01 IU, WAB TL 81. Grid Ref. 861188.

The callsign will be GX4CRA and the group will be calling CQ Jamboree. They will be QRV on h.f., v.h.f. and packet radio. The station manager will be G0EGX. QSL via Bureau.

## Irresistible Video

A six minute video has been produced which covers the manufacturing operation at Europe's largest resistor network plant - Beckman Industrial in Glenrothes, Scotland. The presentation also briefly covers the activities of the company's test and measurement instrumentation side.

The video traces the company's growth, from a garage in California, to its present position as one of the major innovators and manufacturers of components in the world. The manufacturing operation is covered in detail, especially that of surface mount resistor networks.

Copies are available from **Dave Whitelaw on (0384) 442393.**

## The Worked All GI Award

Keen certificate hunters will soon be hunting the re-introduced award for working all GI. The colourful and very high quality certificate shows the six county coats of arms from the province. Although officially known as the Northern Ireland Radio Amateur Award, it's also affectionately named as the 'WAGI' (Worked All GI) certificate.

The prestige certificate is being re-issued to mark two important occasions for radio amateurs in Northern Ireland. The first occasion was the election of Terry Barnes G13USS earlier in 1991 as Vice President of the RSGB, and the second is the forthcoming 25th

Anniversary of the Bangor and District Amateur Radio Society in September of which Terry is a founding member.

The award is available to radio amateurs, and to s.w.l. on a heard basis, by contacts on all bands from 1.8 to 1296MHz. Claims for the award must be for valid contacts with GI stations on or after January 1 1979, and only photocopies of QSL cards should be sent. No mobile, repeater or extra-terrestrial QSOs are eligible for this award.

Full details of the certificate and entry conditions can be obtained from: **The Award Manager, WAGI, G14BBV, 11 Drumawhey Road, Newtownards, County Down, Northern Ireland BT23 3RS.**

NORTHERN IRELAND RADIO AMATEUR AWARD



## Scottish Tourist Board Expedition Group

On November 30, GB6SA will be on the air for International St. Andrews Day event. Also involved is a station in USSR and one in Greece. The station is being operated by the Scottish Tourist Board Radio Amateur Expedition Group. Contact: **John McGill (Paddy) GM3MTH Tel: (0236) 40495.**



## New Engineering Course

Students on the new Higher National Diploma in Engineering (Electronics), initiated by the Brighton Polytechnic/Sussex Colleges Consortium, will soon be able to choose Electronics for Broadcasting as one of their second year study options, thanks to a successful education/BBC collaboration.

This development came about through an approach made to Brighton Polytechnic in December 1990 by the BBC, following an internal review of their Engineering Training arrangements. The objective was to set up an HND level course to feed into the BBC's existing engineering training at their Evesham, Worcestershire establishment.

The Broadcasting element of the new course has been worked out in collaboration with the BBC's Engineering Training Department and has their full approval. The Polytechnic will also be able to use the BBC's name and logo in connection with the course.

Other broadcasting organisations in the commercial sector have expressed strong interest in the course. The commercial sector, despite current uncertainties, is in an exciting and dynamic state at present and course leaders for the new HND Engineering option feel that the whole broadcasting industry promises well for employment in the future.

The first group of students on the new two-year HND in Engineering (Electronics) are now completing their first year studies at Sussex Consortium Colleges. Second year work is split between Brighton College of Technology and the Department of Electrical and Electronic Engineering at Brighton Polytechnic, and optional units and special projects are studied along with those in common with the core course.

The BBC wish to interview first year students with a view to possible vacation placements, although there is no guarantee of either sponsorship or eventual employment with the Corporation.

Further information from **Dr Tim Katz, Department of Electrical and Electronic Engineering. Tel: (0273) 642200.**

## Electronics & Computer Fair

A new event will take place October 6 at the Horncastle Youth Centre, adjacent to the A128 Lincoln to Skegness main road. Parking facilities are available and all rooms are on one level, making it ideally suited for those with mobility difficulties.

The cost is £1 per person, with negotiated discounts for organised groups. All youth groups and school parties must be accompanied by leaders/teachers. The event opens from 10.30am to 5pm, with

the disabled being admitted at 10am.

There will be a whole range of computer, radio and electronic components, a second-hand and a surplus equipment sale. They also hope to have a large flea market/car-boot sale outside, and the Louth & District ARS will be running a Bring & Buy stall. Further details and trade stand booking forms can be obtained by sending an s.a.e. to:

**Tony Nightingale G6CZV  
Horncastle Youth Centre  
Cagthorpe Building  
Willow Row, Horncastle  
Lincs LN9 6HW.**

## Tennamast

Tennamast (Scotland) who produce a range of masts for communications, lighting and surveillance, have been adding to their range over the years.

The company have again improved the range, and now galvanise all their products except their mobile masts.

If you have a special requirement, whether it be for a free-standing, wall-mounted or mobile mast; slim-line or lattice, contact Tennamast at:

**81 Mains Road, Beith, Ayrshire KA15 2HT. Tel: (0505) 53824.**

# Newsdesk '91

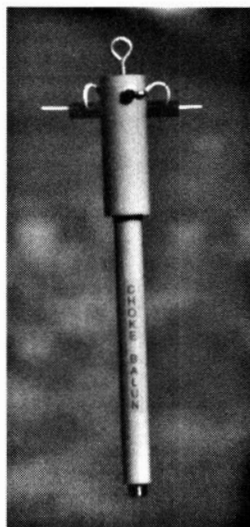
## Multi-Brush

The Quick Stix (multi-brush) was developed for use in the dental profession, where the need for applying small amounts of liquid materials to difficult-to-reach areas was encountered.

This unique, disposable applicator, is used for the neat, rapid and economic application of materials. The Quick Stix micro head is composed of tiny non-linting fibres situated on a fine plastic neck. These can be bent to, and retained at, any angle for maximum accessibility. It's ideal for neat, rapid and economic application of small amounts of material.

Boxes of 500 (25 combs of 20) are priced at £22 + VAT.

**Dent-O-Care Ltd  
7 Cygnus Business Centre  
Dalmeyer Road  
London NW10 2XA.  
Tel: 081-459 7550.**



## Ferromagnetics

Ferromagnetics are now producing a new type of Choke Balun, available for use on any type of dipole or inverted 'V' antenna from 1.7 to 30MHz. Another model is available for mounting on h.f. beam antennas with 1.5in or 2in boom mountings, and there is also a type especially made for v.h.f. use from 30 to 250MHz.

The standard model costs £28.54 + £1.75 p&p, the Yagi model costs £29.95 + £2.25 p&p and the v.h.f. model costs £16.95 + 90p p&p.

**Ferromagnetics  
PO Box 577  
Clwyd  
North Wales CH7 1AH.**

## WAB News

The Worked All Britain Awards Group (WAB), recently asked for suggestions for a worthy charity to which they could make a donation.

After serious discussion, the group decided that the Royal National Lifeboat Institution would be the next to benefit from their fund raising efforts. The group are currently liaising with the RNLI in the hope of operating from various lifeboat stations around the country.

Last year, WAB donated £5000 to the Guide Dogs for the Blind Association. This donation covered the cost of training five dogs.

For those of you interested in joining the group, life membership costs just £7 inc. p&p. Full details from their membership secretary, **Brian Morris G4KSQ, 22 Burdwell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.**

## Special Event Station GB0PD

Plymouth Radio Club will be on the air with its only special event station this year - GB0PD - on Saturday 14 September, from 9am to 7pm. The station is being set up in the Foyer of the Plymouth Dome on the sea front on Plymouth Hoe.

Plymouth is celebrating the 300th anniversary of the Royal Dockyard at Devonport, and the city's unique place in world history. Many great explorers and privateers made Plymouth their base including Sir Francis Drake, Sir John Hawkins, Frobisher, Cavendish, Raleigh, Glenville and many others all started epic voyages from the port.

The Pilgrim Fathers also sailed from Plymouth to settle in America and in the 19th century, half a million emigrants sailed from there to settle in New Zealand, Australia, Canada and South America.

There are some 50 Plymouths scattered around the world, and Plymouth RC hope to be contacting as many of these as possible during the course of the day, as well as inviting calls from all radio amateurs on s.s.b. and c.w.

The Plymouth Dome uses latest techniques to tell the city's story past and present, from the sights, sounds and smells of a reconstructed Elizabethan street to radar, computer and satellite technology.

A special QSL card is being printed and will follow all contacts via the Bureau. For further information, contact **Peter Howell G0NAP** on (0752) 667241 daytime or 892690 evenings/weekends.

## Blessed With The Blarney

Technology Partners, publishers of the *Equipment Costing Guide*, have announced that the winner of their March competition comes from Ireland.

The task set was to see how many new words could be made up from Technology Partners. The winner, John McElhinny from Letterkenny in County Donegal, has obviously been to Blarney Castle and kissed the 'Blarney Stone' as he came up with 948 words! John won himself a year's joint subscription to *Practical Wireless* and *Short Wave Magazine*.

## Club News

**Aylesbury Vale RS** meet 1st & 3rd Wednesdays, 8pm at the old Village Hall, Hardwick. September 18 is a Mini Construction Contest, and October 2 is a talk by Martin Jones G4XZJ on 'Restoring Vintage Radio Equipment'. Further details about the club from **Geoff** on (0280) 817496 or **Martyn** on (0908) 560026.

**Barnsley & District ARC** meet Mondays in the radio club room and shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. September 16 is a proposed talk on e.m.c., the 30th is the Novice Licence and October 7 is a Shack night. A new Novice course will start in September, and the club runs a Novice and Morse class each week. For further information, ring **Ernie G4LUE** on (0226) 716339.

**Bradford ARS** meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service club, Shearbridge Road, Bradford, West Yorkshire. September 26 is by G1SGB 'WAB Aims & Objectives' and October 10 is a Junk Sale. **Charles Bolt G0ACX** on (0247) 494694.

**Braintree & District ARS** meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. September 16 is QTH reports & social evening, and October 7 is a Junk Sale & Bring & Buy. **D. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ.** Tel: (0376) 27431.

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

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

**Dragon ARC** meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. On September 19 Mrs Anne Harrison will give a talk on the National Trust, and the club have their a.g.m. on October 7. **Tony Rees GW0FMQ** on (0248) 600963.

**Echelford ARS** meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. Further details from **P. Townshend G6PMT** on (0344) 843472.

**Fareham & District ARC** meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. September 25 is a Junk Sale and October 9 is 'The GDO' by Ron G3XPH. Details from **Rod Smith G0ERS** on (0705) 373572.

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club,

Midgeland Road, Blackpool. On October 10 they have a visit to Blackpool Airport. **Eric Fielding G4IHF** on (0253) 726685.

**GB3HZ Repeater Group** meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Their next meeting is on September 26. Details from **Francis Rose G2DRT** on (0494) 814240.

**Gloucester ARS** meet at St. Johns Ambulance HQ, Heathville Road, Gloucester at 7.30pm. October 2 is a Homebrew Equipment Demonstration evening, and the 9th is Packet Self-Help Group. More info from **J. Beckingham** on (0452) 528533 Ext. 2741.

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

**Hambleton ARS** meet in Room A5 of Northallerton Grammar School at 7.30pm. September 16 is RAE, the 23rd is 'Electronic Countermeasures' by Frank Peirson G3HSG, the 30th is RAE and October 7 is 'RAYNET' by Nick Whelan G7COC. For more details, contact **Nigel Robertshaw G0NHM** on (0609) 776608.

**Horsham ARC** meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. They have a Surplus Equipment Sale on October 3. Further details from **Peter Stevens G8SUI, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT.** Tel: (0737) 842150.

**Ipswich RC** have a new secretary, and she's **Mrs S.M. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ.**

**Kettering ARS** meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. September 24 is 'Satellites' by Derek Slater G3FQZ. All enquiries to **Len G7EHM** on (0536) 514544.

**Kidderminster & District ARS** meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. October 1 is a visit from the RLO & Novice Instructor. For more details contact **Geoff Philpotts G7JIR, 62 Erneley Close, Stourport-on-Severn, Worcs DY13 0AH.** Tel: (0299) 379229.

**Lothians RS** meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge

Hotel, Polwarth Terrace, Edinburgh. September 25 is an Open Night and October 9 is 'Radio From The Munros' by David Gentles. Further details from **Mel Evans at 56 Southhouse Road, Edinburgh EH17 8EU** or telephone 031-664 5403.

**Loughton & District ARS** meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pilsbury G4KCK** on 081-504 4581.

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. September 17 is 'SSB Exciters' by Dave G3SET and October 3 is a Junk Sale. Details from **Neil G8XYN** on (0628) 25952.

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

**Norfolk ARC** meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', the Livestock Market, Harford, Norwich. September 18 is 'Practical Troubleshooting' by Arnold Tomalin G3PTB, the 25th is an informal/committee meeting, October 2 is 'Oscillators' by Dick Bacon G3WRJ and the 9th is about the Castle Mall archaeological excavation by Brian Ayres. **Jack Simpson G3NJQ** on (0603) 747992.

**North Bristol ARC** hold their meeting at S.H.E., 7 Braemar Crescent, Northville, Bristol. September 27 have an 'Amateur Radio in the Antarctic' video. **Chris Budd G0LOJ** on (0454) 616267.

**Poole RAS** meet 2nd Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. For more details from **Phil G0KKL** on (0202) 742453.

**Prudential ARS** is open to all employees of the Prudential companies, and also those who are retired/pensioned, together with any short wave listeners. They are world-side and have members overseas, who should contact their Overseas Liaison Officer - **Alan McCulloch ZS6KU, PO Box 2291, Helderkuin, 1733, South Africa.** Those in the UK can contact **Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF64TE.** Tel: (0222) 512959.

**Reading & District ARC** meet 2nd & 4th Thursdays,

8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. September 12 is their Autumn Junk Sale, the 26th is 'Packet Radio Explained' by Paul Taylor G1PLT and October 10 is an RSGB evening. **Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR.**

**Salisbury Radio & Electronics Society** meet at 7.30pm at the Grosvenor House Centre, Churchfields Road, Salisbury. September 24 is 'CW Operating Procedures', and John G4POF will be giving a beginners' guide to c.w. QSOs with practical demonstrations, and October 1 is Guest speaker, Ray Baldwin G3WZ, on his world travels. For further details, contact **Bert Newman G2FIX** on (0722) 743837.

**South Dorset RS** meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. September 15 is a Fox Hunt and October 1 is 'Construction Demonstrations.' **Geoff Gwillian G4FJO, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS.** Tel: (0305) 781164.

**South Notts ARC** meet at Highbank Community Centre, Farnbrough Road, Clifton Estate, Nottingham. September 13 is On Air, the 15th is a Foxhunt, the 20th is a talk-in on 144MHz/Jandek talk and the 27th is a Construction (Fairham college). For further details call **Trevor G4IRH** on (0509) 672734.

**Spalding & District ARS** meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. On September 14 they have a Visit to Central Television Studios in Nottingham, and the 20th is about 'Worked All Britain' by G1EUU. They now have a new secretary, so further details from **David Johnson, 65 West Street, Bourne, Lincolnshire PE10 9PA.** Tel: (0778) 425367 (6-7pm).

**Stevenage & District ARS** meet in Ground Floor Lecture Room, 'O' Block, Ridgmond Training Enterprise, Ridgmond Park, 7.30pm. September 17 is talk on 'HF Operating' by Jay G3HEA, the 24th is 'HF night on the air', October 1 is a talk on 'Bio-engineering' by Richard Hartley and the 8th is on 'Practical Test Equipment Usage'. More details from **Pete Daly G0GTE, 48 Lincoln Road,**

Stevenage, Herts SG14PJ. Tel: (0438) 724991.

**Stourbridge & District ARS** meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. September 16 is Commercial Radio Servicing and October 7 is an On Air and Discussion evening. Details from **Dennis Body G0HTJ at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.**

**Stratford-Upon-Avon & District RS** meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. September 23 is 'Converting PMR Equipment' by Bill Mahoney G3T2M. Further details from **Alan Beasley G0CXJ, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE.** Tel: (0608) 82495.

**Sutton & Cheam RS** meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. September 19 is 'Radio Investigation Service' by Chris Winton, the 26th is a committee meeting at G3WHK, and October 7 is a natter night. More details from **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.**

**The Three Counties ARC** meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. September 25 is Royal Corps of Signals TA and October 9 is 'Communications on the Battlefield - The Ptarmigan'. **Kevin Roche G8GOS** on (0420) 83091.

**Wakefield & District RS** meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. On October 1 they have a debate on 'The Future for Construction'. **John L. Bailes G0MVA** on (0924) 220048.

**West of Scotland ARS** meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G0MKT, PO Box 599, Glasgow G3 6QH.**

**Wimbledon & District ARS** meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. September 13 is 'Radio With Computers' by G3XTC and G4XLM and the 27th is a Surplus Equipment Sale. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR.** Tel: 081-397 0427.

**Wirral ARS** meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. September 18 is a Sale of Surplus Equipment, the 27, 28, 29th is Scout Field Weekend, Hadlow Field, Williston and October 2 is their a.g.m. More details from **Alec Seed G3FOO** on 051-644 6094.





*Richard Ayley  
G6AKG recently  
had the  
opportunity of  
evaluating the  
Yaesu FT-5200  
mobile rig, and  
he seems to have  
enjoyed the  
experience very  
much indeed!*

## **The Yaesu FT-5200 Dual Band Mobile Transceiver**

Yaesu have surpassed themselves with the FT-5200. They've put all the features required by today's mobile amateur and a few more for good measure, into a transceiver virtually the same size as an average car radio.

The FT-5200 combines all the search and memory facilities of a top-of-the-range scanner with two separate high powered v.h.f. and u.h.f. transceivers. These are capable of giving full duplex cross-band QSOs.

### **Features And Functions**

I'm limited in space to describe this complex machine. However, I'll try to provide a taste of what you can expect if you're lucky enough to be able to purchase an FT-5200.

The first thing of note was the amazing transmitter

output power of the FT-5200. This is 50W on 144MHz and 35W on 430MHz. That's more than enough power for f.m. mobile operation, both simplex and repeater operation.

The transceiver's microprocessor control can be programmed to give user-selectable tuning steps from 5kHz to 25kHz in either 5 or 12.5kHz units. It also gives you no less than 16 fully tuneable memories per band. These will memorise standard and non-standard transmit and receive frequency shifts.

The rig's processing and memory capacity are used to full advantage. All manner of scanning combinations, between limits, memory scanning, priority monitoring and single touch instant recall of calling channels for each band are on offer.

As in most scanners, a memory skip function is provided. This is a useful feature for avoiding some of the highly populated repeater and packet channels.

The FT-5200 is quite musical when running simultaneous band-scans on 144 and 430MHz. It produces a two-tone bleep each time it stops on an occupied channel. Each set of tones is different, depending on which band the signal has appeared. This facility, although very useful, can be switched out when not required.

### **Physical Description**

The rig itself measures only 140mm wide by 40mm high and 150mm deep. It's a very simple and stylish design using a large easy-to-view reverse-mask dual l.c.d. display.

Despite its sophistication, the transceiver has surprisingly few buttons, and uses a single large knob for frequency entry. The FT-5200's front control panel can be remotely mounted from the transceiver using an optional three or six metre multi-way cable.

I was very impressed with the mobile mounting bracket supplied with the unit. It's made from pressed

**Richard Ayley  
G6AKG.**



steel fitted with spring clips. These, in conjunction with two anchor points bolted to the transceiver's chassis, provide a very quick-release system so you can remove the rig for security purposes.

The transceiver is very solidly constructed. On the rear side, there's a die-cast heatsink which is forced-cooled by a thermally-triggered miniature fan.

Although it's small, the fan does its job very well with very little noise. If the rig is left running in a hot car, the fan will also operate while it's on receive.

Two leads emerge from the rear die-casting. The first is a coaxial antenna cable, terminated in an N-type line socket. The second is a very substantial twin lead for the 13.8V d.c. input. The power lead of the rig is fitted with a single in-line fuse holder which is terminated in a polarised plug.

Yaesu supply a very generous portion of heavy duty cable. The cable, fitted with in-line fuses and matching socket, is more than enough for most installations.

### Current Trends

In line with current installation trends, the FT-5200 comes with an integrally fitted antenna diplexer to use with a dual-band antenna. I used a Sandpiper 'on-glass' dual-band antenna which worked very well with the transceiver.

The transceiver also comes with the facility to run a separate extension speaker for each band. The supplied microphone is a fairly standard curly lead fist type.

Buttons on the microphone control the scan-up and down facility. There's also a repeater tone access control, and a frequency lock provided by a small slide switch.

### Good Display

The display, has a good character size for the primary band and a slightly smaller version for the secondary. The 'busy' symbol, together with signal and power bargraphs are easily visible, while all other functions are small but adequate.

The display is illuminated, and the level of illumination automatically adjusts to match the ambient lighting. I've only got one adverse comment regarding the display, and it involves the extras. I think that if you have all the available options fitted, such as c.t.c.s.s./pager operated squelch and digital voice store, the display could get a little crowded.

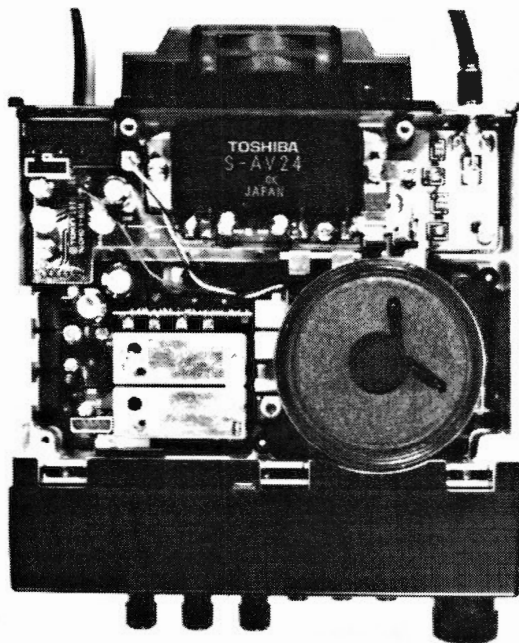
### Common Squelch

The transceiver has a common squelch control for both bands. I approached this control rather sceptically, but it worked well.

There's only one volume control, and it's used in conjunction with a cross fader between each receiver's



**The rig has a good display.**



**An inside view of the complex FT-5200.**

audio. It was a combination I liked, and it proved easy to use while on the move.

The FT-5200 control panel is also fitted with 12 push buttons. The level of control they provide is as complex, or as easy as you require. This is because most of the buttons have several functions which are logically layered.

### Month's Loan

I had the rig in my car for nearly a month. Apart from its scanning facilities, which always seemed to provide something for me to listen to, the FT-5200 is a good work-horse. Its high power TX gave access to our three local repeaters, even at the extremities of their coverage.

The receive sensitivity of the FT-5200 is well matched to its high power TX. I also found the receive audio was crystal clear, and that high volume settings didn't rattle the rig's outer casing.

No vices, such as spurious emissions, which could cause the receiver to dwell on internally generated signals were noted. The receiver didn't show any signs of blocking, even in the presence of high power adjacent signals originated by the primary band transmitter.

### Mobile Working

When working mobile, I found that the repeater tone access button was not that easy to operate, as it's in a recess on the front of the microphone shell. With all that processing capability on tap, I'm surprised Yaesu didn't design and fit an intelligent tone burst!

However, during night time mobile working I found the automatic dimming system very useful. The overall front panel illumination is very good, as was the clarity of the l.c.d. display.

### Easy Reading

The operator's manual for the FT-5200 is well written. It gives step-by-step instructions as to the unit's many complex features.

Without the guide, I found the transceiver easy to use without referring to the manual for its most basic operation. I regard this as the mark of a well designed rig. To help you learn to operate the many scanning features, Yaesu provide an operator's quick glance reference sheet. I found it very useful!

REVIEW



**The Yaesu FT-5200 costs £639 inc. VAT and is available from S.M.C. Ltd., S.M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY. Tel: (0703) 255111.**

Although circuit diagrams are provided with the FT-5200, personally I'd hesitate before trying to alter or service the rig myself due its complex and compact nature. For packet use, connection details for a t.n.c. are provided in the manual.

Unfortunately, I found very little information enabling the connection of home-brew accessories such as head-set and boom microphone units. However, this type of accessory is well catered for by Yaesu!

## Optional Extras

The most intriguing optional accessory for the FT-5200, is without doubt the MW-1 Wireless Microphone/Controller. This unit (currently not available in the UK), according to the FT-5200 manual, will provide you with full remote control in addition to a d.t.m.f. keypad microphone.

Paging/selective calling is covered by the FRC-4 option, available in addition to the FTS-22 Dual-Band CTCSS Decoder. This is used in conjunction with a 38-tone encoder supplied in the standard transceiver.

Finally there's a digital voice store option that can be used to record and playback received or transmitted audio. I can't think of a practical need for this but it sounds fun anyway!

## Summary

I was impressed with the basic transceiver, although basic is not really a word to describe the FT-5200's very comprehensive communication package! My thanks go to South Midland Communications for the loan of the transceiver. I'm also grateful to Sandpiper for the loan of the on-glass dual-band antenna for the review period.

**PW**

## Specifications

Frequency range	144-146 and 430-440MHz
Channel steps	5, 10, 12.5, 20 & 25kHz
Frequency Stability	$\pm 5$ p.p.m. from -5 to 50°C
Emission type	F3
Antenna impedance	50 $\Omega$ unbalanced
Supply Voltage Consumption	13.8V d.c. $\pm 15\%$ -Ve ground
Receiver	600mA
Transmitter	144MHz 11.5A(high) 4A(low) 430MHz 9A (high) 3.5A (low))
Operating temperature Range	-20 to +60°C
Case size	140 x 40 x 155mm
Weight	1kg

## Transmitter

Output Power	High (144Mhz) 50W, Low 5W, High (430MHz) 35W, low 5W
Modulation type	Variable reactance
Maximum deviation	$\pm 5$ kHz
Spurious Radiation	-60dB or better
Microphone impedance	600 - 10k $\Omega$

## Receiver

Circuit type	Double conversion superhet.
Intermediate Frequencies	17.7MHz and 455kHz (144MHz) 22.5MHz and 455kHz (430MHz)
Sensitivity	12dB SINAD, better than 0.158 $\mu$ V
Selectivity	-6dB/-60dB) 12/24kHz
Image rejection	Better than -65dB
Squelch sensitivity	At least 0.1 $\mu$ V
Maximum audio output	3W into 8 $\Omega$ with 5% t.h.d.
Audio output impedance	4-16 $\Omega$ (8 $\Omega$ internal speaker)

## Errors & Up-dates

### PW Robin Frequency Counter. PW July and August 1991

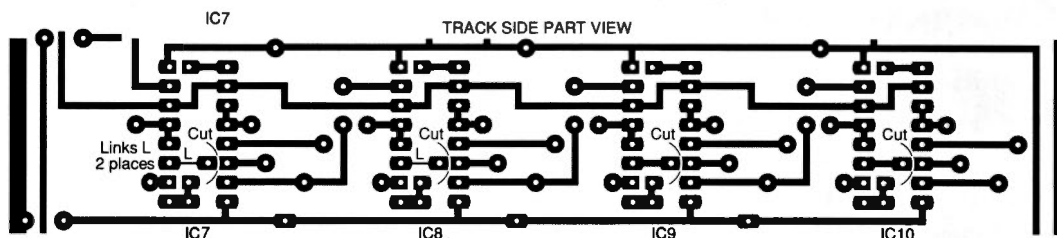
This correction refers to the second part of the of the PW Robin, on page 35 of the August issue. Under the heading 'Setting Up Inputs', it was said that altering R5 would alter the collector voltage of TR1. This should of course, have read 'altering R3'.

Another biasing problem that may occur, is a latching of the l.f./h.f. input due to a spread of the parameters of transistors TR7-9. To overcome this problem, reduce the value of R20, at present 18k $\Omega$ , to a resistance value of 5.6k $\Omega$ .

There are some changes to be made to the p.c.b. layout shown on pages 36 and 37 of the August issue of PW. The track pattern diagram, Fig. 2.2 as printed, needs several modifications.

You should refer to the accompanying illustration, and Fig. 2.3 of the August issue. There are four cuts that need to be made, and these are detailed in the diagram below. The track to pin six of ICs 7-10 must be cut immediately inside the outline of the i.c. When you have carried out this operation, look at ICs 9 & 10. Pin 11 of each of these i.c.s is now no longer connected to pin six. It is though, connected to the wire link, which goes to pin one of IC17 for IC10, and pin one of IC15 for IC9. Similarly, ICs 7 pin 11 should connect to pin one of IC11, and pin 11 of IC8 should go to pin one of IC13.

These changes have been incorporated into the **WR291 issue 2** p.c.b. Any p.c.b. supplied by us since the beginning of September 1991 will have had these changes made. **Please accept our sincere apologies for these errors. Editor.**



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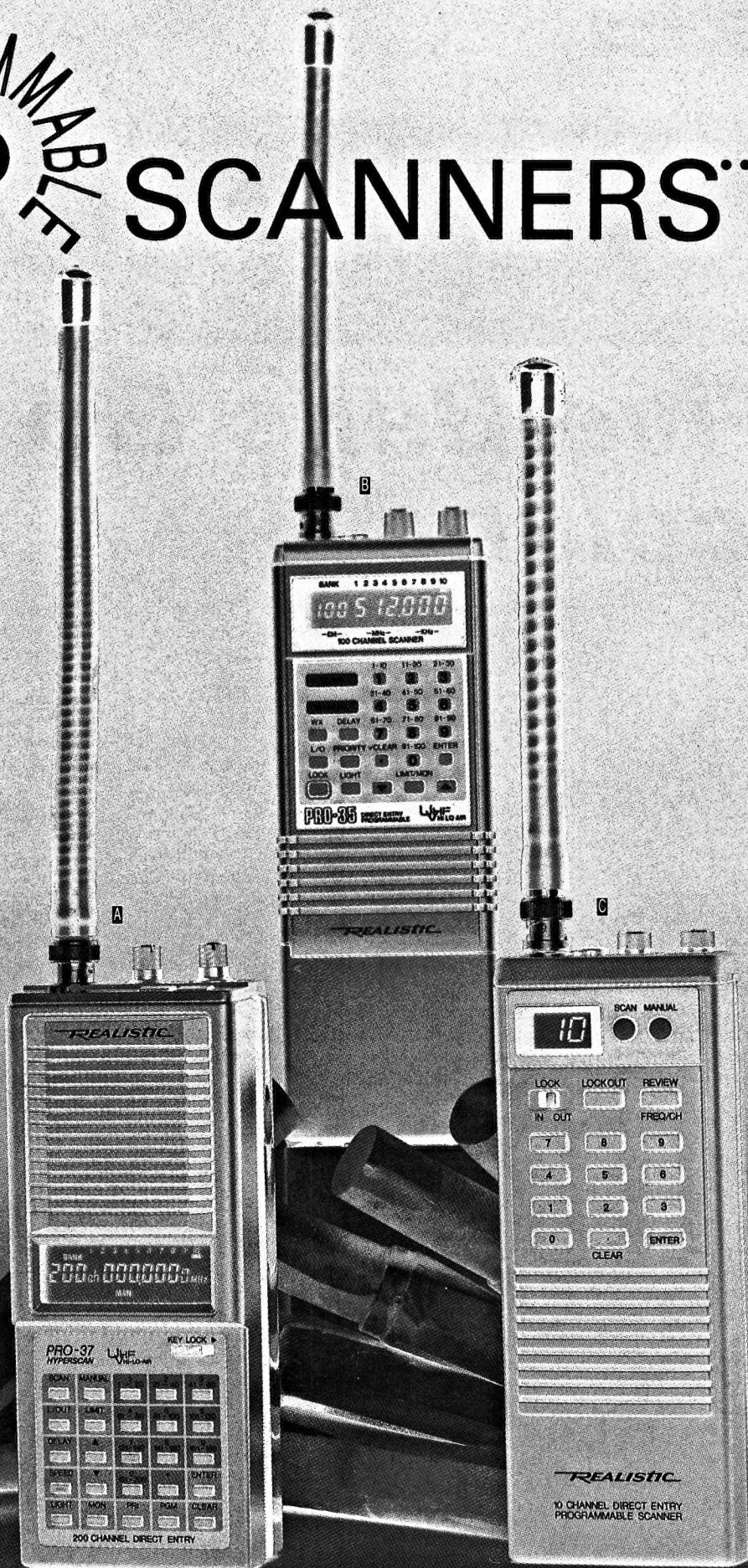
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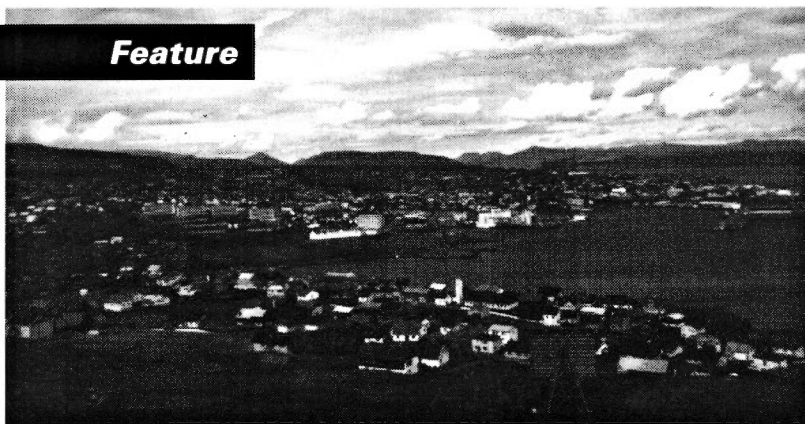
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*Dave Johnson G4DHF shares some of the experiences from the Five Bells DX group trip to Iceland in 1990. They're gluttons for punishment, because this year's expedition was to the Faroe Islands!*

# Five Bells Go To Iceland

**Above: The Five Bells Group travelled to Iceland via Torshavn in the Faroe Islands.**

**Below: They were made very welcome at the club station shack of OY6FRA during their stay.**

We had considered the possibility of operating from Iceland for a number of years. However, the main reason we chose Iceland was because it sounded a magical place to visit. But even after we obtained detailed maps, we weren't fully prepared for what we actually experienced!

In places, the Icelandic landscape consists of volcanic craters and lava fields set in an almost lunar landscape. We saw huge mountains rising sharply to 2300m, massive glaciers and vast glacial meltwater plains extending along the coast for many kilometres.

Despite the splendid rugged scenery, there is much green land under cultivation. In addition, the weather was so warm during our stay, that we were in shirt sleeves for a good proportion of the trip.

## Little Activity

There has been little v.h.f. activity from Iceland, and this is because the country is so sparsely populated. The situation isn't helped by the distances between areas of amateur activity. From the central southern coast of Iceland, to central England is in excess of 1500km.

The long haul extends to beyond 1800km to the coast of northern Europe. Obviously, the chances of experiencing 'super-tropo' conditions were going to be very remote!

Instead, the meteor scatter and e.m.e. (earth-moon-earth) modes would have to provide the main form of 144MHz propagation. Activity on 430MHz would be exclusively e.m.e. However, the planned 50MHz operation would allow us to take advantage of any sporadic-E propagation.

## Sea For Two

Keith G4ODA and I had the job of driving the Landrover, starting off from Lincolnshire on our long journey. We drove overnight through Scotland and arrived in Scrabster, near Thurso in Caithness at 12pm the following day. We had plenty of time because our ferry did not depart for the Faroe Islands until 6pm.

Thankfully, the 17-hour crossing to the Faroe Islands was reasonably calm and uneventful, except for the visual aurora I witnessed at 3am on the Sunday morning. It was frustrating to be stuck on a boat in some very rare 'wet-squares' and unable to operate!

We arrived in Torshavn around 12pm, and arranged bed and breakfast accommodation for a few days. The next boat from the Faroes to Iceland did not sail until the following Wednesday.

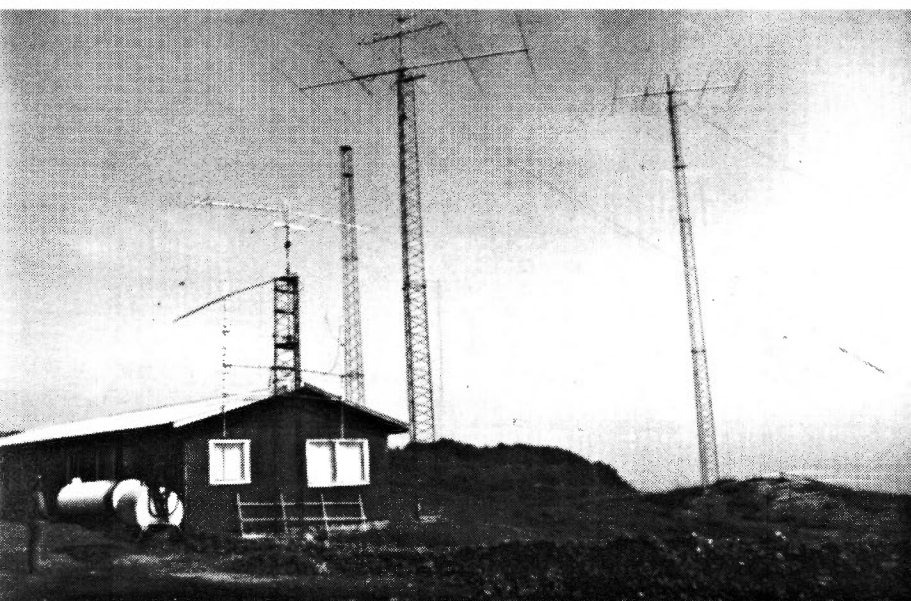
Fortunately we soon found the club station shack at OY6FRA. All the amateurs at OY6FRA were extremely helpful during our stay and we were grateful indeed for their assistance, hospitality and the chance to use their gear.

## The Team

The expedition members included Chris Phillipson G8IJC, Dave Hilton-Jones G4YTL, Andy Cook G4PIQ, Keith Tatnall G4ODA and myself. Although Dave was unable to stay for more than a week in Iceland, I know that he was very pleased to work us from his home QTH.

Both Dave and Andy flew to Keflavik from Heathrow. This was a week after Keith and I left Lincolnshire on the long journey by land and sea.

Chris G8IJC was already in Iceland on a walking holiday. He met Dave and Andy in Reykjavik, and



travelled with them to the operating location.

Our chosen site, a self-catering holiday home on the south coast of Iceland had been booked from a holiday brochure. There could have been neighbour problems when they saw our antennas, but fortunately our Icelandic hosts were very sympathetic and responded to what they saw with amusement!

### Expensive Salt

Because so many goods have to be imported from Scandinavia, mainly Denmark, we found the Faroese cost of living very high. For example, a small packet of table salt costing 55 Danish Krona is a snip at a mere £5.50! Iceland wasn't going to be any cheaper.

On Wednesday 2nd August 1990, we left for Iceland on board the Norona, which was much larger than our previous ferry. Being the only viable way of transporting vehicles to Iceland, it was fully loaded with cargo and passengers from almost every European Country.

On arrival in Seydhisfjardhur some 14 hours later, officials instructed us to drive our vehicles into long queues behind the Customs barriers. We had a long wait!

### Unlikely Friend

It was three hours later when we finally arrived at the customs barrier. The official on duty looked like the archetypal secret policeman, complete with an expressionless face.

Keith and I expected a further delay of several hours as we unpacked all the boxes, and then had their contents checked against the detailed itinerary. The customs man looked carefully at the mass of storage boxes, our equipment and then at the wide variety of cables and antenna elements lashed to the roof rack.



Finally, when he spoke in English, we were holding our breath. But there was no need to worry, and we were in for a surprise!

"You are British, yes? I see you have radio, is it short wave equipment? I too have short wave radio and listen to the BBC World Service in bed. My wife thinks I am mad! Goodbye, have a nice trip."

That was it, we were through. All we had to do now was to tackle the 460km or so drive to our operating location!

### Dusty Drive

Away from towns, the 'roads' in Iceland are no more than heavily potholed mudtracks! The better surfaces are loosely covered with volcanic pumice and stone chippings.

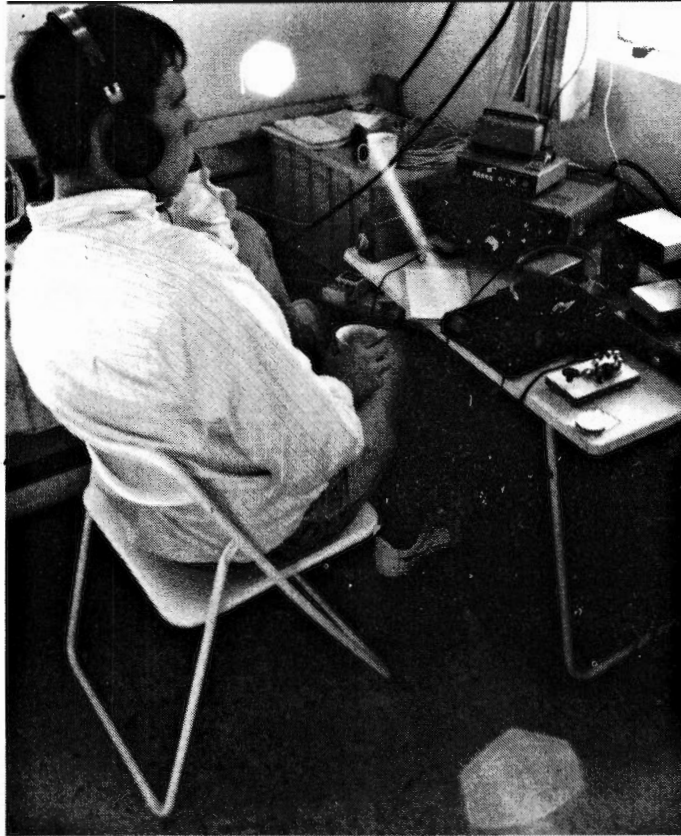
Even with a four wheel drive vehicle, the problems

**The Five Bells**  
**Landrover coped with the rugged roads of Iceland, despite being 'machine-gunned' by stones from the road! Keith G40DA takes a break from the noise and dust.**

**Although the group knew Iceland's scenery would be beautiful, they were still surprised by the stunning scenery such as this glacier ice-lake.**







**Andy Cook G4PIQ/TF  
busy operating on  
144MHz.**

of the long journey were worsened by continuous vibration and dust. Giant plumes of dust, like the proud tail of a scurrying squirrel, seemed to chase approaching vehicles. As they passed, our Landrover shook under a shower of stone chippings that sounded like machine gun bullets!

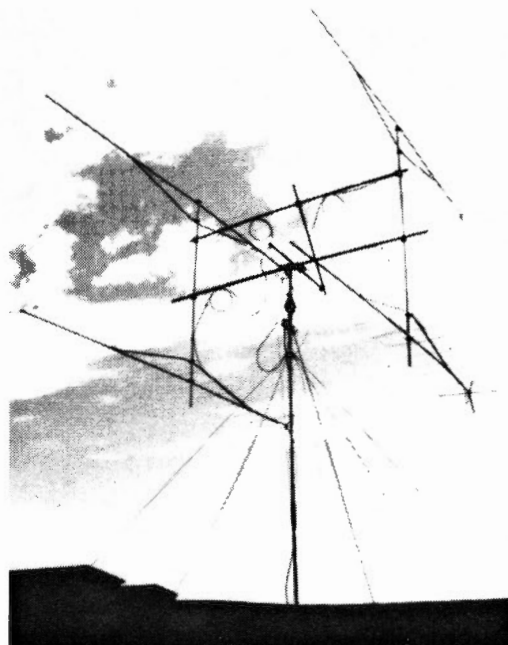
### **Overnight Camp**

Camping overnight, we continued our journey early the following morning. By lunchtime we'd arrived at our destination near the small town of Kirkjubaejarklaustur.

Within hours, we were joined by the rest of the group. Our priority was then to become active on 144MHz as quickly as possible. So we began the long and labourious task of assembling the antennas element by element, and preparing the shack.

### **Previous Expeditions**

From our previous expeditions we had gained much experience, and knew that if the weather was



**The 4 x 16-element  
144MHz antenna  
used during the  
Icelandic trip.**

reasonably kind and the equipment worked correctly, the chances of successful contacts from the meteor shower peak were good. We couldn't control the weather, but could ensure that spares and back-up systems were available.

Ordinary tropospheric propagation doesn't require the use of high power or large antenna arrays when conditions are good. The meteor scatter mode however, is generally more successful with high power transmitters and high gain antennas.

This is because we are scattering signals from the ionised trails of vapourising meteoric particles entering the earth's atmosphere. Unfortunately not much of the signal is actually reflected in a forward direction towards the station you're trying to contact. However, by using low noise receivers and high levels of effective radiated power (e.r.p.), the weaker ionised trails can be used more effectively for communication.

### **On Air**

We became operational at 1310GMT on August 4th. The European v.h.f. net, is held on 14.345MHz and we heard Dave Butler G4ASR, who writes the *PW* 'VHF Up' feature, having a general chat.

Dave was quick off the mark, and one call was sufficient to arrange an immediate test on 144.028MHz. Reflections were good, and we completed the contact in only 15 minutes by using high speed c.w. Not bad for a sked in the middle of the afternoon using random meteors!

Back on 14MHz, we were greeted with a wall of QRM. It seemed that the whole of Europe and the USA were eagerly waiting to arrange skeds on e.m.e. and meteor scatter.

Andy G4PIQ, controlled the pile-up and organised most of the skeds. Dave G4YTL, did a large amount of m.s. operating during his brief stay, and we were delighted that he enjoyed the night shift!

### **Information Feedback**

We called on the v.h.f. net at 1500GMT every day. This provided feedback information on the success of the previous skeds. Fortunately, the reports confirmed we were radiating an excellent signal.

The Perseids meteor shower occurs between August 11-12th and it's renowned for long duration reflections. This makes s.s.b. contacts a distinct possibility.

Andy and myself spent a considerable time at the peak of the shower, calling for one minute periods on our s.s.b. random frequency of 144.125MHz. Many stations were hearing us, and were replying in the 'opposite minute' period.

Many contacts were completed in a single burst. This was helped by the accepted procedure of calling 'break' at regular intervals in the transmitting sequence.

Often, you can call 'break', before listening and hearing nothing but white noise from the loudspeaker. Sometimes you'll hear the odd 'ping' or even a recognisable word.

At other times however, particularly at the peak of the shower, you'll call and be surprised by a massive pile-up of stations excitedly giving their calls and a report.

### **Exciting Times**

The busy times with m.s. are very exciting and necessitate a cool-headed and methodical operating procedure. No matter how much experience the operator has, it's not easy to remain calm!

Some stations provided tremendous signals via this

mode. However, we were particularly encouraged by the number of medium power stations who contacted us during our random sessions.

Our last contact on 144MHz was at 2210 on August 13 with Ian G1DXI. We were alerted to the time, by Ian's excellent c.w. signal which we could detect beneath our own signals returning from the rising moon. We turned the antennas and completed the contact very quickly, in an almost continuous stream of reflections.

### Moon Mode

Operation via e.m.e. mode can only be described as fascinating. Certainly, with our four Yagi system and modest power, we never considered ourselves as being a big signal.

We'd only expected to work a handful of stations. Gale-force winds during our first full night of operation had inverted the antennas through 180°, making elevation impossible.

On lowering the array, we improvised a method of elevating the system by using poles and some rope! When the rope was slackened, the array would elevate under its own weight.

At moonrise, we were frequently able to copy our own echoes. In fact, they were often so strong that a recording was made of several of our Q5 s.s.b echoes!

Signals off the moon were frequently very strong and it was fascinating to hear so many stations, including VE7BQH, KB8RQ and W5UN calling us during our random periods. It seemed unreal exchanging 559 reports via the moon! At the other extreme, we were able to complete with several four Yagi-equipped stations, and even a two Yagi station.

### Reasonable Success

Although we achieved reasonable success on 430MHz, the number of completed contacts was noticeably lower than on 144MHz. The main reason for this was the amount of Faraday rotation on the returning signals. Stations using dish antennas with rotatable feeds were providing noticeably better signals.

On the v.h.f. net Peter SM2CEW, said he'd noticed that signals had been returning from the moon with a different polarisation for several days. This was confirmed by Jan DL9KR.

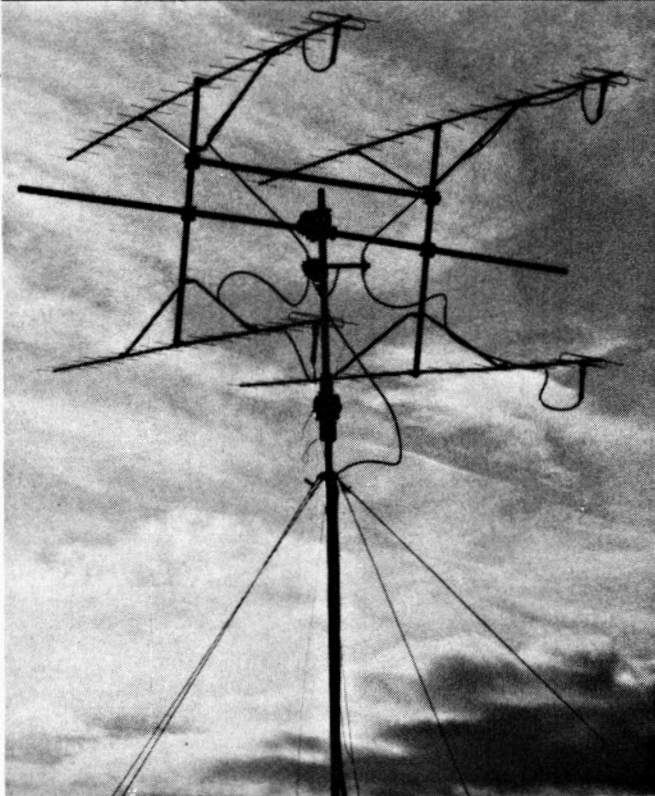
We spent a considerable amount of time calling CQ on our frequency of 432.028MHz operating 2.5 minute periods in synchronisation with the 144MHz station. Activity was very low, mainly because an e.m.e. conference was being held in the USA at the same time as our trip!

### Antenna Troubles

Having noticed an increase in v.s.w.r., we lowered the system to find that the contacts in the antenna change-over relay had melted! This prompted modifications to the home brew sequencing unit.

We'd suspected that there may have been some weak auroral activity for several days. In the early morning of August 14, there'd been a magnificent visual aurora which extended above our heads and across the sky.

Despite rushing to the radio, we hadn't heard any activity or beacons on any v.h.f. or u.h.f. frequency. We'd also noticed that during the last night of operation, e.m.e. conditions had deteriorated. Despite this, every contact was a 'first' which heightened the satisfaction and success of the operation.



Faraday rotation on reflected moon signals reduced the number of 430MHz e.m.e. contacts, but the group regarded the 430MHz operation as being reasonably successful.

### Doubtful Six

There was a considerable amount of uncertainty regarding 50MHz operations when we arrived in Iceland. The band is not permitted on the usual reciprocal licence.

In a last attempt, Keith wrote to Krisjan TF3KB, only two days before our departure. Krisjan had offered to appeal on our behalf. If he was successful, authorisation was to be forwarded to our address in Iceland.

On arriving, we were delighted to find the authorisation waiting for Keith, who rushed to the local post office to pay the licence supplement!

We were very grateful to Kristjan for his efforts on our behalf. But Keith was the sole holder of the 50MHz permit, and so was personally committed to operate on this band as a matter of priority.

### Outside The Peak

The 50MHz activity started with m.s. operations on August 4. It soon became clear that reflections to the UK and the Continent at around 1500km were extremely poor.

There was a brief E's opening on the 5th into GI. Later that day the first major E's event started. We worked SM, OZ and northern DL before moving south into PA, ON and central DL, east coast G stations and eventually all of England.

The best DX of this opening was FC1BUU (IN94) at 2400km. The event faded out at 2133, the last station worked being G3IMV. This event provided around 160 complete QSOs. The sheer wall of QRM made progress slow and quite difficult at times!

The next event of note coincided with the peak of the shower. It was quite extensive and provided QSOs into G, GW, GI, GM, PA, ON, LA, DJ, LX, F, and HBO.

The event didn't appear to move very much and provided around 180 QSOs with the best DX into HB0 at around 2500km. The final event occurred on August 14th, the last day of operation but only 55 QSOs were completed. PW

### Conclusions

*Operating in such environments as Iceland's is an entirely different experience to the comfortable shack. You soon realise why military equipment is built so solidly!*

*We worked for the greater part of each day, to meet the heavy demand of stations wanting to work a new square and DXCC country. Some sight-seeing was possible, but we always returned in time for the evening session and thoroughly enjoyed ourselves during the whole expedition.*

*The Five Bells group is entirely self-financing, and our 1991 trip was to the Faroes but we're not going to stop there! We have a number of other ideas and for myself, I'd prefer the Bahamas or Seychelles. Who wouldn't?*



# The PW Beaver

*There's a lot of interest in simple 50MHz equipment, so Mike Rowe G8JVE has designed a very straightforward rig to get you going on the band. Mike briefly outlines the complete project before discussing the receiver side in depth.*



## A Simple AM Transmitter-Receiver For 50MHz

The PW Beaver was conceived as a simple, easy-to-build QRP starter rig for the 50MHz band. The rig operates from a 12V d.c. supply and has a double conversion superhet covering from 50 to 52MHz.

The receiver has a crystal-controlled first oscillator and is continuously tuneable over the band. The transmitter is a two channel crystal-controlled amplitude modulated type, with a peak output of approximately 1W.

### Receiver Description

The circuit diagram is shown in Fig. 1. The receiver r.f. amplifier follows convention by using a dual gate m.o.s.f.e.t. with a link coupled input. The ferrite bead, and R4 in the drain circuit, aid stability.

Again, the mixer is a dual gate m.o.s.f.e.t. The signals are coupled via the band-pass transformer L1, L2 into gate 1. The local oscillator injection from the crystal-controlled oscillator is into gate 2. The crystal oscillator is a Colpitt's type and uses a third overtone

crystal tuned by L4 and C32. The i.f. output from the mixer at 2-4MHz is selected by T2, which is tuned by a varicap diode.

The coupling winding on T2 is coupled to the input to the multi-operation integrated circuit IC1. This device provides the following functions: h.f. amplifier with a.g.c., mixer, and 2nd mixer oscillator.

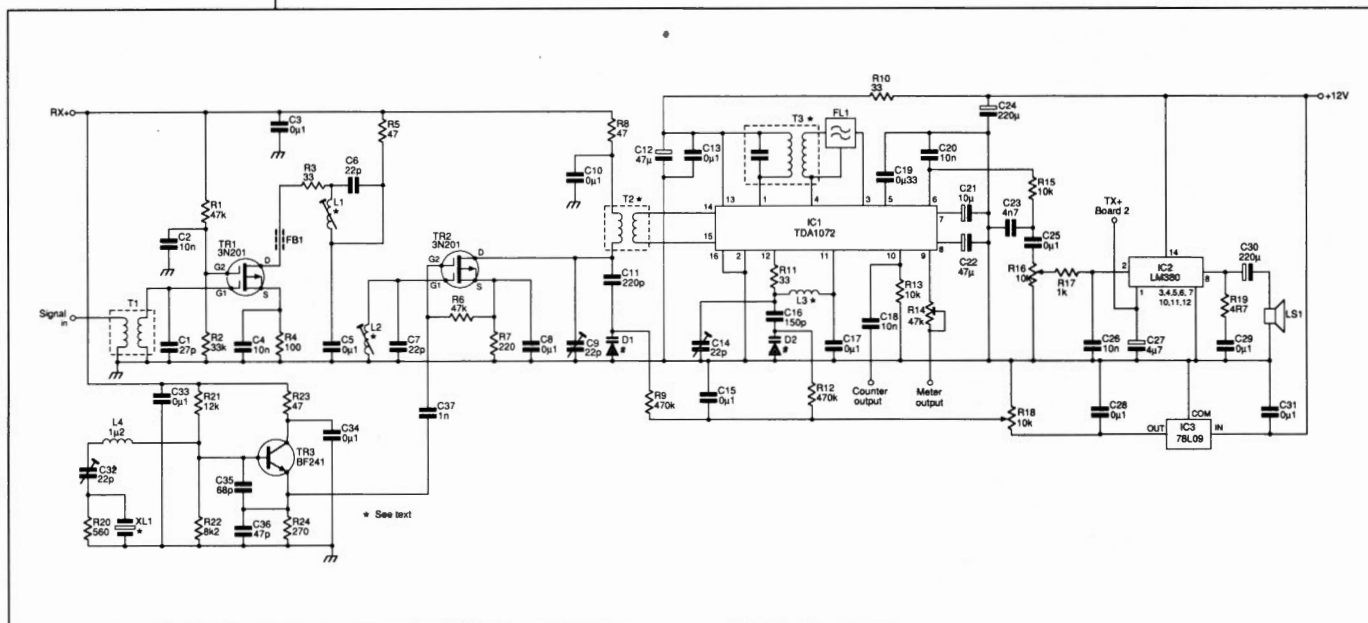
The i.c. also provides counter output of the oscillator, an i.f. amplifier with a.g.c., a.m. detector, a.g.c. generator and tuning meter output. All the facilities are used in the Beaver.

### High Side Oscillator

The oscillator, which is on the high side of the signal, is varicap diode tuned by R18 with IC3 providing the necessary voltage stabilisation. The tuning resistor R18, must be fitted with a slow motion drive and be a high quality type.

Output from the mixer is at 455kHz and the necessary filtering is provided by FL1, a Murata mechani-

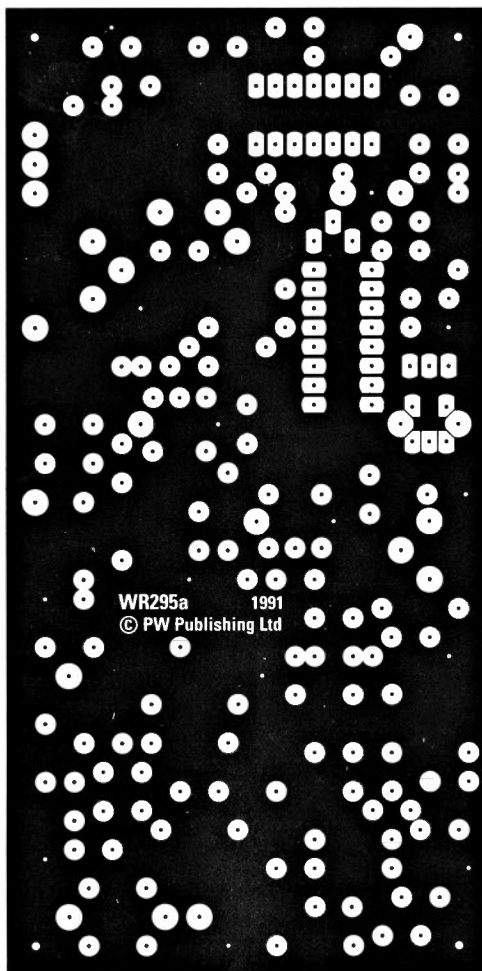
**Fig. 1. The Beaver receiver circuit diagram.**



The ground plane,  
component overlay and  
p.c.b. diagram,

cal filter with matching to the  
mixer provided by T3.

Audio output at pin six of  
the i.c., is filtered by C20,  
R15 and C23 before it's fed to  
the audio amplifier. Audio  
gain adjustment is provided  
by R16.



### Audio Stage

The LM380 audio i.c. raises the level to provide approximately 1W into an 8Ω speaker. The resistor R19 and C29 form a Zobell network across the device output.

In order to reduce any frequency shift when switching to transmit and back again, the second oscillator is fed with a continuous voltage and is running all the time. The audio stage itself is muted during transmissions by applying the transmit supply via a diode to pin 1 of the audio i.c. from the transmitter p.c.b.

### The S-Meter

The S-meter adjustment is achieved by a pre-set variable resistor R14. The meter output from the TDA1072 has a standing voltage of 1.6V.

This standing reading on the meter, would make it very insensitive to small changes in voltage. The affect is offset by the diodes on the meter p.c.b.

The meter board also has the transmitter power output indicator adjustment. This will be fully described in Part 2, when I describe the transmitter construction.

### Receiver Construction

You should now look at the overlay diagrams in Fig. 2, and start the construction by placing all the resistors and capacitors on the p.c.b. Don't forget to get the polarity correct in the case of electrolytic and tantalum types.

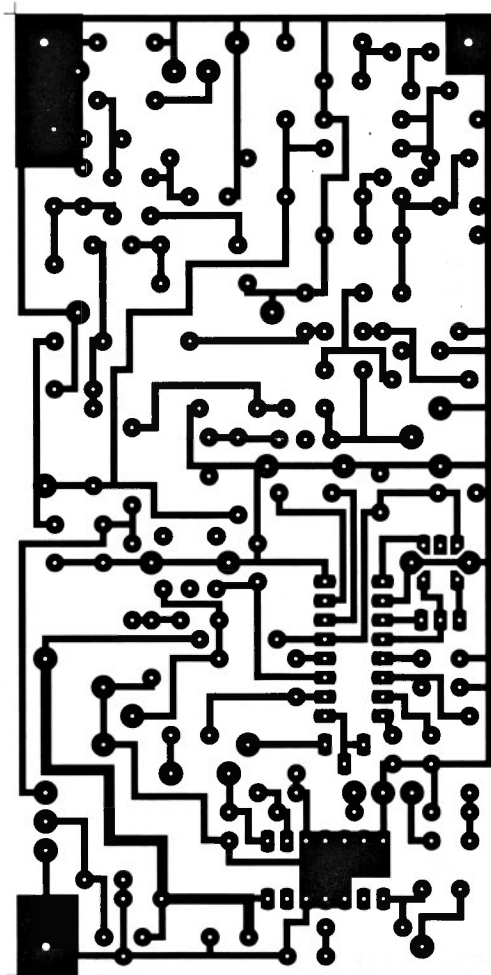
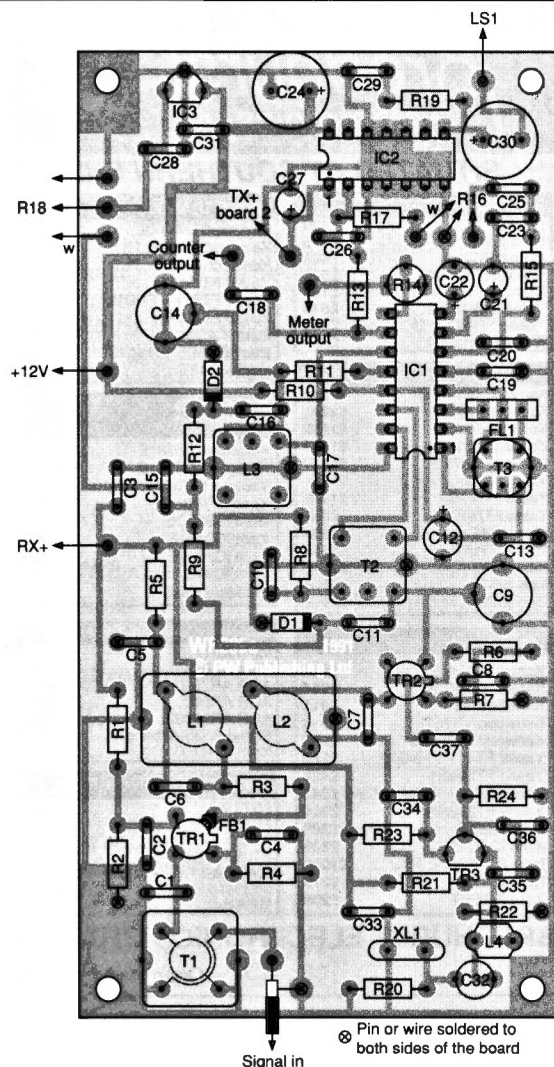
Don't forget that some components have to be soldered on both sides of the board, to the ground plane and to the tracks on the underside of the board. This allows certain components with inaccessible leads, to be connected to ground with minimum impedance.

The next stage is to fit all the inductors and the filter. It's important to remember to ground all the screening cans on the inductors by soldering them as the p.c.b. allows.

When you fit the variable capacitors and crystal, be careful and **don't use too much heat**, as they may be damaged. The next job is to fit the semiconductors, taking note to make sure they're correctly orientated.

The i.c., IC1 may be fitted into a holder if required, as in the prototype. Another point to remember, is the fitting of the ferrite bead on the drain lead of TR1. It's also necessary to fit all the transistors with the minimum lead lengths. Finally, you should fit Veropins where indicated for the off-board wiring connections.

Your next job at this stage is to check all component locations, just in case you've







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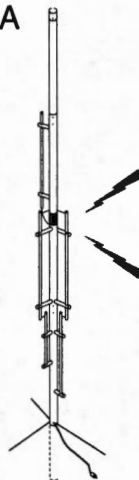
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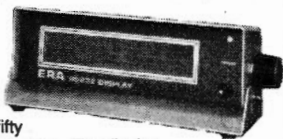
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**ASA**

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got any wrong! You should also check for dry joints and solder bridges as these can be very difficult to find later on.

As a final check, make sure that there are no short circuits on the continuous 12V supply rails and varicap tuning rails. So, if everything's okay, it's time to think about alignment, by connecting up a suitable 12V d.c. power supply.

### Receiver Alignment

Set all the variable capacitors to half mesh. Check with a frequency counter connected to TP1 (emitter of TR3), that the crystal oscillator is running, and then set it to 48MHz by adjusting the variable trimmer capacitor C32.

For the next stage, connect a frequency counter to TP2 (counter output on IC1), and with R18 fully anti-clockwise (wiper at 0V) adjust T2 to give a reading of 2.455MHz. Then rotate R18 clockwise (wiper at 9V) and adjust the variable trimmer capacitor C14 to give a reading on the counter of 4.455MHz.

Repeat this operation several times until there is little interaction between the adjustments. The second oscillator is now aligned.

Next, feed a 51MHz signal into the antenna socket and tune in the signal. Adjust T1, L1 and L2 for maximum reading on the tuning meter, adjusting R14 as necessary to give a reasonable deflection on the meter.

Now adjust the signal source to 50MHz, and tune in the signal, adjusting T2 core for maximum reading on the S-meter. Reduce the signal source input as tuning progresses.

Retune the signal source to 52MHz and tune into the signal, adjusting C9 for maximum meter deflection, again reducing the signal source input as the tuning progresses. Repeat the operation several times until no further improvement is obtained. Following this procedure, the prototype gave a sensitivity in the region of 0.25µV.

*Next time, I'll describe the construction and alignment of the transmitter and final completion of the Beaver. In the meantime, have fun building the receiver.*

## How Much ? £30 + p.c.b.s How Difficult? Intermediate

### Shopping List

#### Resistors

Carbon film 5% 0.25W

4.7Ω	1	R19
33Ω	3	R3, 10, 11
47Ω	3	R5, 8, 23
100Ω	1	R4
220Ω	1	R7
270Ω	1	R24
560Ω	1	R20
1kΩ	1	R17
8.2kΩ	1	R22
10kΩ	2	R13, 15
12kΩ	1	R21
33kΩ	1	R2
47kΩ	2	R1, 6
470kΩ	2	R9, 12

Rotary

10kΩ	2	R16, 18 (see text reference R18)
47kΩ	1	R14, miniature preset

#### Capacitors

Disc ceramic

22pF	2	C6, 7
27pF	1	C1
47pF	1	C36
68pF	1	C35
150pF	1	C16
220pF	1	C11
1nF	1	C37
4.7nF	1	C23
10nF	5	C2, 4, 18, 20, 26
0.1µF	13	C3, 5, 8, 10, 13, 15, 17, 25, 28, 29, 31, 33, 34
0.33µF	1	C19

Variable

22pF	3	C9, 14, 32 Miniature foil trimmer
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Electrolytic

Radial 16V working minimum

4.7µF	1	C27
10µF	1	C21
47µF	2	C12, 22
220µF	2	C24, 30

#### Semiconductors

BF241	1	TR3
KV1236	2	D1, 2
LM380	1	IC2
TDA1072	1	IC1
3N201	2	TR1, 2
78L09	1	IC3

#### Inductors

L1	S18 violet Ferrite core (Toko)
L2	S18 violet Ferrite core (Toko)
L3	S18 violet Ferrite core (Toko)
L4	7BA 1.2µH choke (Toko)
T1	KANK 3426 (Toko)
T3	7MCS 4718 (Toko)

#### Filter

FL1	Murata CFM 455D
-----	-----------------

#### Miscellaneous

48MHz third overtone crystal case (Maplin 231 or similar), Jackson slow-motion drive or similar, knob and dial to suit, u.h.f. socket, 8Ω speaker, speaker grill fret (if using internal speaker), plugs, sockets, stand-off pillars, fuse holder, p.c.b. available from PW PCB Service, tuning meter (Circuit).

#### Suppliers:

Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 8LR.  
Circuit Distribution Ltd., Park Lane, Broxbourne, Hertfordshire EN10 7NQ.



# Radio Diary

\* Practical Wireless & Short Wave Magazine in attendance

**\*September 15:** The BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Located close to London, it is a 10-minute drive from the M25 (junction 10) and is not far from the M3, M4 and M40. Free parking for over 5000 cars. On-site catering, hot and cold meals, snack, beverages and licensed bar. Doors open 10.30am to 5pm, admission £1 for adults and OAPs, with children under 14 free if accompanied by an adult. Talk-in on S22. **Peter Nicol G8VXY, 38 Mitten Avenue, Rubery Rednal, Birmingham B45 0JB. Tel: 021-453 2676.**

**September 15:** The East of England Radio Rally will be held in the ICI Building, The East of England Showground, Oundle Road, Peterborough. Admission is £1, doors open 10.30am (10am for the disabled). There's a main traders' hall with bar and catering, a traders' marquee with Bring & Buy, separate outside area with flea market plus radio and electronic car boot sale. Various other attractions - Which-Kit Car Show, Caravan Club Rally, Banger Racing, Golf Driving Range & Go-Karts, Nene Park & Nene Valley Railway, acres of free parking. **Nigel G1ARV. Tel: (0733) 78685.**

**\*September 15:** The Bristol Radio Rally will be held at Brunel's Great Train Shed, Temple Meads, Bristol. **D. Farr (0272) 839855.**

**\*September 22:** The Norfolk Amateur Radio, Computer & Electronics Rally has been cancelled due to lack of response, however a much larger two-day event is planned for 25/26 July 1992. **G4ONF. Tel: (0603) 747782.**

**\*September 22:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, OAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. **Frank Martin G4UMF. Tel: (0952) 598173.**

**\*September 28/29:** The RSGB HF Convention will be held at the Friendly Hotel, Daventry, Northants. Featuring two lecture streams in parallel sessions throughout Sunday, which should offer something interesting for everyone. There will be the usual bookstalls, club stands, c.w. pile up competition, raffle and refreshments. Reduced rate for overnight accommodation. For more details, contact **Bob Whelan G3PJT, 36 Green End, Comberton, Cambridge CB3 7DY. Tel: (0223) 263137.**

**September 29:** The Harlow & District ARS will be holding their 33rd Amateur Radio and Electronics Rally at the Harlow Sportscentre. The Main Hall will provide a large and varied selection of traders, both old and new to the event. The studio upstairs will also have some

traders along with the Bring & Buy, there will also be the usual special interest groups. Adjacent to the centre there's parking for 1000 cars. On-site reserved disabled parking is available, with full facilities for the disabled inside. Catering and licensed lounge bar. Talk-in on S22 and SU22 by G6UT. Entry is £1, with children under 14 and OAPs half price. **Liz G0MDL. Tel: (0277) 364742 evenings and weekends only.**

**\*October 6:** Great Lumley Amateur Radio & Electronics Society will be holding their rally in the Community Centre, Great Lumley, nr. Chester-le-Street, Co. Durham. Doors open 11am, 10.30am for the disabled. Trade stands, Bring & Buy (£500 value limit), refreshments available. Talk-in on S22 by GX6GLR. Admission £1, children under 14 (accompanied by an adult) free. **Barry Dvorton G1JDP. Tel: 091-388 5936.**

**October 6:** Blackwood Amateur Radio Rally will be held at Oakdale Community College, Blackwood, Gwent NP2 0DT. **Brian Matthews GW0JWF, 25 Manor Park, Newbridge, Gwent NP1 4RS. Tel: (0495) 243858.**

**October 13:** The Armagh & Dungannon District ARC will be held in Gosford House Hotel, Markethill, Co. Armagh. Doors open at 12pm. Usual trade stands plus other events. For further information please contact **Mr T. Hell G10MSJ, 1 Hamiltonsbawn Road, Armagh City BT60 1DL. Tel: (0861) 523454.**

**October 13:** Blackmore Vale ARS have their annual rally at Wincanton Racecourse, Somerset. This is an indoor event, doors open 10am to 5pm and entrance fee is 50p. Talk-in on S22. Details from **Norman G4YXX on (0749) 85432.**

**October 13:** South Devon RC have their seventh annual Ham Radio & Computer Exhibition and rally at Hill Head Camp, Hill Head, Brixham, Devon. Doors open 10am. Trade stands, AR supplies, kits, computer sales, raffle, refreshments, unlimited free parking and overnight camping. Car boot sale, bigger and better this year. Outside attractions. Talk-in on S22 + SU22 by G7FDC and G4SSB. Special event station GB4CPU. Details from **G6ZRM. Tel: (0803) 522216 or (0836) 577220.**

**October 20:** The Wirral Radio & Computer Fayre will be held at The Masonic Hall, Manor Road, Liskard, Wallasey, Merseyside. Doors open 10.30am. Further details from **D. Clifford G0NVF on 051-639 5922.**

**\*October 25 & 26:** The Leicester Amateur Radio Show will again be held at the Granby Halls, Leicester.

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**So, come and join the fun, have a go at winning a prize, buy your books and meet the team from your favourite publications, Practical Wireless and Short Wave Magazine at the 1991 Leicester Show on October 25-26.**

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**Wanted** By lapsed amateur: communications receiver, 1950s to 1970s vintage (circuits I can understand!) - HRO preferred but RA17 or others considered. Mr Teague, Perrotts, Lyfod on Fosse, Somerton, Somerset TA11 7HA. Tel: (0963) 24319.

**Wanted** Science of Cambridge MK14 computers, UK101s, OHIO superboards, Altair 8800 (CP/M), IMSAI (CP/M), manuals, spare parts and software. Stephen Walters, 42 Achilles Road, West Hampstead, London NW6 1EA. Tel: 071-431 1204.

**For Sale** DNT 40 channel CEPT CB hand-held with flexi antenna, as new, £55. Sony ICF-2001 receiver, p.i.l., 150kHz-30MHz, good working order. Peter Ewing, 23 Cherry Orton Road, Peterborough PE2 0EQ. Tel: (0733) 231860.

**For Sale** Complete data system - RTTY, AMTOR, c.w.,

G3LIV interface, Commodore computer, leads, ready to operate. Monitor by Honeywell if required. Has to be seen, will demonstrate, £45. Tel: Gloucester 714791.

**Wanted** KW107 supermatch a.t.u., and off-air frequency standard. Good price paid and collection arranged for mint equipment. G3AAO, Bournemouth. Not QTHR. Tel: (0202) 871903 evenings.

**For Sale** Versatower 20m 3 section telescopic tower complete with auto-brake winches, head unit and shortened base post, £350. Telequipment D52 oscilloscope complete with handbook, £50. Don Ross G4LOO. Tel: (0462) 811591 after 6pm.

**Wanted** Pye battery charger type BC21D - condition not important. Peter GW4GCB, Colwyn Bay. Tel: (0492) 531760.

**For Sale** Yaesu FT-101Z transceiver with manual, 9 WARC bands and f.m. board fitted, £300 o.n.o. J. Sanders G4LYS, 263 Town Street, Leeds LS10 3SE. Tel: (0532) 703706.

**For Sale** Ten-Tec a.t.u. 200W with s.w.r. meter switch to select dummy load and ants, £50. G2DRT. Tel: (0494) 814240.

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**Wanted** Books - Antenna Tests and Measurements by Hooton published by Radio & Electronics World; Antennas Volume I & II by Roubine & Bolomey published by Kogan Page Ltd. Any other books on antennas, propagation, etc. R. Parkes, 2 Saxon Road, Steyning, West Sussex BN44 3FP.

**For Sale** Kenwood 440s one year old, little used, includes: auto a.t.u., c.w. filter, fist mike, £875. Also Kent twin

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**Wanted** Wireless set No22, WS19 high power amplifier, WS19 MkII (Russian Legends), WS68, WS76, and R107 sought by collector. Is there one in your garage, loft or shed? Martin G4NCE. Tel: 021-357 6139.

**For Sale** 2500-0-2500V 500mA transformer, £50. 600V 2A transformer, £40. Buyer collects, both very heavy. Eimac SK610 valve bases, £10 each. Wide spaced variable capacitors, 'phone for details and prices. John G3RMA. Tel: (0803) 556425.

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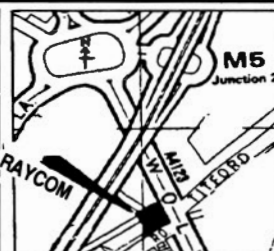
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# The PW-50M Vertical Antenna For Mobile Operation

## Construction

This project, in response to the recent ruling allowing mobile operation, enables you to get a move on, on 50MHz. Another article dealt with a home construction 'base station' antenna. After that article I looked into an antenna for mobile operation. I came up with two basic designs, both of which are described here. As the construction requires a fair amount of engineering, PW have arranged a kit of parts to be made available. I am going to concentrate on this antenna design, and will only briefly describe the other design.

### Basics Revisited

The frequency of 50MHz, just above the h.f. region, is a part of the spectrum that has various possible modes of propagation. This has been more fully explained elsewhere.

A particularly critical factor at 50MHz is the length of, and height above ground of the antenna. With an antenna mounted on a moving vehicle other factors **must** be taken into account, e.g., physical length, stability and secure mounting.

**Safety when the vehicle is moving, is the primary consideration.** Also to be taken into consideration is the overall efficiency of the antenna which depends on the 'type' and its performance parameters.

### Low Level Waves

For mobile operation at 50MHz the mode of propagation will be mainly 'ground-wave'. In this mode, the communication distances will depend largely on the attenuation of the signals over the 'ground path' between stations. At 50MHz this can be quite high. The computer-generated diagram of Fig. 1, gives an indication of this path loss. Calculations for the simulation were based on average ground attenuation over a fairly flat terrain.

### Grounded Monopoles

Any single element vertical antenna is omnidirectional (horizontally) regardless of whether it is 'grounded' or not. The computer produced vertical radiation patterns (one half only) shown in Fig. 2 is for 'grounded antennas' of **efficient lengths operating with perfectly conducting ground**. This, in reality, can't exist. As a result, there is always some cancellation of the radiated wave at low vertical angles. This is known as the **Brewster Effect**. The average maximum Brewster angle is marked BA in the illustration of Fig. 2.

Although an antenna mounted on the roof of a vehicle is above real ground, it is in fact using the roof, in whole or in part, as a 'ground-plane'. This assumes the roof is metal of course. However, the position of the antenna on the roof makes it difficult to define the vertical angle radiation by calculation. In any case, below about 100MHz or so, a car roof behaves as a very small ground-plane.

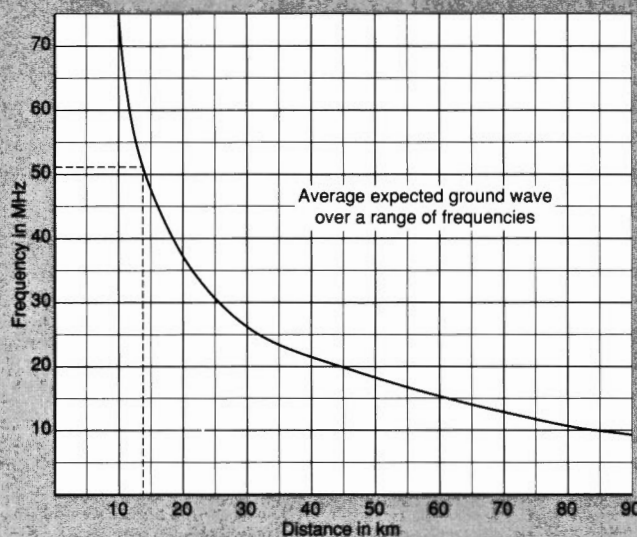
Vertical radiation patterns, as those shown in Fig. 2, would only be obtained with a perfectly conducting ground-plane, and extending to infinity. The diagonal

line at 30° marked GPA, is approximately the angle of maximum vertical radiation obtained with any antenna operated above a ground-plane, such as a car roof. This is based on a ground plane less than one wavelength square, at the frequency of operation.

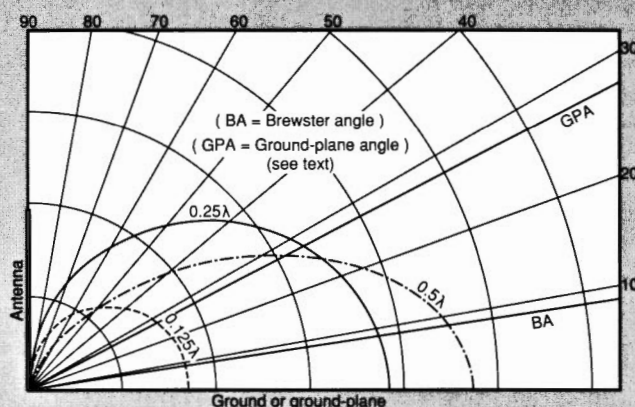
### Antenna Size

At 50MHz a full  $\lambda/4$  (1.5m) would be the largest and most efficient mobile antenna you could use. For mobile safety, antennas of this size would really need to be bumper-mounted. This is not always possible with modern cars. An antenna this length on the roof, or attached to the gutter, could be dangerous, even though most 27/28MHz antennas are of this size!

*Following the lifting of restrictions, we asked Fred Judd G2BCX, to design some vertically polarised antennas for 50MHz. This project is for a mobile antenna to get you moving on the band.*



**Fig. 1: Ground-wave propagation signal attenuation is high at frequencies in the region above 30-50MHz.**



**Fig. 2: Radiation patterns for grounded vertical antennas. Note: the horizontal radiation pattern is continuous around the antenna.**



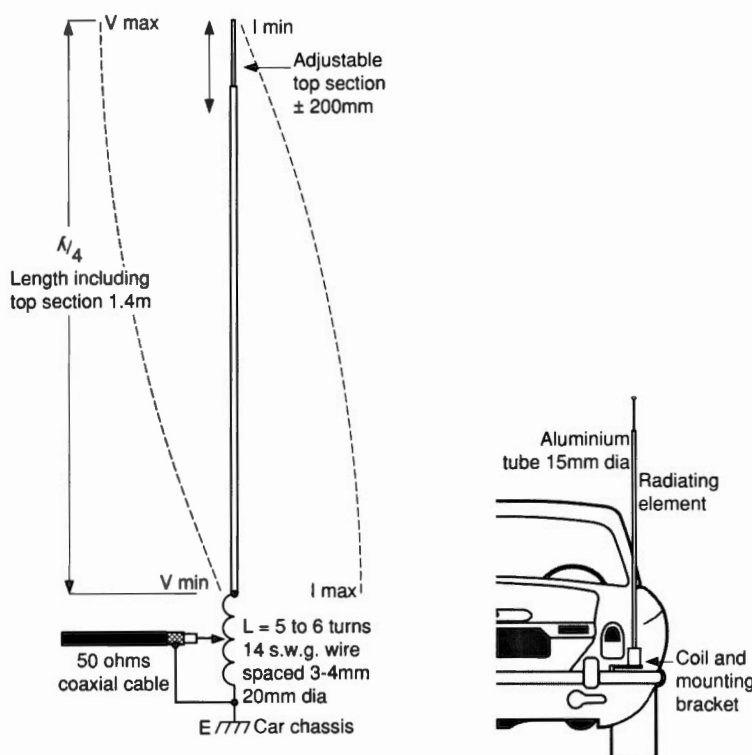


Fig. 3: Suggested car bumper mounted  $\lambda/4$  antenna for 50MHz.

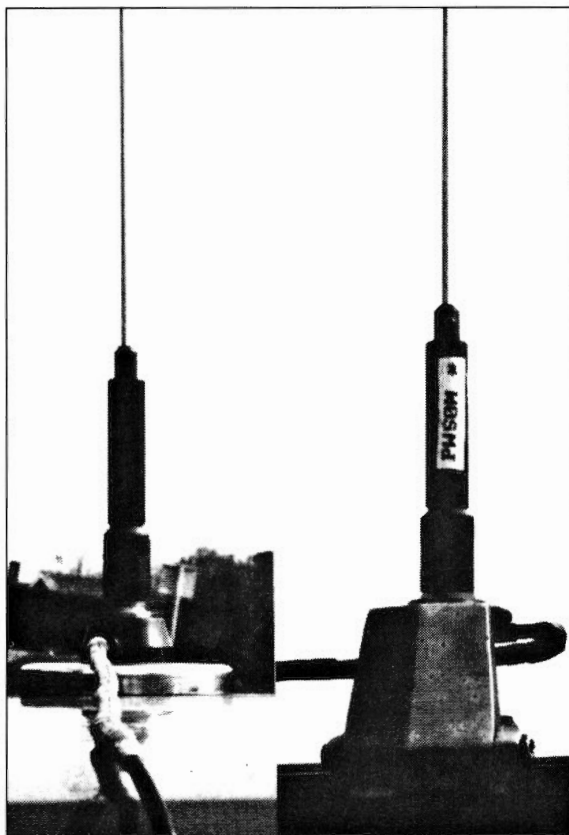


Fig. 4: The PW-50M antenna shown as: (left) mag-mounted and (right) gutter-mounted.

However, if a bumper-mounted  $\lambda/4$  antenna is what you want, you may like to look at the ideas sketched out in Fig. 3. Resonating the antenna and a low v.s.w.r are achieved by moving the feed point on the small matching coil at the base of the radiator. A good connection (E) to the car body, and the chassis is important in this design.

### Shrinking Antennas

When using 50MHz there is little point in using a centre loaded short antenna to simulate half-wave resonance, or in the hope of the 'free-space' function of maximum radiation at a very low angle. It doesn't work with a metallic, or a non-metallic vehicle roof. The centre of the antenna is much less than half a wavelength above the ground.

In addition the 'resistive' loss of the centre loading coil, and losses created by the 'matching' inductance at the base would lead to a very inefficient antenna. Moreover, the centre inductance instead of antenna element, further lowers the radiation efficiency.

### Enter The PW-50M

This PW-50M for 50MHz mobile operation is an inductively loaded  $\lambda/4$  with a maximum element length of little over 1m, shown in the photograph of Fig. 4. It can be safely put on a 'mag-mount' or gutter mounted.

The drawing, Fig. 5, shows the overall idea of the PW-50M. The radiating element is physically short and so appears as a capacitor, shown dotted and marked C, in Fig. 5. The base loading coil L, tunes the antenna to resonance with this capacitance. This makes the antenna more efficient, and matches it to the 50 $\Omega$  coaxial cable.

The 'electrical' configuration is shown in Fig. 5. As the inductance (L) at the base is small, approximately 5 $\mu$ H, a whip section capacitance (C) of about 1.95pF provides resonance at 51.02MHz. This is close enough for final adjustment to 51MHz, the band centre frequency.

The illustration in Fig. 6, and the photographs, make it appear that the construction of this antenna calls for the use of a lathe and other machine tools. In fact, no tools are needed other than an allen key and a small hacksaw to cut the stainless steel whip to length to obtain the lowest v.s.w.r.

The reason why it is so easy, is that the PW-50M antenna is available as a **kit of parts**, finished in matt black, and ready to tune. This is probably more cost effective than trying to make one yourself; even if you had the tools!

### Assembly

The order of assembling the kit of parts is shown in Fig. 6. Begin the assembly with the part marked (A). This screws into the socket shell (B) far enough for the threaded portion to extend about 10mm above the top. It then forms a plug to mate with the usual socket found on most antenna base mounts. This assembly is then screwed into the lower end of the inductance housing tube (D). Next, the spring coil inductance (C) is inserted into the tube. **Do not cut this coil.** It will project above the top of the tube, but is compressed into it when the whip connector marked (E) is screwed into the top. **Be careful to avoid cross threading these fittings.**

All that remains is to fit the stainless steel whip element, (F), which will be supplied a little longer than required. In the first instance cut this element to a nominal length of 1.2m

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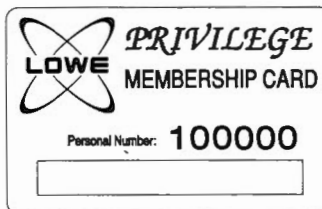
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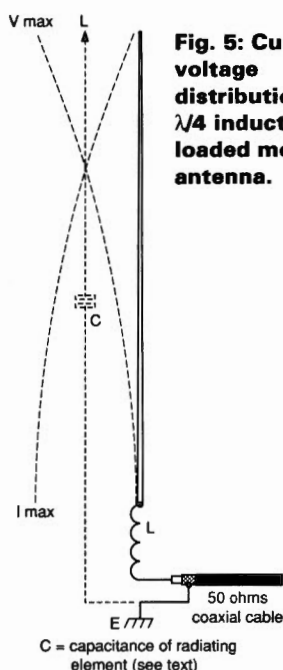
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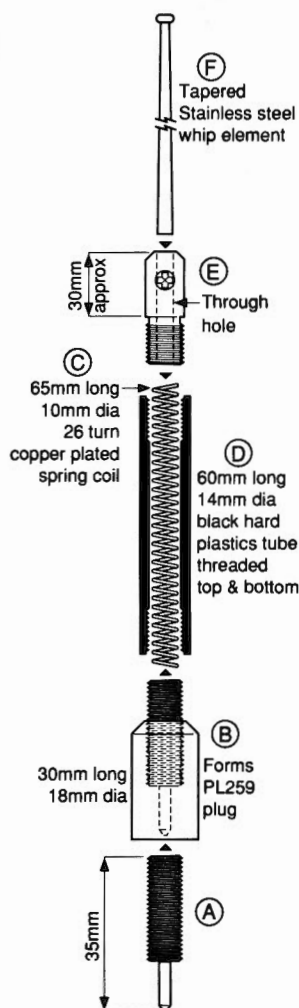
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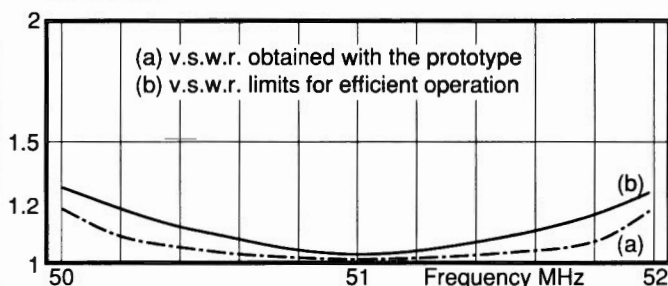


**Fig. 5: Current and voltage distribution on the  $\frac{1}{4}$  inductively loaded mobile antenna.**

**Fig. 6: Assembly of the PW-50M mobile antenna (see text for assembly order).**



**Fig. 7: Measured s.w.r. curves obtained with the PW-50M antenna. Curve (b) is more likely with gutter mounting.**



## Adjustments

We now begin the task of adjusting the v.s.w.r. of the antenna system. Insert the whip element into the top fitting (E) as far as it will go. If possible use a minimal r.f. power to begin with and check v.s.w.r. at the band centre of 51MHz. Adjust the external length of the element until this v.s.w.r. figure is as near unity as possible.

Then you should measure the v.s.w.r. near band edges. (50.1 and 51.9MHz). The curves shown in Fig. 7 are what you should be aiming for. If the v.s.w.r. at band edges is appreciably higher than that shown, trim about 10mm from the bottom of the whip element and try again.

The amount of adjustment required will depend on whether the antenna is roof centre or gutter mounted. Repeat the process until the v.s.w.r. is as close to unity (1.0:1) as possible. The v.s.w.r. should in any case, be less than 1.5:1 within the band for maximum radiation.

As there are no internal tuning capacitances, the antenna may be used up to the full legal power of 20dBW (100W). The coaxial cable should be the best quality possible, cut to the length as required.

I'm grateful to Sandpiper Communications, for help in creating the prototype, and agreeing to supply a kit of parts. I would also like to thank Waters & Stanton of Hockley Essex, for the loan of the transmitting equipment to complete measurements and testing.

## Obtaining the Kit of Parts

The kit costs £10 including packing and postage. Cheque or cash only order for the PW-50M 50MHz Mobile Antenna Kit as described in *Practical Wireless* to:

Sandpiper Communications (PW-50M)  
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# Getting Started - The Practical Way

Theory

The transistor is now the basic building block of electronics. When I first built radio sets using valves, I played with high voltages and drilled and filed large holes in metal for chassis mountings. I also grew up with that delightful smell of dust heating up on the hot glass in the days when a radio had to 'warm up'.

Nowadays radio construction is easier. The voltages are low, the component parts are small, and it all happens inside silicon 'sandwiches'! The transistor in its many forms has made an amazing difference in a very short time and it's about time for us to look at them in more detail.

## Transistor Types

There are two main groups of transistor and they are known as the bipolar and the field effect transistor. Although each group is further broken down into other sub-groups or types.

The diagram, Fig. 1, shows the physical construction of two common types of transistor. These are the *npn* and *pnp* bipolar transistors.

They are rather like electronic sandwiches but I don't intend to enter into the electron theory of transistors. If you want to explore the physics of transistors, there are books, available from the PW Book Service, concentrating on theory.

I've shown the layers to illustrate the transistor forms: *npn* and *pnp*. These are layers of types of silicon, or rather silicon with different types of added impurity. These types are called 'P' and 'N' and the sandwiches can either be in the order *npn* or *pnp*. In this application, the middle layer acts as a control between the two outer layers.

## Layer Connection

The bipolar transistor has a connection to each layer and these are called the **emitter**, **base** and **collector**. The base layer is **very** thin. In practice, this means that a small current passing between the emitter and base will cause a much larger current to flow between the emitter and collector.

The transistor is a 'current' amplifier. In other words, small emitter-base current changes cause larger emitter-collector current changes. The diagram, Fig. 1(a), represents the action. We'll consider the transistor as an amplifier later in the series.

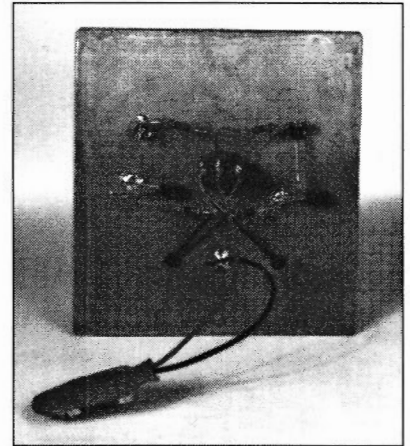
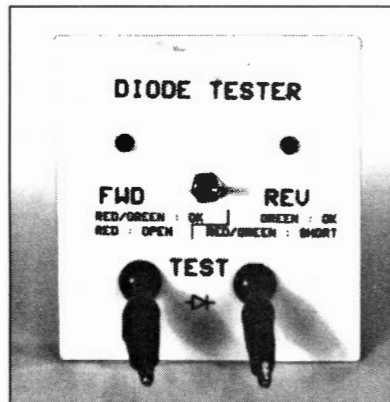
## Transistor Symbols

The circuit diagram symbols for both *npn* and the *pnp* transistor are shown in Fig. 2. The only difference is the direction of the arrow in the emitter. If the arrow is facing **OUT** of the transistor, it is an *npn* type. If the arrow, which is referring to the electron flow, is facing **INTO** the transistor, it is a *pnp* device. You can remember it as *npn* is, **Not-Pointing-IN**!

The arrows also point to the negative side of the circuit. Looking at the way the symbols are shown in Fig. 2, the positive side would be at the top of the *npn* transistor and at the bottom of the *pnp* transistor.

## Common Types

The details may all seem very complex, but it soon falls into place when transistors have been used in a few circuits. In fact, the *npn* device is by far, the Practical Wireless, October 1991



commonest of the types in most electronic circuits.

In most amateur radio circuits, the transistors used will be *npn*. But do look out for those arrows, as there might be the odd *pnp* lurking around. Very often, *pnp* types will appear in a circuit upside down. This is because circuit drawing convention, at least in Europe, puts the positive at the top of the diagram.

## Practical Learning

The practical way to learn about transistors is to use them, and that is exactly what we do in this series! Our first circuit doesn't use a transistor as an amplifier, but in the simpler application of a switch.

You might think that this is a needless complication, but don't be misled. Solid state switching, using transistors and other electronic components, forms an important part of electronics.

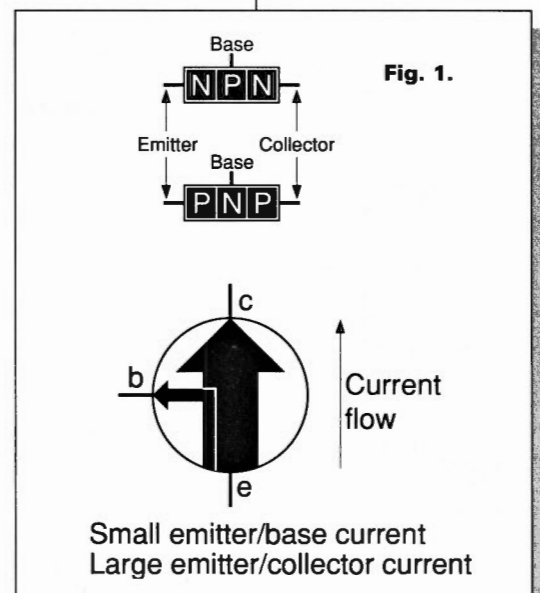
There are several advantages, not least of which is that there are no moving parts to wear out. Also, control voltages within a circuit may easily be used to produce a switching action on other circuits. Diodes may also be used as switches, but for the moment we'll just look at transistor switching.

## Simple Circuit

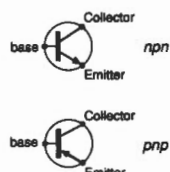
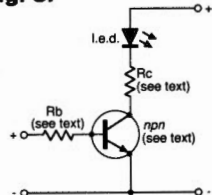
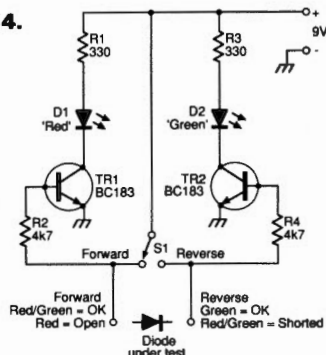
The diagram, Fig. 3, shows a simple transistor circuit. Note that each transistor is an *npn* type (the arrow points outwards). You should also note that the positive side of the supply is connected to the top, and is at the collector end. The emitter is connected to the negative end.

The circuit also contains an l.e.d. and two resistors. The resistor,  $R_b$ , is the base resistor and  $R_c$  is the collector resistor. The resistors protect the transistor from drawing too much current. Too much

*In this month's column the Rev. George Dobbs G3RJV takes a look at transistors, their use as switches and shows you how to make a diode tester.*





**Fig. 2.****Fig. 3.****Fig. 4.**

## Conclusion

*It's also a good idea to mark the front side of the board with the diode symbol. This will act as a reminder to show you which way to test a diode. It's also a good idea to add brief instructions on how to use the tester. This is a useful and easy little project to build. It's ideal for testing those surplus diodes which can often be bought cheaply at radio rallies. That's the lot for this time, keep busy and get building, it's the best way to learn!*

## Shopping List

*To build the diode tester you need: Two BC183 transistors (Marco Trading), but take care and avoid the BC183L which has differing layouts. One red l.e.d. (Marco Trading) or Maplin WL27E. One green l.e.d. from Marco Trading or Maplin WL28E. Two 4.7kΩ and two 330Ω resistors. Single-pole change-over miniature toggle switch, and clips for test points.*

current would cause excessive heating and damage the transistor.

As current is drawn by the transistor, the resistors also produce voltages at the base and collector terminals. This action, producing the desired voltages at the terminals of a transistor, is referred to as biasing

## Forward Voltage

Do you remember reading that a diode requires a forward voltage of around 0.6V before it can conduct? This forward voltage is also required at the base of a transistor, and a transistor could actually be thought of as two diodes connected 'back to back'.

The base-emitter junction of the transistor cannot conduct until the forward voltage exceeds 0.6V. If the power supply is connected but there's no positive voltage at the base, or it's less than 0.6V, the transistor will not conduct and the l.e.d. would not light.

If you apply a voltage, as shown, to the base of the transistor and it's higher than 0.6V, the transistor will conduct. When the transistor conducts, a current will pass between the emitter and the collector and the l.e.d. will light.

The transistor in this case, is acting as a switch. The resistors Rb and Rc, need to be selected so that a suitable current flows through the base (this is known as biasing). This is to allow the transistor to switch on, and allow the l.e.d. to draw the correct amount of current to light.

## Promising Application

The simple circuit shows promise as a transistor application. A small voltage applied to the base, can make the transistor conduct and perform an action, in this case lighting an l.e.d. Now we're going to make use of this property, and make a useful little item of test equipment.

## Diode Tester

The circuit of a diode tester, using two transistors as switches is shown in Fig. 4. In fact this circuit is a good lesson in understanding the transistor switching action.

Actually, it's really two identical circuits with both halves having an npn transistor wired as a switch to operate an l.e.d. It's only the circuit from Fig. 3, with component values and transistor types added.

The prototype used BC183 transistors. These are a common and inexpensive bipolar npn type, although a whole variety of common npn silicon transistors are suitable.

## How It Works

Now it's time to see how it works! Consider the circuit as shown, with the switch set to the FWD (forward) position. The switch puts a positive voltage onto the base of the left transistor. This causes it to conduct and light the red coloured l.e.d. The transistor on the right of the circuit will not light the green coloured l.e.d., because its base has no forward voltage.

The working of this circuit depends on you being able to identify the cathode (marked) end of the diode. The next stage is to add a diode across the test points, connected as indicated by the symbol below these points on the circuit.

The diode will then forward conduct, putting a voltage onto the base of the right-hand transistor. The transistor 'switches on', causing the green coloured l.e.d. to light. This shows that the diode is capable of conduction. If the diode does not conduct, it must be open circuit and therefore useless!

## Going In Reverse

When you place the switch to the REV (reverse) position, a positive voltage is put onto the base of the right-hand transistor. This allows the green coloured l.e.d. to remain on. The red coloured l.e.d. however, will switch off because the voltage has been removed from the left-hand transistor.

If the red l.e.d. is still on, the diode has a problem. The fact that the l.e.d. is still illuminated, indicates that the diode is short-circuit and useless.

By now, you'll realise that the tester is a useful piece of equipment! It not only shows that the diode will only conduct one way and is therefore good, but also indicates a faulty diode is open circuit or has a reverse short circuit.

## Ugly Construction

The diode tester is built using the 'ugly construction' technique on a piece of blank p.c.b. The piece used for the prototype measured 80 x 90mm but it is possible to make it smaller.

I didn't bother with a case, but the board could form the cover of a box to house the tester. I didn't bother with a switch either, as the tester is switched on by connecting the battery. If the tester is boxed, an on/off switch would be required.

The layout of the diode tester can be seen from the photograph. The emitter lead of the transistors are soldered directly to the board, as is the negative lead of the battery connector. The switch contacts, the l.e.d. connecting wires and the battery leads all give supports from which the circuit can be wired.

## Toggle Trouble

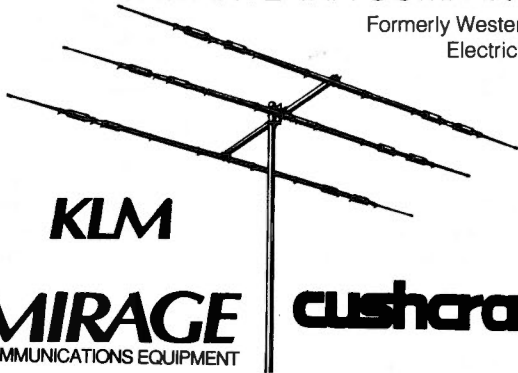
**Here's a word of warning for you!** Almost every miniature toggle switch, operates its contacts in reverse with the direction of the switch lever. So, the wires from the 4.7kΩ resistors and the test point leads cross over to the opposite switch contacts.

The necessary 9V supply is wired to the centre contact of the switch. Finally, don't forget to ensure that the l.e.d.s are connected the right way round in the circuit. (see 'Getting Started - The Practical Way' June issue PW for connection details if you're not sure).

Practical Wireless, October 1991

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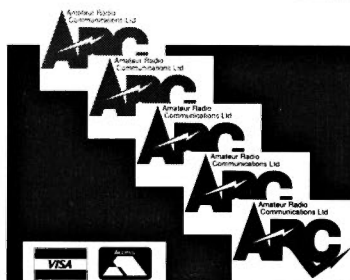
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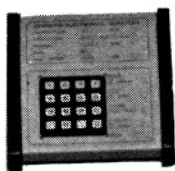
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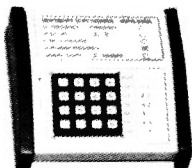
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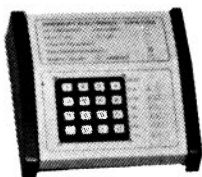


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# A Simple 934MHz Antenna

Construction

At u.h.f. and especially at 934MHz, there are numerous antennas that have high performance characteristics making them suitable for 'base station' operation. Types such as parasitic (Yagi type) arrays, cubical quads, log periodic arrays (l.p.a.), helical antennas, etc. may be found in reference books. No constructional or performance details of these antennas are included in this article.

The antenna featured here is the corner reflector, which at 934MHz, with optimised dimensions, has a fairly 'wide-band' response and acceptable directivity gain. Being relatively and with the reflector constructed in 'grid' form, it offers very little resistance to wind. Furthermore, it may be operated to obtain either vertical or horizontal polarisation. There being virtually no difference in the radiation pattern, or directivity gain.

## Configuration

This antenna is derived from a 'flat sheet' reflector and a single driven element. With a 'corner system' the reflector normally consists of two flat metal sheets (L) by (S) that join at a corner angle ( $\theta$ ), as shown in Fig. 1. I have decided to use a corner angle of  $90^\circ$  (square corner reflector). An angle of less than  $90^\circ$  may be used, but has certain disadvantages.

## Gain And Impedance

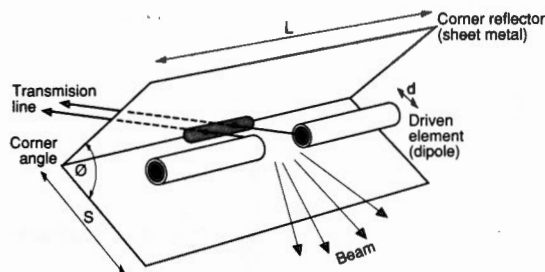
Refer now to Fig. 2, which is based on work by J.D.Kraus <sup>†</sup>, and it shows the directivity gain factor in dBd for a driven element distance (d) to the corner of  $90^\circ$  and  $60^\circ$  reflectors. There is little change in the 'gain' factor as the distance (d) is varied between about 0.2 to almost  $0.5\lambda$ .

However, the input impedance is also determined by this distance (d). The feed cable will normally be  $50\Omega$  coaxial cable (ultra low loss for 934MHz). To create this impedance the distance (d) must be approximately  $0.3\lambda$  for a  $90^\circ$  reflector. Keep in mind however, that small changes in the distance (d) produce an appreciable change in the input impedance. This change will drastically affect the v.s.w.r.

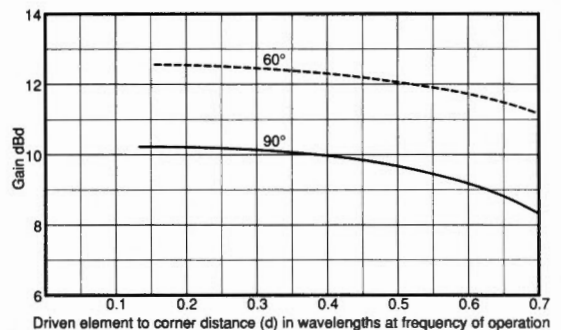
## Optimum Sizes

To restrict radiation to a low order mode, i.e. with no side, or split main lobes, the most practical arrangement is a reflector with a corner angle of  $90^\circ$ . There is provision for positioning the driven element  $0.25$  to  $0.4\lambda$  from the corner. This will enable a minimal v.s.w.r. to be obtained when the antenna is fed from  $50\Omega$  coaxial cable.

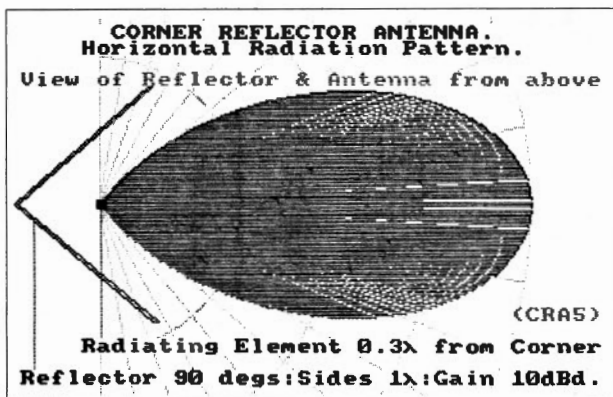
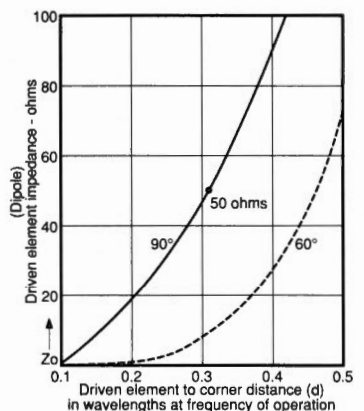
*As 'Quaynotes' is on holiday, we're giving Fred Judd G2BCX the opportunity to show you how to make a simple antenna for the 934MHz band.*



**Fig. 1: The basic 'corner reflector'. The corner angle ( $\theta$ ) is normally between  $60^\circ$  and  $90^\circ$  with (S)  $0.9\lambda$ , (L)  $0.6\lambda$  and (d)  $0.3\lambda$  ( $\lambda$  at 934MHz is 319mm)**

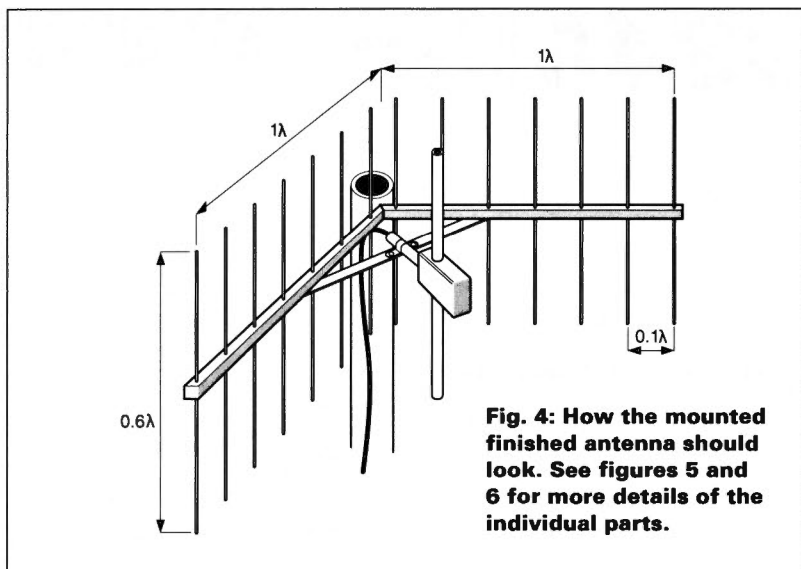


**Fig. 2: Directivity gain in dBd (top) with respect to distance (d). The lower diagram shows variation in impedance of driven element as (d) varies (corner angles of  $90^\circ$  and  $60^\circ$ ).**



**Fig. 3: Radiation pattern of a vertical 'optimised'  $90^\circ$  corner reflector antenna. Gain shown is average with a distance (d) of approximately  $0.3\lambda$  and reflector sides (S) of  $\lambda$ .**





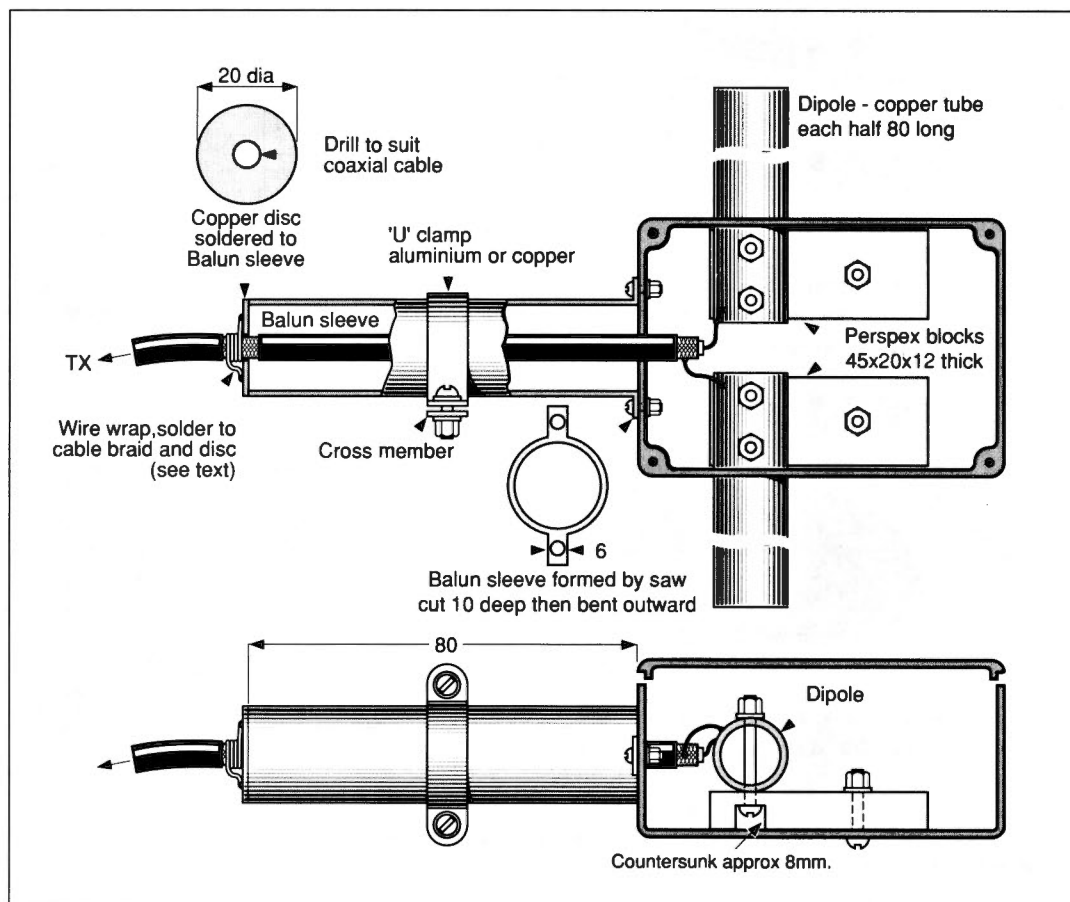
**Fig. 4: How the mounted finished antenna should look. See figures 5 and 6 for more details of the individual parts.**

### Lobes And Gain

The computer produced radiation pattern shown in Fig. 3, is for a 90° reflector with the driven element located at  $0.3\lambda$ . The directivity gain is about 10dBd. This pattern remains virtually the same, regardless of whether the antenna is used vertically or horizontally.

Higher forward gains are possible with corner reflector antennas, but the main lobe may be too narrow for convenient operation. For example, with a gain of nearly 13dBd, the forward lobe 'width' at -3dB will be in the region of 10°. Such a narrow beam width is not particularly desirable, unless of course the antenna is required for point-to-point communication over a fixed path.

**Fig. 5: The balun sleeve and antenna elements in detail. The dipole elements are made of 12mm diameter copper tube.**



### Construction

A corner reflector for 934MHz could be made from thin aluminium, or perforated zinc sheet to keep down wind resistance. However, this resistance can be reduced even more by making the reflector with a grid of parallel conductors as in Fig. 4. This shows a 90° corner reflector antenna constructed in this way.

Incidentally, it must be remembered that the frequency of 934MHz is almost 'microwave'. This is a region where care must be taken with construction. You can't take even small liberties with dimensions which, at lower frequencies, have little or no effect on the performance of antennas.

### The Driven Element

The comments regarding dimensions apply particularly to the construction of the driven element. This is half-wave dipole, fed via a balun sleeve to ensure a proper match between the antenna and the unbalanced coaxial cable. More details are given in Fig. 5. The dipole and the sleeve are made from copper water-pipe, with diameters nearest to those given. Note: the balun sleeve is approximately twice the diameter of the cable used.

The two lugs for fitting the sleeve to the protection box, are formed by making two saw cuts each side of the sleeve and bending the cut sections outward. Don't make the bend too sharp, or the lugs may break off. The copper disc soldered to the end of the sleeve is in contact with the coaxial cable braid at that point.

The soldering can be done by first stripping a very short length of the cable outer cover away where it passes through the disc. Two or three turns of tinned copper are wrapped around the braid and soldered to it. Take care not to melt the dielectric beneath. Solder each end of the wire across the disc. The cable will be held centrally to the sleeve by the hole in the protection

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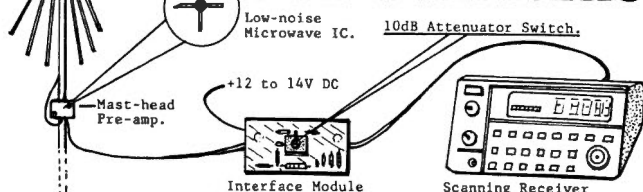
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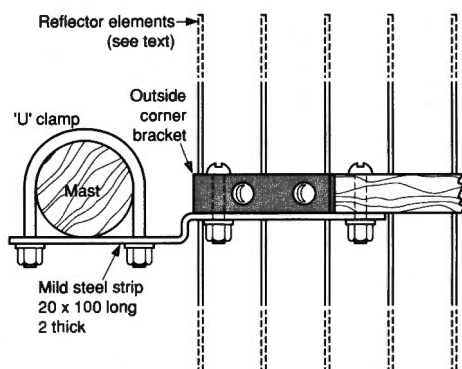
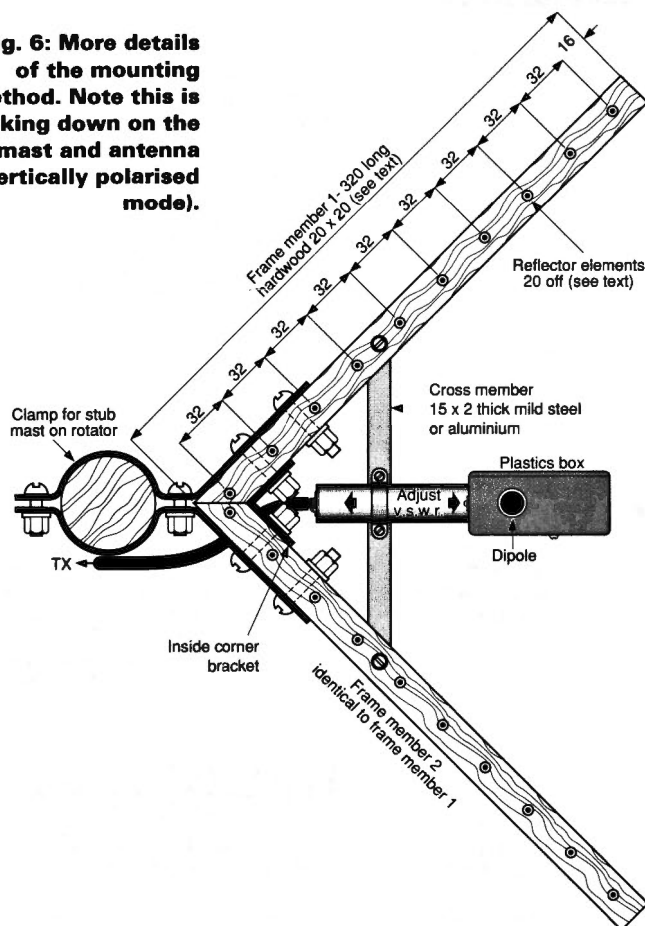
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73 from Dave G4KQH, Technical Manager



**Fig. 6: More details of the mounting method. Note this is looking down on the mast and antenna (vertically polarised mode).**



**Fig. 7: These modifications need to be made to the mounting method if it is intended to use the antenna horizontally.**

box. A plastics disc may be added in the middle of the balun to hold the coaxial cable centrally. *If possible a single length of cable should be used to run between the antenna and transceiver. This will avoid a plug and socket connection, and its losses, at the antenna.*

### Final Assembly

The 'frame members', as in Fig. 6, may be constructed from hardwood (Oak), or metal such as square aluminium tube. Dimensions should be as close as possible to those given. If wood is used, it must be treated for protection.

The 'cross member' should ideally be mild steel although aluminium, at least 2mm thick, will support the driven element assembly. This is secured by a 'U' clamp as shown. Slightly loosening the fixing bolts, will help when this assembly is moved later to adjust for minimum v.s.w.r.

The 'grid' elements, each 192mm long, may be cut from aluminium, brass or copper rod 2 or 3mm diameter. Welding rod could also be used. They should be a tight fit, and be secured in position with an epoxy adhesive or, if possible soldered into place, electrical contact with a metal frame is not essential.

### Any Way Up

The diagram Fig. 6, shows how the rear corner brackets are extended to form a clamp, allowing the whole antenna to be mounted vertically. If horizontal polarisation is required the whole antenna is mounted horizontally. The illustration, Fig. 7, shows how this may be achieved with aid of a mild steel strip, mounted under a frame member extending beyond the corner.

**Each of the reflectors must be isolated from the mounting boom. So holes must be drilled through this strip to clear any of the reflecting elements.**

Note: The radiation pattern in the horizontal plane, remains the same regardless of whether the antenna is mounted vertically or horizontally.

### Adjustment

With the assembled antenna temporarily mounted about two metres above ground, adjust the position of the driven element assembly (as previously mentioned) until the lowest possible v.s.w.r. is obtained. A reading of 1.12:1 was obtained with the experimental model over the bandwidth 933 to 934MHz.

Finally, secure the driven element assembly and attach the lid on the protective box. Run a sealant around the holes in the box, and around each end of the balun sleeve to prevent the entry of moisture. It's a good idea to bind adhesive tape around the end of the cable where it enters the balun sleeve, and onto the end of the sleeve itself before applying the sealant.

Various types of low loss coaxial cable suitable for use at 934MHz are available from advertisers in this issue of *Practical Wireless*.

### Other Antennas

There are of course many other types of antennas that may be used on 934MHz, some of which I mentioned above. But those would be the subject of other articles (letters to the editor in support perhaps?).

### Thanks

My thanks go to Nevada Communications of London Road, Portsmouth, for the loan of the 934MHz equipment used in connection with testing the corner reflector antenna dealt with in this article. I hope you enjoy using this simple antenna, if built carefully it should serve you well. **PW**

### Further Reading

*Antennas*, by Prof. J.D. Kraus. McGraw-Hill book Co. USA (available UK libraries. Considerable theoretical information. Chapter 12 is about reflector antennas.  
*Wires And Waves* a reprint of articles from previous issues of *PW*.  
*Out Of Thin Air* reprints of other articles from previous issues of *PW*.  
*Beam Antenna Handbook* William I. Orr W6SAI and Stuart D. Cowan W2LX, Radio Publications Inc.  
*VHF-UHF Handbook*, edited by D. Evans G3RPE and G. Jessop G6JP, an RSGB Publication.

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# PACKET PANORAMA

*There's been considerable interest and some concern shown regarding the proliferation of DXClusters lately. To shed a little more light, Roger Cooke G3LDI describes how they work.*

Interest is always more intense at the start of a new project. When packet BBSs first came on line, users were queueing up to connect. After the novelty has worn off, connections become somewhat more sporadic. The same is true for DXClusters. After first trying them to see the response, users are now more selective in the use of the command structure.

It has become routine to connect and quickly get the the latest DX information, then leaving. The concern arises because users often go through several nodes to obtain access to a particular cluster.

This can be somewhat laborious and time-consuming. However, it's best to wait until your local cluster has been up-dated with information. Then, you should proceed to use it in much in the same way as the BBS. If there is a DXpedition currently operating, the information was probably made public long before the event, so the avid DXer will be monitoring the usual frequencies anyway.

## Five Modes

There are five operating modes available:

**Command Mode:** This is the default mode where all commands are input to the DXcluster. The other modes all need /EXIT typed on a new line to return to the default mode.

**Conference Mode.** This can be very useful for 'round table' contacts. MSYS has this mode available and it has proved very popular locally. In this mode, all input is sent to all other stations in the Conference.

**Talk mode** is entered by typing TALK, followed by the callsign of the station you wish to talk to. If I wanted to talk to Pat G3IOR, then I would enter TALK G3IOR.

**Mail-send mode** is available through the command SEND. The system then prompts the user for information as to the addressee etc.,

much in the same way a BBS would. As with a normal packet BBS, to complete the message, press Control+Z. To cancel a message, press Control+Y.

**Database Update** mode similar to Mail-send. All text entered is used to update a database.

To exit all these above modes, returning to cluster command mode, typing /EXIT on a new line will suffice.

## Handbook Necessary

A very useful and informative handbook may be obtained from your cluster sysop. There are numerous variations of the commands and it's really worthwhile. In fact it is almost a necessity to have a handbook for reference. However, please bear in mind that the sysop has had to purchase the software in the first place, so a suitable donation would not be out of place!

Connecting to the cluster is simple. Issue a connect to the node (in my case G1TLH-2) and then

type CLUSTER. This will bring you a response similar to the sign-on screen of most packet BBSs.

The available cluster commands are shown in Fig. 1.

Probably the most commonly used command is SHOW. Issuing the command SHOW/DX 15, produces a response similar to that shown in Fig. 2. In this case '15' means the 21MHz (15m) band, and this may be changed for the band of interest, i.e. SHOW/DX 80, or SHOW/DX 10 etc.

For those of you searching for propagation checks, etc., the command SHOW/WWV will be of decided interest. This command produces an output something similar to Fig. 3.

Similarly the m.u.f. and l.u.f. can be checked for any part of the world. Issuing the SHOW/MUF command, followed by the DXCC prefix required (in this case G for the UK) is all that is required.

The command SHOW/MUF G will produce something like:

England propagation: MUF: 6.4 MHz LUF: 3.7 MHz.

## Wanted Lists

A check can be made of the countries that a member of the cluster is on the lookout for. I checked on Pat G3IOR and myself. The first was in answer to: SHOW/NEED G3IOR and the second in answer to SHOW/NEED G3LDI.

Countries needed by G3IOR:

CW: 70 T33

SSB: 70 T33

Countries needed by G3LDI:

CW: 70 A5 KH4 S2 VK0/H ZA

SSB: 70 A5 KH4 S2 VK0/H ZA

DX de GB7TLH: 14177.0  
YL1WC CALLING CQ 1853ZRR

This immediate last line came up whilst I was making the request. I had asked for latest DX announcements.

Signing off is the same as for a normal packet BBS, just a B for BYE. This will respond with a line such as:

CUL Roger 5-Jul-1991 1854Z  
73 de GB7TLH

## Special Services

There is so much more to a cluster however, with specialised services available if the various databases are there. Some examples of these are as follows:

**SHOW/COM** will provide a list of customised databases, should they be available.

**SHOW/ALLOCATION xx** will provide the country allocated to a particular prefix, where xx is the ITU callsign prefix.

**SHOW/CONTEST** will provide a list of DX-related contests.

**SHOW/IRC xxx** will provide the number of IRCs required for return postage (to the USA, as this database was distributed by K6PBT).

**SHOW/MEETING** will provide information on club meetings, etc.

ANNOUNCE	make a general announcement to all connected stations
BYE	bye, disconnect from the packet cluster
CONFERENCE	enter conference mode
DELETE	delete mail message
DIRECTORY	list active mail messages
DX	DX spotting info announcement
EXECUTE	execute your personal command procedure
FINDFILE	locate file(s) on the system
HELP or ?	help (displays this listing)
HELP x	display help for that particular command x
READ	read mail message
REPLY	reply to the last-read mail message
SEND	send mail message
SET	set user-specific parameters
SHOW	display various packet cluster information
SWITCH	change to alias call
TALK	talk to specified station
TYPE	display a particular file on the packet cluster
UPDATE	update a custom database
UPLOAD	upload a file to the packet cluster
WWV	log/announce WWV propagation information
WX	announce weather conditions

Fig. 1: The available commands of a DXCluster

# PACKET PANORAMA

The only limit is your imagination and the provision of the relevant database with the necessary information. Mail can also be dealt with from the cluster, with a similar structure to the main BBS.

Although the commands are slightly different, to see what bulletins are present, you only need to type DIRECTORY/BULLETINS. To read a message, the normal READ command followed by the message number will suffice. To send a message, the SEND command is used, and to delete a message which has been read, type DELETE followed by the message number.

Messages may be sent to another user on the system by using TALK CALL, where CALL is the call-sign of the other station. To exit the talk mode, type control+Z.

Shortened versions of these commands may also be used.

## European Clusters

The DX cluster is also very popular on the continent, and I've been forwarded a list compiled by PA3DZN. This list is rather too long to fit into the space available in the column. A stamped s.a.e. marked 'EUROCLUSTERS' to the editorial address will get you a copy of the listing. When you see the list, I think you'll agree that they're certainly catching on.

That's about it for this time. Next month I shall present some of the views received regarding my comments in July issue of PW.  
73 and Happy Packeting de Roger  
G3LDI @ GB7LDI.

```
21015.5 4K3/UA3YCA 5-Jul-1991 0728Z IOTA EU-102 <G3VMW>
21070.7 JA3BN 4-Jul-1991 1046Z 559 just worked him <G3VBI>
21024.5 HS0AC 4-Jul-1991 0934Z <G0CGL>
```

Fig. 2: Issuing the command SHOW/DX 15, will get a return looking something like this example.

Date	Hour	SFI	A	K	Forecast
4-Jul-1991	21	247	12	2	SOLAR LOW/MOD, GEOMAG QUIET/UNSETTLED <G3COJ>
30-Jun-1991	21	236	18	3	Solar High, Geo Active Flare 0302, Pro <G3PWJ>
29-Jun-1991	21	227	5	1	SOLAR MODERATE, GEOMAGNETIC UNSETTLED <G3COJ>
28-Jun-1991	06	200	10	3	Solar Low/Mod, Geo Unset /Active <GW4BLE>

Fig. 3: Issuing a SHOW/WWV gives this sort of answer.

## Starting Frame

**Echo:** A DTE and DCE (t.n.c.) function that sends each character passed to the t.n.c. from the keyboard, back to the screen of the terminal. This usually causes each character typed at the DTE keyboard to reappear on the display in full duplex mode (see below).

**EIA-232:** The original definition of the serial communication line used by many terminals and computers. It has since gone through several rewrites. See below.

**EIA-232-D:** The current EIA standard for DTE-to-DCE interfacing that specifies the interface signals and their electrical characteristics. It replaces EIA RS-232-C.

**EIA:** Electronics Industries Association. An organisation composed of representatives of the United States electronics industry. The EIA is involved in formulating data communications standards.

**Enter:** A key on the computer keyboard, which causes the computer to accept the information previously typed at its keyboard.

**Escape:** A control character with the numeric value of 27 (decimal) or \$1B (hexadecimal).

**Escape code:** A sequence of alphanumeric characters that are typed at a DTE keyboard to cause the DCE to exit the current operating mode, and return to the previous operating mode.

**Escape sequence:** A sequence of alphanumeric characters that are typed at a DTE keyboard to cause the DCE to exit the current operating mode, and return to the previous operating mode.

**FCS:** Abbreviation for Frame Check Sequence. See CRC. The field in an AX-25 frame that is used for frame error checking.

**Field:** In link-layer packet radio, a subdivision of a frame, consisting of one or more octets.

**Flag:** In HDLC, a bit pattern (01111110) used to initiate and terminate a frame.

**Flow Control:** The method of stopping and restarting the transfer of characters between the DTE (computer/terminal) and a DCE (t.n.c.). There are two methods of control. Hardware using control lines, and software using two special characters (Xon/Xoff). It is a means to restrict the overall number of characters per second, to the speed of the receiving system. Baud rate has no bearing with flow control.

**Frame:** The data structure of the High-level Data Link Control procedure (HDLC). A group of AX.25 fields consisting of an opening flag, address, control, information, frame-check sequence and ending flag fields.

**FRMR:** Frame Reject Frame. An AX-25 unnumbered frame that indicates that the source station is unable to process a frame and that the error is such that resending the frame will not correct the problem.

**Forwarding:** The process of passing a message into the chain of BBSs so that it may reach the addressee.

**Frequency Shift Keying (f.s.k.).** A method of transmitting digital information by switching a carrier signal between two separate frequencies.

**Full Duplex:** A physical or logical connection between two points over which data may flow in both directions simultaneously. The terminal may not print the key-stroke passed to the t.n.c. unless echo is set on (see echo).

**Gateway:** A device or BBS function that allows packet stations on different operating frequencies to communicate with each other. Also the name of a packet radio newsletter published by the ARRL.



# Reflections

*This month Ron Ham takes a look at lightning, something that should concern us all, both in the radio and safety sense.*

News reports on August 2 about a woman being killed by lightning as she sheltered under a tree, a golfer being burned as lightning touched the tip of his umbrella and of buildings being set on fire made me think. I thought it was time to include this serious subject in 'Reflections'.

Sadly, this isn't the first time I have reports like that this year. I've no doubt either, that many of you read the same piece or something similar in other papers.

Like anybody else, I can only guess at what really happens when untold millions of volts discharge between two points. So, I'll just think aloud while revealing some personal experiences.

I can start with an example from close by. This is because an old document that Joan found during her researches, stated that the shingle, or wood steeple, on Storrington's church was set on fire by lightning in May 1732!

## Nature's Nightmare

Thunder-storms are yet another natural disturbance from which none of us are immune. Don't forget readers, everyone's antennas, receivers, transmitters, electronic attachments and the operator's personal safety are all at risk while such a storm is in progress.

First, I want you to take a close

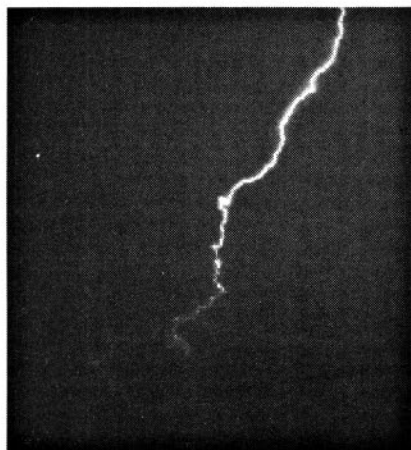
look at Figs. 1 and 2, because these photographs were taken by me, from our bedroom window, during a thunder-storm around 0130 (yes 0130) on 7 July 1989. To do this, I knelt in a comfortable position with my Minolta 5000 camera, which was hand-held and tilted upwards about 15°.

I protected my eyes from the brilliant flashes of sheet and fork lightning, held the 'take' button down and let the Minolta's onboard computer take 24 shots. Although the more distant hills are not visible in Fig. 1, because of the prevailing cloud and rain, the foreground view was illuminated by a powerful flash of sheet lightning.

My incoming telephone line, a few metres from the house, which crosses the centre of the picture causes some argument about Fig. 2. Did the fork of lightning really wrap itself around my phone wire, or was it a trick of the camera? We'll never know because it is impossible to get a repeat performance to conduct a controlled experiment.



**Fig. 1:**  
**Sheet lightning.**



**Fig. 2:** Fork lightning.

## Thunder Static

Apart from the weather forecast and that well-known thundery atmosphere, radio operators have the advantage of an early warning service. This is because their sensitive receivers, usually coupled to outside antennas, can detect static 'crashes', while a storm is a good distance away. These static 'crashes', often referred to as 'atmospherics', can be very pronounced on the low frequency bands.

This means that, in order to give the station's equipment some protection, the operator has time to disconnect it from the antenna and mains-power supply. However, having said that, I once replaced a completely open-circuit front-end transistor (AF114) in a battery portable that was standing idle on a shelf at the time of a nearby strike. I wonder, is anything safe under such circumstances?

The amount and extent of damage must vary considerably with the intensity of a discharge, and its relative point of contact to earth. Nothing can be taken for granted because, in my opinion, there are only similarities to look back on. There's no precise pattern of behaviour with lightning, and it does not need a direct hit on a property to disable the complex electronic devices in use today.

Some twenty years ago, I remember replacing a set of nixie

tubes in a counting machine after the road outside the building had been struck. Yet, on another occasion, the r.f. amplifier transistors in my radio telescope survived after a strike in a field adjacent to the antenna. I believe these devices were saved because one leg of the folded dipole was well bonded to earth. But how can anyone be sure?

## Early Protection

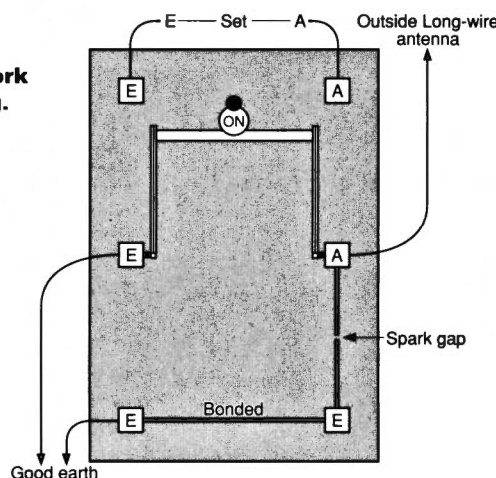
Authors of technical books dating back 40 to 60 years frequently gave their opinions of lightning. One author said, "Although there is no evidence to show that aerials attract lightning, yet there have been cases where wireless apparatus has been damaged by lightning. The chance seems to be very remote that this will occur but many people use lightning arresters which are connected outside the house and which are intended to provide an easy path for any current produced by lightning".

Another, while agreeing that the chances of a direct strike is rare, pointed out that there is a tendency for charges of electricity to build up in an antenna when thunder is about, and these should be discharged to earth through a suitable earthing device in order to protect the receiver from possible damage. Two books from the 1930s suggest using an aerial change-over switch like the one I have drawn in Fig. 3.

The first book said, "Outside the window a lightning switch should be fitted, and this should be of the type known as double-pole-double-throw (unless, of course, you can afford one of the proper lightning arresters)." The second, having talked about this type of switch, added, "Remember, therefore, that you must switch over to the receiving set before commencing to listen, (position 'ON', Fig. 3.) A number of people find it very convenient to make a regular nightly practice of earthing their aerial, by means of such a lightning switch, before retiring for the night, (such was my father's routine for many years) or when they cease using their receiving set".

The base of these switches and the 'handle' assembly, were usually made from one of the polished ceramic insulating materials. The popular household antenna in those days was an inverted 'L', strung between two egg-shaped insulators and supported by a wooden pole in the garden at one end, and the eaves of the house at the other, Fig. 4.

I have seen lightning arresters,



**Fig. 3:** Antenna change-over switch.

in the form of a glass tube, containing two electrodes fitted to ex-military communications receivers, especially those working at low frequencies and spark-gaps fitted to Admiralty and some domestic change-over switches as indicated in Fig. 3. However, in 1934, John Scott-Taggart wrote, "To my knowledge there is no evidence to prove the effectiveness of wireless lightning arresters." Although I have seen a number of such tubes 'blacked' up and evidence of burning on spark-gaps, I cannot be sure myself that lightning was the cause.

In May 1979, a colleague of mine had installed a long-wire antenna, change-over switch and a good earth for a wireless exhibition. On the day the show opened, there was a violent thunder-storm, with a strike a bit too close for comfort, and he actually saw the spark-gap working on the antenna switch.

### Flash Before Bang

We all know that light travels faster than sound, and there's nothing like a thunder-storm to prove the point. How often have you seen a lightning discharge (300 000km per second) and heard the associated rumble of thunder a while later? The sound travels at around 1225km per hour. Joan and I were made very aware of this around 1700 on July 23 while we were having tea at Nymans, one of the National Trust gardens in Sussex, about 40km from home.

Although there had been some cloud in the sky when we left Storrington in the morning, the day was generally sunny. However, during the afternoon, static discharges were more frequently heard on the car radio and large areas of slow moving black clouds were building up. Thunder became audible from about 1600 and by 1645 the amount of visible fork lightning and typical thundery rain was increasing.

Suddenly, a widespread 'spiky' flash of lightning darted across the sky, followed by a lengthy and deafening clap of thunder. Little did we know then that some, or all of it, went to earth, via an oak tree, on an estate about 3km from our house.

Further enquiries revealed that this massive discharge was also seen and heard in Chichester some 24km from the oak tree, and in the opposite direction to Nymans. The estate telephone network was badly damaged, static sparks were seen dancing around the top of a lightning conductor and not surprisingly, the electricity went off in the area. Did this particular fork really cover a 65km area?

### Stranger Than Fiction

The lightning strikes reminded me of an, 'X' shaped, Band 1 television antenna that I had installed, on a chimney, one hot sunny afternoon in the late 1950s. The coaxial cable was left,

unterminated, inside the window of a ground floor room ready for the installation of the set next day.

While a violent thunder-storm was in progress overnight, 'ignition' type sparks were frequently seen jumping between the inner and outer of the cut end of cable. Now, had this happened when the installation was complete, would the lightning have gone to earth via the set and the mains, severely damaging both en-route?

I once saw a television set after a strike, which had left a nasty burn-mark on the tube coating and no copper wire inside the mains lead. Only the silk outer and rubber insulation were left, but there were no signs of scorching.

On the electrical side I have seen immersion heater, refrigerator and toaster thermostat contacts welded together, an appliance earth wire open circuit in three places and house wiring randomly 'pushed' out from behind the plaster. A strike often produces the unexpected, like the Bakelite cover of a water heater blown off leaving the centre fixing screw in position, a single wood-plank at the side of an airing cupboard knocked out leaving the nails in place, and a broken window and gutter just below a TV antenna that had been struck.

After meeting a man who had received a nasty electric shock while carrying a metal jug (inside his house) during a storm, I could then understand why my elderly aunt removed her metal hair curlers at the first sign of thunder! She also covered up all her mirrors and my mother immediately put all shiny metal cutlery and similar objects into the nearest drawer.

So readers, please take care! If you have any horror stories about lightning, do drop me a line and I'll use what I can in future months.

### Scientific Observations

Information about more of nature's work came from Neil Clarke (Ferrybridge) who kindly

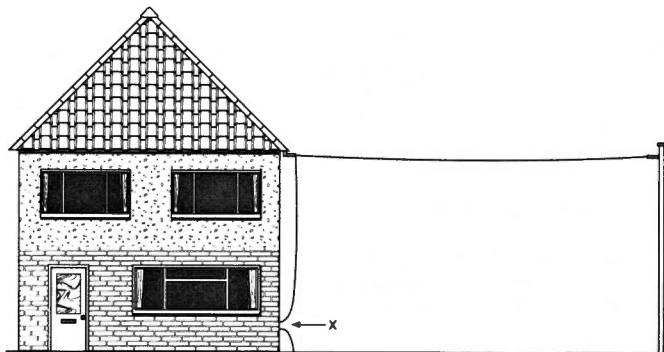


Fig. 4: Long-wire, a typical 1920-1940 domestic antenna.

sent graphs, Fig. 5, showing the daily relationship between the 'Ap' magnetic index for June and the 'F2' critical frequency and Patrick Moore sent a drawing of the sunspots he observed at 0950 on July 2, Fig. 6. In Bristol, Ted Waring counted 40 sunspots on the 1st and 44 on the 25th and, between them, Gordon Foote (Abingdon) and Ern Warwick (Plymouth) heard the German beacon (DK0WCY - 10.144MHz) give auroral warnings on July 8, 9, 10, 11, 12, 13 and 14th.

Fred Pallant (Storrington) reports a 'rasp' on the signals from the German (DF0AAB) and UK (GB3RAL) beacons on 28MHz at 1500 on the 13th and Ern found this band 'dead' around 1540 on the 2nd, 0930 on the 9th, 1600 on the 13th and 1730 on the 23rd. He also heard solar noise on 28MHz at 1215 on the 12th, 1630 on the 16th and 0900 and 1640 on the 24th. Strong f.m. signals from some 60 East-European broadcast stations were heard in Sussex during an intense Sporadic-E opening around 1900 on July 21 and about 40, under similar circumstances, at 1745 on the 22nd, 0800 on the 27th and 1900 on the 29th.

### Optical Equipment

In New Zealand, Harry Bourne ZL1OI uses a Swift spotting

telescope with a magnification range from 15 to 60, to project the sun's image on to a 100mm diameter screen. "I have attached a light wooden box to the telescope, open on one side and painted black inside. This reduces the ambient illumination and thus makes it easier to see the smaller sunspots," said Harry.

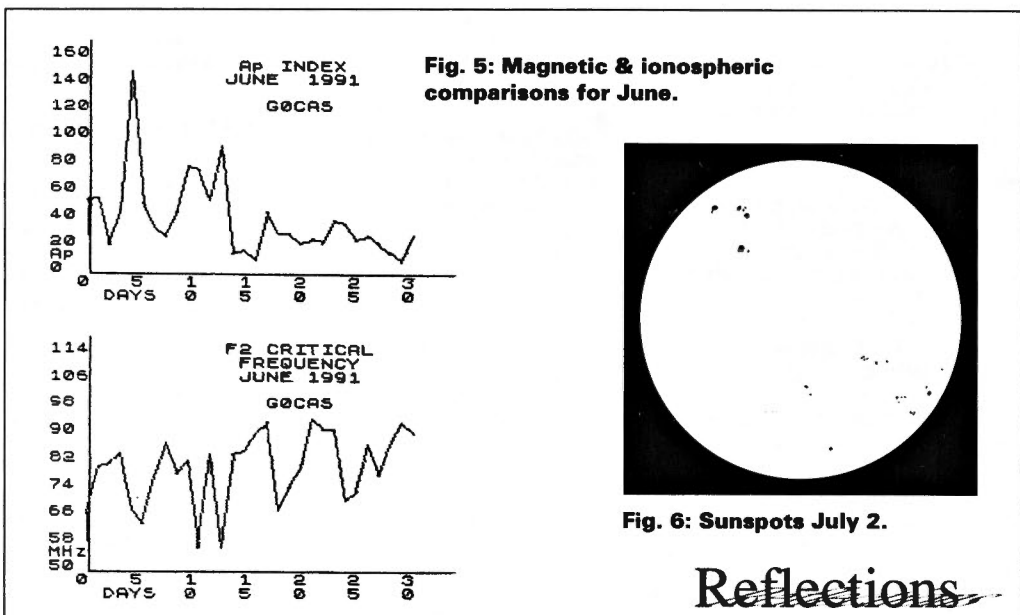
Although his telescope is mounted on a pan-head on a sturdy tripod he finds it convenient, when possible to use two observers, one to hold the position of the sun on the projection screen while the other reads the position of the sunspots. Weather permitting, Harry endeavours to make his solar observation at the same time each day, preferably during mid-morning. He finds it interesting to watch for the reappearance of active areas some 27 days later.

### Linesman

John Woodcock (Basingstoke) was delighted to see the picture I published recently of a mid-1930s Post Office Telephones Linesman's van. John passed his driving test in one of these vehicles.

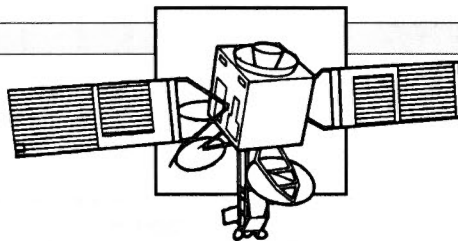
As a young linesman, he drove one of the vans for thousands of miles. He tells me that the green glass above the windscreen, was for looking at the overhead wires!

PW



Reflections





## Fuji-Oscar-20

Dave Rowan G4CUO, who continues to make excellent contacts with many W stations, reports that FO-20, now out of continuous sunlight since May, is showing real signs of cooling down at last. Telemetry taken over the weekend of 29 September 1990, showed that the NiCad battery temperature had risen to nearly 45°C. But this long period of excess heating does not seem to have adversely affected the capacity as much as was first feared.

On behalf of JAMSAT, JJ1ZUT wrote "We stopped routine operation (of FO-20) and carried out operational tests of the transponders in order to understand the thermal balance at every operating mode, and by this means determined the upper limit of safety in operation. We also stopped routine operations and carried out further tests, but we could not find any meaningful increase of temperature due to the transmitters being activated". This was borne out by Dave G4WFG's full telemetry taken from many states over many times.

The JJ1ZUT letter continued: "The average temperature of the battery repeated a cycle of variation up and down with around one to one and a half day period, this perhaps due to the attitude variation of the bird. Gradually the variation of the satellite was rising, and the temperature was gradually rising also due to the distance between the earth and the sun getting closer. We have now recognised that this temperature increase was not caused by transponder operation, even the power parallel operation of modes JA and JD". He concludes: "Generation of the solar cells is between 11W and 21W, 17W average, and may be capable of 21W, when both transponders are operated in parallel. Should the power generation fall to less than 10W, JA mode will be turned off, and operations will be subject to stop without notice in case of emergency".

Thus, now that we have the satellite in periods of eclipse again, it may be found necessary to command the transponder(s) off from time to time.

Heinz Hildebrand DL1CF, reports that he's now logged 271 users of 8J1JAS. This figure breaks down as 81 Ws, 42 JAs, 24 DLs, 22 Is, 13 LUs, 13 VKs, 12 Gs, seven ONs, five HBs, four SMs, four EAs and ZLs, two each from XE, 9M2, SV, 9H1, PA, OH and UA, and one each from KL7, FO5, KH6, YB1, DU1, ZS, EA8, KG4, KP4, VE, VS6, CE, CX, FM5, HK3, VP9, GM, GW, GU, EA6, EI, LA, F, YU and OE.

## A-O-13 Perigee Decreasing

Joe Kasser W3/G3ZCZ reports that the perigee of OSCAR-13 is now down to 870km, and it's still decreasing. This is not due to the additional atmospheric drag, as imparted to the low earth orbit satellites during the recent periods of high solar

# SATELLITE SCENE

by Pat Gowen G3IOR

*This month Pat Gowen G3IOR discusses the Japanese FO-20 satellite, OSCAR-13, MIR and tells of the new craft that have just been placed into orbit and plans for the future.*

flux. Neither is it arrestation due to magnetoquing, as the apogee seems to be increasing by the same value as the perigee decreases.

The actual cause is an accident with the combination of its orbital path to earth, moon and sun gravitational fields. The perigee is expected to rise again before it again commences to drop, this then continues into final decay and terminal re-entry loss. This is not imminent. We have A-O-13 for a long time yet, and by the time it re-enters, the bigger and far better elliptical orbiter should be functional (see 'PHASE III-D' further down).

John Branegan GM4IHJ, believes that similar orbiting MOLNIYA satellites, used for trans-Soviet radio, TV and telephone communication to reach the parts that GEOSATs cannot, have suffered similar fates as OSCAR-13.

## MIR News

During the passes of MIR in late May, just before Musa U2MIR returned back to earth with U9 and GB1MIR, the following information came down on packet radio on 145.550MHz:

'U5MIR>CQ:FROM 24.05.91 YOU CAN CONNECT WITH U5MIR, PMS: U5MIR-1. U2MIR SENDS HIS BEST 73s TO ALL !!!'

Anatoly Artsebarsky and Sergei Krikalyov now crew the MIR/KWANT-1/KWANT-2/KRISTALL/SOYUZ TM-12/PROGRESS M-8 complex. On June 12 they hand launched the 'MAYAK' microsat from one of the scientific module airlocks. It was intended for ionospheric studies, but sadly the transmitter failed following deployment.

They also jettisoned nine garbage bags on June 10 followed by eight more on June 20. This accounts for the many smaller objects in the MIR orbital plane reported as visible by a number of our keen-eyed readers.

On June 25 the crew made a five-hour space walk to repair the damaged KWANT module docking antenna. On June 28, they performed yet another EVA to install a radiation monitoring experiment and an external TV camera.

Judging by the many reports of our readers working them in July, Sergei and Anatoly have been very active, both on packet and voice f.m. on 145.550MHz

S22 simplex. Colin G1YIL of Bridport, Dorset wrote to pick me up for stating that few UK stations were to be seen in the MIR packet mailbox. He points out that George G1IEJ, of Teignmouth has left 11 successful messages since May 2, and has made 58 'connects'.

Another operator, G0JUL, has also made quite a few. "It makes my humble half dozen connects seem small fry" says Colin. The MIR fans of south-west UK are more fortunate, as they can 'see' the space station when it is out of range of the worst of the European QRM.

Sergei and Anatoly have asked that your packet messages to U5MIR-1 should contain news, views and other matters of interest to them. The PROGRESS newspaper deliveries are infrequent, and the many greetings messages, sent to the U5MIR-1 can become more than a little 'old hat' after a time. A strong rumour from two reliable sources states that U5MIR has been active on 21MHz s.s.b., but this has yet to be verified at source.

While QSOing on packet mode with students in Australia, the earlier active MIR cosmonaut Musa U2MIR, indicated that he was not at all sure as to whether he wanted to go up in MIR again. He has already spent a record 18 months in space, and has been on seven space walks, with one lasting for six hours.

Musa is in his early 40s, and has a wife and two children on earth, who would undoubtedly appreciate spending some time with him. Look out for Musa on h.f. as UV3AM, radiating from a somewhat lower antenna!

## UoSAT-F Launched

The expected launch of the ARIANE V-44 launch carrying the primary ERS-1, UoSAT-F, and microsatellites SARA and ORBCOM-X was postponed to July 18. This was in order to modify the liquid hydrogen pump and feed-line system, which was giving potential problems in the start-up launching phase of earlier ARIANE flights.

The official ESA communique read "After analysis of recent third stage motor test and flight data, ARIANSPACE along with CNES and SEP have concluded that a modification should be implemented, in order to improve the operating margins of the motor by suppressing an undesirable

transient in the H<sub>2</sub> feed-line during the start-up phase. This transient has been aggravated due to some dispersion in the manufacturing process and has been consequently noted on several past flights".

The modification involved the introduction of an LH<sub>2</sub> pump discharge system downstream of the main H<sub>2</sub> feed valve. For this, a qualification test program was initiated and the first results were "positive". The communique finished with: "The V44 payload composite with the ERS-1 and the four microsatellites will be taken off the launch vehicle and transported to S3B. The fairing will be de-mated and ERS-1 reconditioned to be ready for an early July launch."

This forecast was spot on, and the launch went like clockwork at 01:46:31 UTC on 17 July 1991 as planned. With the exception of a premature separation indication on TUBSAT, all ejections were nominal.

Congratulations are due to the University of Surrey Satellite Technology Labs (SSTL) under the leadership of Professor Martin Sweeting G3YJO, to Neville Bean G8NOB, the project manager, to Jeff Ward G0/K8KA the payload manager, to the entire UoSAT team, and last but not least past AMSAT President 'Rip' Riportella WA2LQQ, who is the Technical Director of SATELIFE. This aid organisation also uses the satellite, sharing a similar system on frequencies outside the amateur bands.

The speed of activation of the satellite must be a world record. Naturally, UoSAT-F, now OSCAR-22, was toppling and tumbling following ejection, but on the very first day the UoSAT team commanded on the telemetry and loaded 130 kBytes of software. On day two, the first message was seen on 435.120MHz 9600 bauds as:

UOSAT5-1>LDR <UI>:166d

UOSAT5-1>TIME-1 <UI>:PHT v2.3: uptime is 000/01:41:52. Time is Wed Jul 17 22:09:28 1991

G0K8KA>NEWS-1 <UI>:Greetings from UoSAT-5.

U O S A T 5 - 1 > L S T A T <UI>:A:0x166D @:0CDD:9889:t1

UOSAT5-1>WASH <UI>:WASH: addr:2540:0000, hwcount=0x03, swcount=0x00

The UoSAT team then set the computer magnetorquing to arrest the motion, as detected by the sun and earth sensors. This action imparted the degree of axis spin to maintain even temperatures. The command even put out the 5m long gravity gradient boom in one shot the next day, when UoSAT-5 gave its very first c.c.d. picture.

The picture was of Italy, clearly showing the coastline and Sicily, with the OSCAR-22 antennas in the foreground. Dave G4WFG, said that it was by far the best picture he had ever seen from any amateur satellite to date.

The first set of functional Keplerian elements follow:

Satellite: UOSAT-22  
 Catalogue number: 82065  
 Epoch time: 91200.09919883  
 Element set: 7  
 Inclination: 98.5401 deg  
 RA of node: 273.9126 deg  
 Eccentricity: 0.0006983  
 Arg of perigee: 211.0882 deg  
 Mean anomaly: 148.9904 deg  
 Mean motion: 14.36094884 rev/day  
 Decay rate: 1.2853E-04 rev/day<sup>2</sup>  
 Epoch rev: 29

An early reference orbit is for an equator crossing of 21 July 1991, 1114UTC, at 191° west longitude. The period is 100.33 minutes, and the increment 25.1° west per orbit. The OSCAR-22 is in a sun-synchronous 800km circular near polar earth orbit.

Stations already active on UO-14 are already equipped for UoSAT-F. Potential new users will need at least a 430MHz f.m. receiver covering 435.120MHz, a f.s.k. demodulator and a KISS TNC.

The first bit of software you'll need is 'PB.EXE' or 'NET.EXE' to receive the PACSAT Broadcast Protocol files. Using that, you'll be able to receive a copy of the image display program when it's released.

Any program which displays UO-14 telemetry will display UoSAT-F telemetry. AMSAT-UK has developed 'DTLM.EXE', which displays and logs telemetry from UO-11, UO-14, PACSAT, LUSAT, WEBERSAT, and UoSAT-F.

Another program, from AMSAT-UK 'SPLOT.EXE' is a general purpose data graphing program. 'SPLOT' graphs output from DTLM, WOD files from UO-14 and UoSAT-F, radiation experiment data from UO-14 and solar cell experiment data from UoSAT-F. Earlier details of UoSAT-F/OSCAR-22 appear on page 49 of the July issue of *Practical Wireless*.

## SARA

Another satellite of interest that went aloft with ARIANE was SARA, a French research satellite. This craft is monitoring eight 100kHz wide channels between 2 and 15MHz of radio emissions from Jupiter.

The satellite's 1W  $\pm 3400$ Hz spectrum is coded to 1200 and 2400Hz a.f.s.k. and sent down at 145.995MHz, where its RTTY similar signal was first heard in Japan by JR3FRF.

The experiment was detailed by ONIKHP, as a follow up to VOYAGER-1. This craft was unable to measure anything but a few of the strongest Jovian peaks, because of both the short stay duration and self-generated e.m.c. QRM.

The SARA is a very simple satellite. Its three perpendicular 5m antennas produce a combined quasi-isotropic pattern, and there's no need for stabilisation.

The 340mm-sided cube is powered by 60% coverage of solar cells feeding the battery, with no need for power or voltage regulation. The other 40% of the surface is

painted, so as to passively regulate the temperature to around +20°C. The satellite uses non-space qualified normal consumer available components, with no redundancy planned.

Despite its low budget cost, SARA will undoubtedly perform this valuable scientific research programme which cannot be done on earth. This is because the radio signals from Jupiter can only penetrate earth's F, E and D layers at the highest frequency end of the spectrum.

In space, solar and earth radiation is relatively small, when compared to the giant planet. So, according to microprocessor-controlled antenna and sequence selection, good results are expected.

## Coming Satellites

As well as 'What's up?' I often get asked 'What's going up next?' So here are a few words on missions now being planned for the future.

While we now know that the geosynchronous PHASE-IV satellite is unlikely until more money is available, AMSAT-DL's advanced Phase III-D is definitely on line.

## PHASE III-D

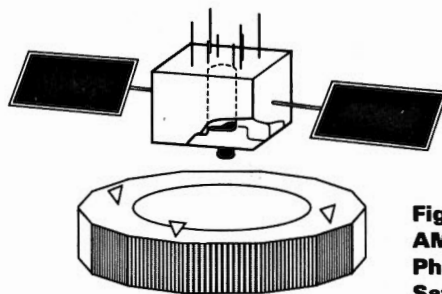
In late July, AMSAT-DL received confirmation from the European Space Agency, that a launch vehicle and a suitable slot is now available for PHASE III-D to ride aboard the ARIANE-5 rocket in October 1995. Until this announcement, the baseline structure could have looked like either a box or a doughnut shaped satellite, both as seen in Fig. 1.

Now, due to the number of satellites that have to be squeezed onto this ARIANE-5 launch, PHASE III-D's shape has been predetermined to the last mentioned. The 'doughnut' will be 3.2m in diameter, some 0.65m high, and weigh-in at around 500kg.

Inside the 'doughnut hole' will be the launch adaptor. This will carry the weight of the two other satellites that sit on top of new OSCAR, with the conical launch adaptor needing to support 2.5 metric tons.

As a result of ESA's announcement, construction will now start in Marburg, leading to the most advanced, most powerful and largest OSCAR ever built. Although in similar orbit, it will give some 10-15dB link improvement over OSCAR-10 and 13, with frequencies from 29MHz to 10GHz.

The design lifetime of PHASE III-D will be 10 years. So this OSCAR will be operative and useable well into the next century.



**Fig. 1:**  
**AMSAT**  
**Phase III-D**  
**Satellite.**

## Alabama AMSAT

The University of Alabama AMSAT group propose to build a high efficiency Mode A linear c.w. and s.s.b. transponder. This will be in addition to an a.f.s.k. uplink and downlink J mode digital transponder which is planned to be placed into low earth orbit by a NASA DELTA launcher in 1995.

## ITSAT

AMSAT Italy report that all goes well with their ITSAT microsat. The central processing unit (c.p.u.) is now up and working to full expectation.

The launch is planned with the above SEDSAT in 1995. It shouldn't be long either, before we have other PACSAT type satellites from other members of the ever growing AMSAT international community. Already, AMSAT-Mexico and AMSAT-Israel also have similar proposals now under development.

## ARSENE

The latest expected launch of the ARIANE flight N-54 carrying the French amateur radio satellite ARSENE, and its multi-frequency linear transponders, is September 1992. This will be on launcher L-426, which has the configuration A44LP carrying the TELECOM-2B and SATCOM-C4 satellites into orbit.

The ARSENE satellite will be 900mm in diameter, 880mm tall, and have a mass of 140kg. The planned orbit is an equatorially based ellipse of apogee 36000km and perigee 20000km, with a 17.5 hour period. It will carry a carbon fibre apogee kick motor, and be stabilized around the north south axis, by active attitude control using controlled nitrogen gas jets.

For electrical power, the six structure-based solar panels will be supplemented by three more unfoldable wing panels set at 120°. The modes used will be linear s.s.b., c.w. and RTTY or conventional AX.25 1200 bauds packet. This will use 435MHz as an uplink and a 20W 145MHz and/or 2245MHz downlink. It will also carry a radiation dosimeter experiment.

Nico PA0DLO writes: "If you would like to get an impression of what passes from the orbit of the future ARSENE satellite will look like, you should use a mean motion of 1.36 orbits per day and an eccentricity of 0.233". He adds "You can experiment with all the other parameters as you like. The only number I am not sure of is the final inclination. Are they planning to keep the orbit as close to the

equator as possible, i.e. inclination around 0°, or will they leave the satellite in the orbit plane where the ARIANE puts it initially, i.e. at around 7° inclination?" Nico also wonders if anyone has more information on this?

## Lunar Missions

The Lunar Beacon and Transponder project I mentioned in an earlier *Practical Wireless* article, has had funding promised by Junior de Castro PY2BJO and development and engineering by Professor Martin Sweeting G3YJO of the UoS AMSAT Group.

Negotiations are now in progress between NASDA and JARL, to investigate the possibilities of flight with the Japanese Lunar Mission. Various other independent space groups have proposed a scientific Lunar Polar Orbiter mission, but the funding has yet to be found.

## Solar Sail

Talks between AMSAT and the World Space Foundation have been continuing for some 10 years on the Solar Sail Project. This is a plan to launch a package with a large deployable aluminised sail which will angulate to the sun.

It will then use solar light pressure to take the assembly from earth, first to lunar orbit and thence beyond to the outer planetary system. Mode L and S linear transponders and 9600 Baud telemetry are planned for this mission.

## Manned Missions

The SAREX missions using 145MHz voice f.m. and packet radio, as well as various other modes are being planned for both future SHUTTLE and MIR missions when the crew consists of licensed radio amateurs.

Specific details will come about as missions and crew members are defined. Negotiations are already underway between NASA and AMSAT to provide a permanent amateur radio station aboard the proposed permanent space station. This project is dependent upon NASA obtaining future funds from the US Government for its fruition.

## Amateur Radio Balloons

High altitude balloons, both manned and unmanned, carrying amateur radio h.f., v.h.f. and u.h.f. beacons, similar transponders, packet radio and u.h.f. TV have already been launched by many of the worlds amateur radio community.

They are also planned for the UK, when we finally manage to achieve an /AM licence to permit this form of operation. In future columns, I propose to discuss some of the findings from such experiments in the USA and South Africa, as a first step toward orbiting satellites. PW

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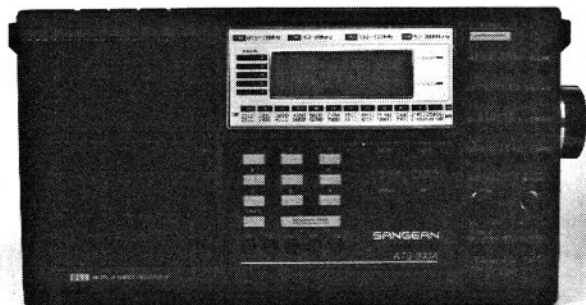
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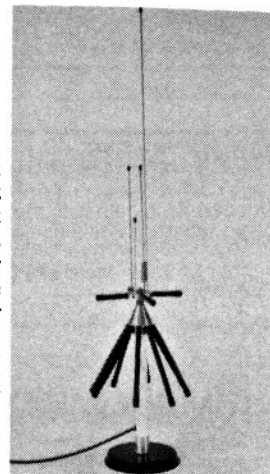
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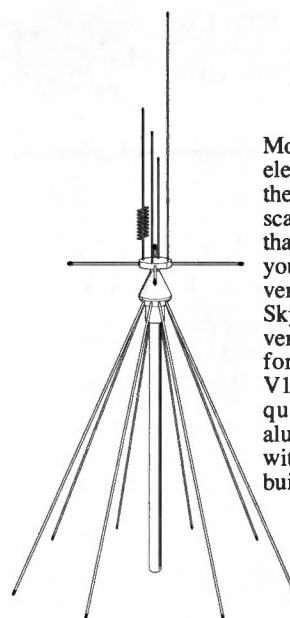
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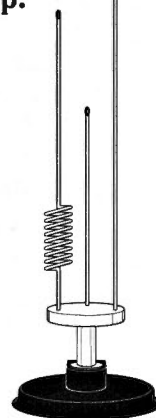
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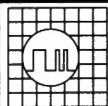


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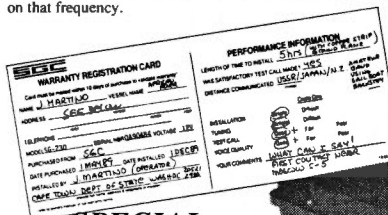


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The input used is identified on the screen at the end of all QSOs so you know if the station that just dropped out was on 24cm or 10GHz. The new logic also has a news page that is updated via a data link on the repeater audio input and is password-protected. **Barry G6LIC** has the keyboard, so if anyone has anything they would like put on the news page please contact him QTHR.

"The new logic is built out of three Eurocards: the c.p.u. and v.d.u. are BATC printed circuit boards that support a project called I2c. The v.d.u. is teletext format and the c.p.u. runs PROM-based Z80 code. The third board is the bits and pieces vision detector, vision switcher and data link: this is Eurocard size Veroboard. The hardware was built by yours truly and the software was written by **Chris Smith G1FEF**; all the new features were ideas submitted by the members of the group. The 10GHz receiver is a reality, but will need the purchase of a suitable LNB to tweak down to 10GHz. The new logic along with a replacement feeder that became waterlogged earlier in the year, the site rental and power and the new RSGB charges have together left the fund a little depleted. If the repeater is to continue to operate and develop, then donations are required and should be sent to **Barry G6LIC QTHR**.

"The polar diagram of the repeater is passing our wildest hopes with some reports coming in from the strangest of places, the best being Summercoates, also Hornsea where **G4YU** has become a regular. **G8CHN** persists in accessing although he is behind the antenna and screened by the tower!"

## DAYTON Report 1991

The best laid plans of mice and men ... well suffice to say that although several BATC members were planning a trip to the USA's premier amateur radio event this year, it didn't work out that way. In the end yours truly was the only one out of the group who made it. Next year it will be different, of course.

Whether you have been to Dayton or not, you are probably bored by the superlatives used to describe what is the biggest amateur radio rally in the world. But it is still a bit awe-inspiring to

find a seven acre outdoor fleamarket, especially one with a pub that opens specially for the lunatic amateurs at 04.30 in the morning.

## Rain, Rain, Rain

Mind you, in Dayton you have to be up early in the morning to catch the bargains. By going at that time you would also have avoided the torrential rain that beset the HamVention this year. A few traders were selling raincoats and did good business; also a tilt roof had been erected over some of the stalls this time, and this was well appreciated by the unfortunates without jackets.

The ATV scene was promoted

430MHz portable ATV station (the TVs conveniently tuned 430MHz) and these TVs were even used to get into the Dayton ATV repeater from the hotels.

## Hospitality Galore

There are two ATV magazines in the USA, *ATV Quarterly* and *Spec-Comm*. Most people find this a case of unhealthy rather than healthy competition, since the two publishers are involved in an expensive circulation battle. Main beneficiaries were the amateurs, who had a choice of ATV parties to attend. These events were lecture streams and demonstrations held in nearby hotels: the accommodation was

Speaking of space activities, several amateurs were ecstatic, that they had managed to get their fast-scan TV signals up to the *Space Shuttle* vehicle on April 10. The lucky few were: **KC6A** (Long Beach, California), **KA4NZD** (Marshall Space Centre, Huntsville, Alabama), **N9AB** (Mundelein, Illinois) and **WA9GVK** (Naval Academy, Washington DC). All were successful in getting a video up to the Space Shuttle but **KA4NZD** had the best signal. The shuttle crew were receiving the signals with an indoor antenna and were not in a position to transmit any pictures back. They did, however, record all the signals they received on a portable VHS recorder, and these same recordings were played back at the ATVQ party.

For the record, the chief operator on board the shuttle was **Ken Cameron**, who used his own call **KB5AWP**. Other amateurs aboard were **Steve Nagel N5RAW**, **Linda Goodwin N5RAX**, **Jay Apt N5QWL** and **Jerr Ross N5SCW**. Well done, and here's to the two-way next time!

## New Goodies

There weren't many new ATV products on show at the HamVention this year, possibly because the recession has hit the USA significantly worse than Britain (yes, it's true).

International Crystal Manufacturing Co. showed a new seven-pole interdigital filter designed specifically for ATV operators. It can be ordered on any frequency between 420 and 440MHz and combines a 6MHz bandwidth with low loss. How it does this, or at what price were not revealed in the literature.

An organisation called Micro Computer Concepts announced a video repeater controller with built-in DTMF decoder and video switcher. The specification looks good and the price of \$400 (say £235) did not seem unreasonable for a quality commercial product.

The AEA company re-launched its vestigial sideband 430MHz transmitter and masthead-mounted linear, though it failed to convince me and others that the high level signal could be truly v.s.b. Oh well, they had a nice promotional video, which showed ATV in a very positive light. Icom had sponsored a video on amateur radio in general but it was a mawkish affair, strong on sentimentality and low on subtlety. You'd collapse laughing if you saw it, and even though Icom were generously giving away VHS copies of it, you couldn't see people paying money for the video or indeed why Icom paid money for it. This is not to say a lot of effort was not put into the production.

# FOCAL The World of ATV POINT

*News this time of updates at Britain's loftiest ATV repeater up on the NTL tower at Emley Moor (Yorkshire) and a round-up of ATV nuggets at this year's Dayton HamVention.*

energetically this year. One of the traders had a helium balloon tethered way above his flea-market stand and the ATVers asked if they could tie a camera to the balloon. Sure, why not?! So viewers had an interesting aerial view of the fleamarket this year.

## A Little Peep

Kreepy-peepies (little c.c.d. camera chips built into hand-held radios) were the flavour of the event this year. Well, two people independently thought of the idea and brought them to the show. Together with a Casio or Radio Shack two-inch screen portable TV, you could have a very handy

sumptuous, food and drink were laid on and ATVers could eat, drink and talk the whole evening about ATV - at no cost to themselves. Paradise? Well, very nearly!

In common with 350 others, I attended ATVQ's event in the *Holiday Inn North*, where I understand the facilities, food and drink cost the best part of \$1,000. No wonder they will be looking for donations next year to defray costs. Even at a few dollars, the entertainment would be worth it. There was no single highlight of the evening: **Bill Brown WB8ELK** showed some breath-taking video recordings made of the signals from his balloon-mounted ATV transmitter. This reached the edge of space and the pictures looked very much like the shots you see from the *Space Shuttle*.



**How small can you make a 430MHz ATV transceiver? A Tandy Pocketvision telly helps bring down the size (but how do you watch TV in your pocket?).**



# Back-Scatter

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Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

Last month, I was moaning about the incidence of Murphy's Law and Finagle's Axiom at my QTH. This month has been less of a pain, with only v.h.f. problems, and at least the temperature has risen a little!

### Conditions

After all the alarms and excursions of the previous period, things calmed down somewhat. So on occasions I found conditions well up to scratch, and rather fewer of the downbeat moments than before. However, as I write I'm beginning to see the first hints of the swing to the equinoctial periods when I hope the DX will hit a peak.

### News!

As always, my thanks to *DX News Sheet* and G4DY0, *The DX Bulletin* and the *DX Magazine* under Chad Harris VP2ML, K1AR's Contest Calendar in *CQ Magazine*, and of course all the reporters and their letters.

The hottest news of all is that the Hungarian ZA expedition seems to be on course; HA0NNN and HA0MM planned to arrive on (August 3), with visas and import licences for all the equipment, and then pick-up promised licences for a one-month operation. By the time you get to read this they will have closed, but I am sure you will have noticed the upheaval on the bands!

Malaysia is developing a tourist resort at Swallow Reef, which is an atoll in the Spratly Is, some 16 hours by sea or one hour by chopper from Kota Kinabalu.

It's now more than a year since the AH3C/KH5J Jarvis Is effort, but it seems that another group are proposing it as a new one to the DX Advisory Committee under Rule 3(b).

Vince 9H1IP (M'Scala, Malta) tried 24MHz and came out with V51P, IS0PNY, TG9TSS, VK7GK, 9V1WW, HK0HEU (San Andres), UH8EA and 6W1QJ. A drop down to 18MHz served to book in TI2CCC, AP2JZB, D2ACA, A45ZN, 4U1ITU, PJ8AD, VU2RX, GU0ELF, VQ9AP, W6BCQ, K00D (Missouri), NQJR (Iowa) and LZ1NK.

Mary G0NZA (Kirkby-in-Ashfield) says she had a holiday period, and used it to explore different operating times, very early and very late, and enjoyed it very much. A visit to Lowe's at Matlock was included, where Mary was able to poke a nose into a TS950S, and as she says, we can all dream!

It was all s.s.b. this time, as she struggled to get the 100 countries up by the time her first year ran out in September. So, on 18MHz, there were PJ8AD, HK0NZY, VY2KHZ, PA3ERL/CT3, CE30XZ, OA4CKN, PT7BZ, EA9IB, 9Q5TE and 6W1QJ. Mary worked the first and last two on the key.

Now it's time to hear from Belgium from Pat ON7PQ, who keyed on 10MHz

with HF0POL, UF6VAI, 4K5ZI, UD850DC, HZ1HZ, HB9CEY/CT3, 9J2HN, K2BS/6Y5, VE2DWO (Zone 2), CQ5DX, 7Q7JH, ZS6QU, GJ4GG, JY9SR, J73A, YB0USJ, 4U1ITU, and ZL3OI. Pat's 18MHz c.w. resulted in PJ8AD, VS6BG, 4K5ZI, HB9CEY/CT3, JJ1VKL/4S7, PJ2AM, 6V1A, ZS6AVM, 7Q7JH, 9J2BO, 4K2PGO, ZP6CW, ZD8WD, UD850DC, EA8BVP, ZD8LII, PY1JF, TK/DK9CG, HF0POL, FG5XC, VP2EST, 4K2BDU, ZF2AH, J73A, HI8A, and LU6CDK. As for 24MHz, EA6ZY, XT2BW, T6AS, HB9CEY/CT3, LU8EWD, PY1BVY, 4K5ZI, HF0POL, ZS6JT, VP2EST, 9L1US and EA8AB.

Don G3NOF based in Yeovil now enters stage left from Somerset, bearing a log containing 18MHz offerings from HC8GR, IIO0NU, JA5AQC, NP4TN, PT7BZ, TI5GLF and 9K2JM; while 24MHz gave HP2CWB, T77J, VP2EST, ZP6XOW and 9Q5TE.

That leaves GM3JDR who hooked JY5EC on s.s.b., followed up on the key by RZ0Y/UA0CWW and a gaggle of JAs.

### The 1.8 And 3.5MHz Bands

I've lumped 1.8 and 3.5MHz together this time for lack of reports. Ted G2HKU keeps up his ON7BW skeds on s.s.b. with a struggle. Meanwhile Angela G0HGA, running approximately about 4W got out to G3PQA in Berks. However, on 3.5MHz she raised ON4TD, SM0KY, GW3FJT, GW4UPV/P, F1NZY, F1JJJ, HG9IHQ, and a string of G stations.

Another reporter G0KRT (Welling) is a QRP operator only. He uses a Lake DTR3 on c.w. with about 2W output, receiving on the Howes receiver. The antenna is a 25m long top, with a counterpoise. Two-way QRP contacts were completed with G0ETV, G0FGW, G0JJI, G3DNF, G3DOV, G3KEK, G3YHO, G3YCC, G4EFE, G4GBS, G4HOM, G4SBU, G4ULT, G4WUS, G6W0LB and ON4KBI; other QSOs were with eight Gs running high power.

Although not many 3.5MHz contacts were made, he did manage UL7TX, 4K5ZI, UM8TX, ZL3GQ, Z21HS, ZS1JX, ZD8WD, UL7GG and FH5EJ, all of course on c.w.

### The 28MHz Band

Summertime conditions on 28MHz wouldn't have helped anyway, but the upset on 'old spotty-face' spoilt things quite a bit! Pat ON7PQ says his c.w. tally came to XU1NQ, 4K5ZI, 9L1US, ZD8LLI, TK0KP/SAN, ZS6BJQ, TL8FD, Z21HS and C39ETA.

Angie G0HGA, made a contact to G2BKZ plus the odd 29MHz f.m. local QSOs.

The s.s.b. from over the Scottish border at GM3JDR received an airing, and he managed to get out to 9J2BO, A22JP, T77C, TV6ACO and PY1AQT.

For Don G3NOF down in 'Zummerzet', the score was F5TV/P, FR5DX, IA5MNR, HV3SJ, T77C, VP2EY, VP8CGL, ZB2IB, 3B8FQ and 5R8JD.

This time G4ITL (Harlow) mentions that his crop in recent weeks on this band included LU5DON and LU7FJD, both on c.w. plus s.s.b. with KR2I and UD6DCG.

### The 21MHz Band

I'm pleased to say that 21MHz reports are probably the best of the bunch this time. Ted G2HKU notes that he had a serious problem with his vertical, as ants got inside the capacitors. When he operated, they were cooked to a turn! Nevertheless these alarms and problems didn't prevent a spot of c.w. with UZ9JVV, D2ACA, 5B4AOA and UF6FKW.

Over the North Sea in Belgium, Pat ON7PQ never seems to have station problems! This time he scored with T6AS, 4K4/UA9KW, 9L1US, SU1HV, C9RTC, Z21HS, 4K2PGD, 4K4A/A, 4K3/UA3YCA, XU1NQ, HS0AC, 4K4I, 7Q7JH, TL8FD, J2BFO, 4K5ZI and FH5EJ.

On this band, Angie G0HGA offers JA1NUT, W6DU, N0MM/MM, WA8ZZA, HK3RQ, K3SEW, W6UZ/4, AA5TN, G3WRV/VE2, W1HT, W1HMD and NA4K.

It was c.w. all the way on this band for GM3JDR, who has the following in his log: 4J1FS, C21NI, 4K5ZI, UY7U, IG8R, I1I, PZ1EA, AG9A/WHO, VP5VEB, J49CW, YV5DK, JY9SR, LT0A, 5K1R, ZD8V, ZP50Y, BY1QH, N7DF/KH2, 4U6ITU, YM7A, UA0KJ, PT7DX, 8A2DX, YB0ARW, XU1NO, TA9/F1LZN, J28FO and UR8G.

Now it's time to hear from Don G3NOF, who spent much time on the band. The resulting contacts were with A41KY, YV4RSA, BY5RCS, BY5RT, BY5RY, BV2BT, BV2DQ, CE3US, CE7NFA, OL2SCQ/TF4, EL2J, EK1NWB, F05CS, FY5EM, HC1JH, HC8GR, HF0POL (S. Shetlands), H18FHD, HK3JHA, HK3JJH, HK5HDM, HK6MLW, IK8KCI/IL8, ID9/IK2BTI, IG8R, IK3BPN/IL4, IK3PQH/IL3, IO4ABF, JT1BG, K7LCT (Montana), KE7PF (Arizona), N6BFM/9K, NH6C, OA4CFC, OD5ZZ, OX3KM, PJ2MI, R9H, SJ9WL, SV8/IK6FNG, SV0HV/SV9, T77C, TA5C, TI0RHU, TL8GZ, TR8CA, TT8Sa, TU2CI, TU2VM, TU2XZ, TV6A (Iota EU 32), UA0FF, UA0QCA, UC2IO/LY, V51BG, V85GA, VE8CB, V02JD, VP2EI, VP2EY, VP2MAO, VP8CEM, VQ9IO, W7LN (Utah), W6s, YB23AR, YCs, Z27JV, ZD8ACJ, ZSs, 3C1EA, 4K5ZI9 (Snake Island), 4U1ITU, 5K1B, 5W1CW, 5U7NU,

5Z4BI, 7Q7JH, 7Q7LA, 8R1UN, 9J2AD, 9J2HN, 9J2BO, 9H3ML, 9L3BM, 9U5BZP, 9Q5TE/AM over Africa, 9V1YC and 9Y4BA.

Mary G0NZA, up near Mansfield in Nottinghamshire, raised SV5AJJ (Rhodes), HK3MCM, FY5EM and CX6CB, all on s.s.b.

Although G4ITL continues with his antenna experiments, it didn't stop him tangling with VK2KHD, YB2FRR (s.s.b.), W1HNA (s.s.b.) and PY4PZ.

### Finally 14MHz

I'm going to let G2HKU have first bite this time on 14MHz. Ted stuck to c.w. and managed 4K2OIL on Franz Josef Land, Y03PQ/MM (cargo-ship *Mercia* in the Med), FY5YE, FM5CW, HP1AC, VE3FXR, KY0B, VP2EI, PY2OC, TL8FD, plus QRP contacts using an Argo 515 to IK2MLW/8 and UA1NDR.

Next it's ON7PQ's turn; and Pat keyed with 4K4/UA9KW, 4K2OIL, CU2QN, 5W1CW, KP2J, T6AS, VE2DWU, FY5YE, Z21HS, TL8FD, V85FC, HR1LW, FH5EJ, ZP6CW, TI4SU/5, FP14DX, ZK1CQ, FW/AA7AF and VP2EI.

On 14MHz Angie G0HGA, managed to work TG9AC, K2SB, KA1F, WB2LFZ, RW6PB and U1PR on low power. However, an increase to 70W resulted in 33 Eastern Ws, plus VEs, VK5QJ, NL7VX, TA7M, WB2SQG/MM..

Another c.w. addict is GM3JDR, who noted the following into his log: YN1CC, FP14DX, EJ7FRL, ZK1CQ, VP2EI, JJ1VKL/4S7, VK2DXI/9M2, UW0IZ, UA0ZDA, VK4ES, 9M2AX, 4J1FS, JU1SU, P34A, VK9NS, CK6KW, FV6PAX, TA9/FD1PKE, HW6JUN, UT7U/LY1DS, UT9U/LY1DZ, R100RW, EK100RW, RM4Q/UM8MAA, UM6A/ES1RA, RM6P/RM8MA, RV00/RT4UY, RM5P/UM8QDX, 4K3/UA3YCA, XU1NQ, V85FC and 4K5ZI.

Down in the west country G3NOF sticks to s.s.b. Don mentions DL2SCQ/TF5, GS6UW/P (IOTA EU92), F5TV/P, H18FHD, HL4GAH, OX3KM, PJ9EE (Bonaire), T6AS (=YA), TR8CA, V63AQ, VKs, VU2NI, W6NZX, W7IHI (both Utahs), 4K2BCA, 4L1NV and 5H3DC.

Now to Mary G0NZA, who efforts found VP2EI, HK1KXA, TA5C, F5TV/P (Port-Cros Island), Y1BGD, 4X4DD, RD850DZ, IS9/IT9FTP (Lampedusa, AF 019), TK0KP/SAN (Sanguinaires Is), V44KAQ, VK7DX, E04RC, RL7FER, PR7SM and L65LG (Morokulien).

Finally G4ITL brings up the rear with VK3DEG, VK5QJ, PY3AVF and ZL4AN, the last on s.s.b.

### Finish

That's the lot for this month. Deadline to reach me is October 1 and November 1, addressed as always at the head of the column. And of course we can always do with more material and photographs to adorn the piece. There's a special prize for the first Novice Licencees to appear in this column, so let's be hearing from you soon!

# Back-Scatter

## VHF Up

Reports to  
David Butler G4ASR  
Yew Tree Cottage

Lower Maescoed, Herefordshire HR2 0HP

### Solar Data for July 1991

During the first week of July there was very little solar activity, apart from a major class flare which erupted from solar region 6703 on July 1, lasting for 47 minutes. This was caused by the return of the old solar region 6659, which produced numerous large scale flares during June.

A proton flare event commenced on July 7 but only lasted three hours. The daily geomagnetic A indices gradually declined from mainly unsettled levels at the beginning of the month to quiet levels by July 7.

A number of significant solar events occurred between July 8-14. There were proton flares, reaching up to 2300 particle flux units on July 9 and 11, an M7 type flare on July 11 and a major magnetic storm on July 12.

It was hardly surprising that a number of auroras were recorded in central England during this period, the larger events being on July 9 and 13. The geomagnetic A index varied from unsettled up to a storm level of 76 units on July 13.

From the middle of the month a number of X1 type flares were recorded. The first of these was on July 17 at 0619UTC and lasted for 33 minutes. Others occurred on July 20 and 22, all giving rise to moderate terrestrial impacts.

From July 27, the solar active side of the sun which caused the auroras during July, rotated into view. It was facing us during the first week of August.

Those of you with a PC, modem, suitable software and a deep pocket to pay for the telephone bills, may wish to know that the Solar Terrestrial Dispatch has recently started the operation of a new Bulletin Board Service. The telephone number to contact the BBS is 0101 403 756 3008 and it's accessible 24 hours a day, seven days a week.

The BBS uses a protocol of 8-bits, no parity, and one stop-bit and supports communications at rates of 300, 1200 or 2400 baud. A few of the features available to registered users include geomagnetic data and magnetic indices, summary of recent auroral activity, forecasts of solar flares, proton events and future auroras and much more.

### Aurora!

Conditions via the auroral propagation mode have been truly superb so far this year. I gave details of radio auroras, that occurred between March-June, in the last four issues of PW and this month's report will be no different. In central England, auroras were observed on July 8, 9, 13 and 14th, some of them reaching up to the 430MHz band.

Ted Collins G4UPS (I080) noticed a weak aurora, at 1700UTC on July 8,



Fig. 1: Ela Martyr G6HKM.

effecting the 50MHz band. This followed a fade-out, one hour earlier, on the 28MHz band.

Signals on the 50MHz band, which had been coming in via Sp-E, also disappeared at the same time. Auroral conditions were considerably better on July 9 and between 1400-2000UTC, Ted worked a number of 50MHz stations throughout the UK and in DL, LA, ON, PA and SM.

John Hilton GM1ZVJ (I085) also noticed the aurora on July 9. Unfortunately his 50MHz 3-element Yagi is fixed to the south, which is great for some Sp-E openings but very annoying during auroral openings. However, he did manage to contact G3ZIG in Norfolk.

Conditions were also good on the 144MHz band as the following reports indicate. Jim Smith G00FE (I090), using an FT221, 170W amplifier and a 12-

element ZL beam worked a number of stations on c.w. These included SP7DCJ (J091), SP9EWU (J090) and RB9PA (K021) at 1840km, for his best DX ever via aurora.

Jim mentions that he finds it much better to use a clear frequency and call CQ rather than chasing after individual stations. He tells me that one of his locals spent over two hours trying to work RB5PA, whereas this DX station came back to one of Jim's CQ calls.

He also reports a tremendous difference increasing his power, previously 60W, to the 170W level. It now seems much easier to attract the DX stations!

Despite being unable to participate in the first two hours of the event on July 9, I managed to work a number of European stations. These included

OK1AXH (J070), OK1IBL (J060), OK3PV (JN88), OK3YCM (JN98), SP4MPB (K003), SP7DCS and RB5PA.

From 1830UTC, the aurora moved far to the west, between 270-310°. Contacts could then be made with stations throughout the UK and the near continent.

John Regnault G4SWX (J002) caught most of the opening and managed to work 46 European stations between 1445-2035UTC. Notable contacts included HB9BHU and HB9DFG (JN37), RB5PA, SP6AEG/P (K002), SP6GVU (J081), SP4MPB and 11 OK stations.

The next radio aurora occurred on July 13 and was a very large scale event reaching up to the 430MHz band. On the 50MHz band, G4UPS worked many UK stations and others including SM7AED (J066), SM7FJE (J065), DK1PZ (J041) and DJ90N (J031).

Around 1630UTC he heard a number of French stations and, further to the south, IK2GSO peaking 55A. The opening faded out with Ted at 1800UTC.

The opening on the 144MHz band was very widespread, supporting contacts into Scandinavia, through the Baltic states and as far south as Yugoslavia, Italy and Spain. Activity was very high, probably because the opening occurred on a Saturday.

Ralph Sachs G2CZS (J001) worked many stations on c.w. and s.s.b. his contacts including DC3VW (J039), DJ2IE/P (J054) and Y23SB (J053), all of which provided new locator squares.

John Lemay G4ZTR (J001), running 80W into an 11-element Yagi, also worked many stations, the more interesting contacts being F1FLN (IN94), F9HS (JN13), HG0HO (KN07), HG2ML (JN97) and YU1EV (KN04).

Another station to send in a report from Essex is Ela Martyr G6HKM (J001), pictured in Fig. 1. She made 79 s.s.b. QSOs, contacting DL, F, HB9, LX and four Italian stations in JN35, JN44, JN45 and JN55.

Staying in East Anglia, but this time originating from Suffolk, another report arrived from G4SWX. Between 1257-1746UTC, he made 121 c.w. QSOs in 20 countries.

At G4SWX the highlights were: OH2BNH (KP20), RB5PA (K021), UT5DL (KN18) and YP0A (KN16). Other contacts included 24 OKs, nine HGs, six HB9s, four YUs, 11JTQ (JN35), I2FHW (JN44), I3EG (JN55), I3VWK (JN55) and OE3HGW (JN88).

Results at my QTH were very similar, and I worked 111 c.w. stations between 1335-1805UTC. The furthest distance QSO was with YU1EXY (KN03) at 1212km. But the highlight of the aurora came at 1724UTC, when a contact was made with IW0AKA (JN61FI) 53A 51A, a considerable distance to the south.

Other contacts from my QTH included 21 OKs, 12 HGs, seven Is, four YUs, four SPs, four HB9s, OE3HGW and EJ7FRL, the Irish expedition to

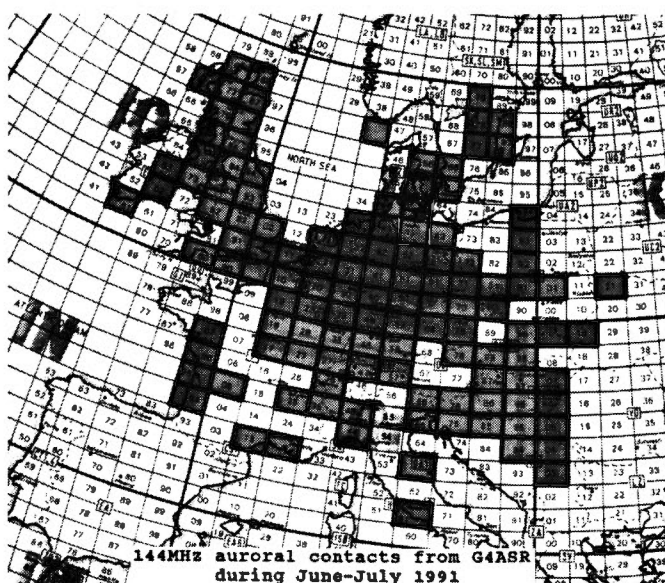
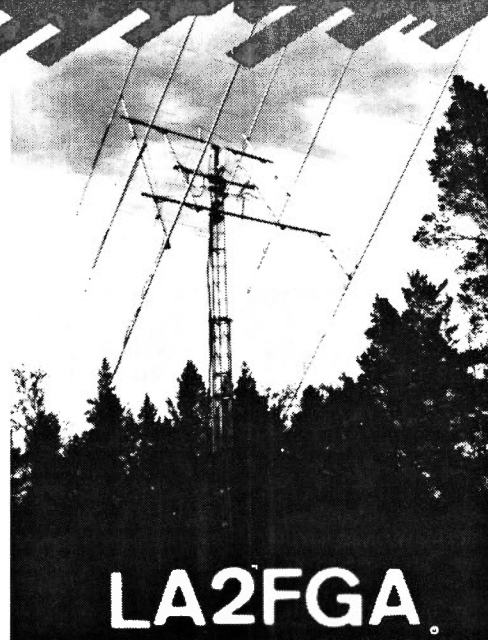


Fig. 2: 144MHz auroral contacts from G4ASR during June-July 1991.

# Back-Scatter



**LA2FGA**

**The impressive 144MHz array at LA2FGA, consisting of six 17-element Yagis.**

Fastnet Rock (IO51). Between 2255-2315UTC, a very much weaker aurora was detected, only allowing contacts to be made into Scotland.

Although there has been very little 144MHz Sp-E activity in the UK this season, the recent auroral activity has probably made up for it. The illustration, Fig. 2, shows the spread of the 365 c.w. QSOs made from my QTH (IO81) in 10 auroras during June and July. Who needs Sporadic-E!

Down on the south coast, **Mark Holloway G4YRY** (IO90), found conditions equally as good. He made many contacts including HA4XT (JN96), HA5JC (JN97), YU2ES (KN04) and YU7SOU (JN95).

At 1642UTC Mark made his first auroral contact with Spain, working EA1WY (IN73EN) 51A 53A. Jim G00FE also worked EA1WY, getting him in the log at 1658UTC. Did anyone further north than Dorset work the Spaniard?

## Sporadic-E

Although the m.u.f. rose over the 100MHz mark on a number of occasions during June and July, it never comprehensively made it to 144MHz for any length of time. Some very brief openings did occur but reports are few and far between.

On June 17, around 2145UTC, **Lee Adams G4RKV** (JO01) worked LZ1KDP and LZ1KRB (KN12). On July 12 at 1800UTC, I worked an IW station, but subsequently lost the envelope on which I had scribbled down the details!

An hour later, at 1900UTC, G4SWX correctly got 9H5CL (JM75) in the log, 59 both-ways. **John Bradford GW4ZQV** (IO81) also managed to be in the right place at the right time and worked, between 1545-1550UTC on July 28, 9H5L, 9H5CL and 9H1GB. An IT9 station was also called but the QSO was incomplete.

## The 50MHz Band

Band conditions were very interesting during July and certainly varied enough to keep the rotator swinging around! One day it would be up to the north for the aurora, the next it would be swishing around Europe tracking the Sp-E. On another day it would be southwards catching the brief t.e.p openings to Africa and South America.

**Mark Thomas G1FYC** (IO81) is a newcomer to 50MHz and therefore every station contacted is a new one. His station consists of a Yaesu FT290R driving a Howes HC266 transverter, which provides 10W into a 5-element Yagi at 10m above ground. Results have been very good, with an impressive list of European DX already worked via Sp-E.

A rare European DXCC country, the Sovereign Military Order of Malta, 1A0KM, was activated on July 20. The operators managed to work many UK

stations during the day via Sp-E.

This 'country' is contained within a large walled garden in Rome. Interestingly, it has DXCC status similar to that of the UN buildings in Geneva or New York.

There were a number of openings into Asia during July, but for most of the time it was restricted to reception reports of the 5B4CY beacon on 50.499MHz. However, 5B4JE (KM64) did make it onto the band on July 27 to work some UK stations. Aris is running 15W into a wire sloper antenna pointing, it would appear, away from the UK.

Openings into Africa, via t.e.p. plus Sp-E, were recorded on July 5, 6, 7, 12, 19, 21, 22, 23, 27 and 28th. The notable call signs were A22BW, CN8ST, Z23JO, 7Q7RM and 9J2HN.

There were also two brief openings into South America. One occurred around 2000UTC on July 10, with PY5CC being worked and the beacons PY1AA and PY2AA being heard. The other event took place at 1940UTC on July 22, with PY5CC again working into Europe.

## The 70MHz Band

Activity on 70MHz was at an all time high during July. The month opened with v.h.f. field day providing many operators with new counties and countries.

This was followed by the appearance, on a number of occasions, of ZB0W via Sp-E. There were also a number of excellent auroras later on in the month.

**Paul Newcombe ZB0W** has been writing in regularly with reports of v.h.f. happenings on the Rock of Gibraltar. I'll be reporting the joys of operating in southern climes in more detail next month.

Conditions on the 70MHz band are quite exciting from Gibraltar, as it's generally either nothing or flat out! On July 5, it was neither. The GB3REB beacon was heard for some considerable time, but only two contacts were

made with G4BTE and G7JHW.

Paul was, however, optimistic that an opening would occur during NFD on July 6-7. At 1541UTC on the 6th, he heard the beacon GB3REB, and a quick scan around the band showed that the c.w. section of the contest was in full swing.

Unfortunately neither ZB0W or Mark ZB0T are proficient with c.w. It's normally a case of Paul receiving the dots while Mark receives the dashes!

Although it was an easy matter to load the Commodore C64 keyer program, receiving the c.w. was much more difficult. Many stations refused to slow down, and therefore lost the chance of working ZB on 70MHz.

Despite the fact that the band was open for two hours, only seven stations were worked. The band also opened up during the s.s.b. section on the 7th, but only for the last 30 minutes of the contest.

The highlight of this session for the Gibraltar-based operators was being told by a leading contest group to "go away" and "pull the other one"! I can send you copies of the letter identifying the group, on receipt of an A4 envelope and a £10 note!

## The 144MHz Band

Many operators were able to work new countries and counties, thanks to the various propagation modes that prevailed during July. There have been some good tropo openings, with paths open to central Europe and Spain, and a number of auroras, details of which you have already read about.

With the sporadic meteor rate reaching a maximum and a number of meteor showers occurring during July, devotees of this mode were also well catered for. A number of contests, particularly v.h.f. Field Day, on July 6-7, also helped to increase activity.

During the field day contest, G2CZS made 43 QSOs, the best being with DF0CG (JO31), EI2SDR/P (IO63), GD4APA/P (IO74) and GM0CDA/P

(IO85). Ralph has been trying his hand at RS satellite operation, 144MHz up, 28MHz down, and has worked F6HZZ and G4CUO.

Ralph reports that it's a little hit and miss, as he has no prediction charts, no 28MHz beam and no elevation control. It's just a case of search and trial and error!

**Gary Nicholas GW7EVG**, (IO83), reports plenty of excitement on the 144MHz band during July. During NFD he worked two new counties, G0ANT/P in Durham and G3VER/P in Oxfordshire.

The aurora on July 13, netted G0EHV in Tyne and Wear, for his first auroral contact. Gary then went on to make his first QSO with France, working FC1PAU (IN88) at 57A.

On July 21, whilst tuning around the f.m. channels, he found G100EC in Co. Tyrone. Another new one in the log!

It would be difficult to find someone with a better tropo take-off into Europe than G4YRY. He's located on Hengistbury Head, Dorset, literally only metres away from the sea shore. Contacts during June included LX/DH4YAT and EA2BWA on the 1st and EA1KC, EA1NV and EA1TA on the 11th.

Tropo conditions remained good to the south, Mark working EA1NV, EB1CTQ, EB1DSD and EA2ARD on July 10, EA2ARD (IN93) again on July 20, along with F6FZJ and F6HRE, also in IN93, EA1DAV on July 22 and EA1DDU on July 23.

**John Hunter G3IMV** managed to get EA/OZ1DOQ in the log on July 25 when the expedition group were in IN62. John now needs only two squares in Spain! I also worked EA/OZ1DOQ via tropo, on July 27, when he was in IN63.

**John Hill G7CLY** (IO93) is now active on the band with a Trio TS520S, Microwave Modules transverter, 25W HL62 amplifier and a 13-element Yagi. Within four months he had worked six countries and 32 counties, the best DX being EI3GF/P (IO63) and GM4CAA/P (IO85). If you hear him, give him a call and tell him I sent you!

## The 430MHz Band

**Brian Ward G7BQP** (IO83) has written in to the column for the first time. Welcome Brian! He mentions that he has listened for the activity net on 432.210MHz for a number of weeks but has not yet heard anyone on it.

However, he has managed to work GD4XTT and a number of other stations in the UK. Brian is using a Yaesu FT726R and an 88-element multi-beam.

Brian's also active on the 144MHz band, with the same transceiver and a 15-element Cushcraft Yagi and on the 50MHz band, using a 3-element Yagi.

Welcome also to **Ian Booth G7HRP** (IO83), another newcomer to the column. He informs me that in the Manchester area there are at least five stations regularly active on the band.



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# Back-Scatter

Ian normally monitors 432.200MHz from 6.30pm on Mondays, Wednesdays, Fridays and during the day at weekends. Unfortunately his QTH is very close to the Pennines and therefore his take-off to the south and east is very limited. He mainly beams north or north-west and particularly welcomes calls from EI, GD or GI.

## The Microwave Bands

A number of stations found that the increase in activity during v.h.f. field day weekend, July 6-7, was a very good way to pick up new countries and counties. **Colin Redwood G6MXL**, located in Poole, worked G6CDA/P (IO85) on 430MHz, G4NXO/P in Humberside on 1296MHz and F/PA3EJC/P (JN09) for a new country on 2320MHz.

Ela G6HKM concentrated on 1296MHz during the contest, and was rewarded with 31 QSOs in 14 locator squares. She heard a GM station calling CQ on a couple of occasions, but failed to make a two-way.

**Jon Acton G0NFH** (IO81) is now using a 2C39BA cavity amplifier on 1296MHz and is getting much better results. On July 15, he worked into Essex, contacting G6HKM. He holds a nightly sked with G3BPJ in Lancashire on 1296.180MHz, if anyone is interested.

## Amplitude Modulation

In a recent issue I mentioned that *PW* would soon be publishing the design of the '6AM' (The *PW* Beaver Receiver appears this month. Ed), a 50MHz a.m. transmitter/receiver design.

**Bill Cardno G6MORT**, sent me a note, via packet radio, commenting that he was very interested in the project, having recently acquired a pair of a.m. Pye Cambridge rigs. He is also active on 50MHz with an FT690R, 25W and a 3-element beam, but is not impressed that most operators only seem to come on when there is an opening. He is hoping that the 6AM project will encourage more use of the band for inter-UK working.

**Ian Liston-Smith G4JQT** is a keen a.m. operator and is very much looking forward to building the 6AM transmitter/receiver. At the moment he's using the circa 1979, PW 1.8MHz a.m. transmitter and last year he completely rebuilt a 1959 Heathkit DX40U a.m./c.w. transmitter.

Ian mentions that it is very easy to get on the bands with home brew a.m. equipment. He says that despite its power inefficiency and bandwidth requirements, (not a problem at v.h.f.), a great deal of fun can be gained using a simple 'phone transmitter you've built yourself.

On a similar theme, I recently asked if any of you were operating on f.m. at the top end of 50MHz. **Jim Hicks G4XRU** (IO90) reports that he listens every Wednesday evening, between 9-10pm, on 51.510MHz f.m. using horizontal polarisation. He's also listened for the GB2RS bulletins on 50MHz but has only heard his local news-reader, G8SC in Uckfield.

**Karl Brazier G7AFT** (IO90) is proposing 50MHz f.m. activity periods, every night at 7.30pm on 51.510MHz. He is using horizontal polarisation as most operators don't seem to have put up vertical antennas yet.

During a Sp-E opening on July 27, I discovered an OZ f.m. net operating on 50.500MHz. All participants were in the Copenhagen area and I went on to work OZ1CDE, OZ7IS and OZ9AU, all stations being fully quieting.

**Peter Carr G7ETZ** (IO81) has recently installed an FT690, 20W amplifier and a vertical antenna in his car. He's now active on s.s.b. or f.m.

Peter is particularly looking for stations in the Gloucestershire area to perform some tests with. Are there any other mobile stations on the band yet?

## DXpedition Update

Look out for PA3BZL and PA3FOC, who are active from Ischia Island (IC8) until September 20. Operating from locator JN60, they are concentrating mainly on meteor scatter on the following frequencies: 144.045MHz

(tropo), 144.115MHz (m.s. skeds), 144.125MHz (m.s. random), 144.215MHz (m.s. skeds), 144.225MHz (tropo).

Stations are asked not to call on the sked frequency, but wait until the QSO is complete and then listen for them on the random frequency. If you want to make a sked you should be able to find them on the v.h.f. net every day from 1600UTC. The group will use a Ten-Tec Paragon, transverter, 3CX800 amplifier, 17-element Yagi and MGF1302 I.n.a.

OZ1DJJ will be active from Greenland on 50MHz between September 17-26. He'll also operate from GP52 with the callsign OX3LX.

## QRZ Contest!

The ARRL are holding their v.h.f. QSO Party on September 14-16. You never know, 50MHz might be open!

If you fancy some 50MHz c.w., then you should listen for the RSGB contest between 1200-1700UTC on September 22. If not, you can always hope for some Sp-E propagation, to enable you to participate in the Scandinavian 50MHz activity period taking place on September 24 between 1700-2100UTC.

Moving up in frequency, there's another chance to wrinkle out those rare counties, when the RSGB hold their 70MHz Trophy contest on September 29, between 0900-1600UTC.

A number of 144MHz events have been organised to cater for most tastes. The WAB group are holding their 144MHz QRO contest between 0900-1700UTC on September 15. Stations exchange RST, serial number, WAB area and county.

The c.w. enthusiast has a number of contests to participate in. The RSGB 144MHz c.w. cumulatives will be held between 2030-2300 local time on September 20, October 7, October 23 and November 8. Only fixed QTH, single operator stations are allowed to compete.

In last years event, G4PIQ came first and I was a runner-up. If you think your c.w. can get to Germany, you could enter the 144MHz AGCW-DL c.w.

contest being held on September 28 between 1900-2300UTC. If you don't fancy that one, then you could monitor the c.w. end of 144MHz on October 1, between 1700-2100UTC, for the Scandinavian activity contest.

A number of u.h.f. and microwave contests have been planned for September and October to take advantage of the enhanced autumn tropo conditions. Cumulative microwave contests, for all bands between 3.4GHz and 24GHz, will be held between 0900-2100UTC on September 15 and October 20 and Scandinavian microwave activity contests will be held on September 17 and October 15 between 1700-2100UTC.

On October 5-6, between 1400-1400UTC, the RSGB are holding a 430MHz-24GHz contest. This contest is co-ordinated by IARU, so you can expect much activity throughout Europe.

Other events planned are a 1.3-2.3GHz cumulative on October 8, with the Scandinavian 430MHz taking place on October 8 and a RSGB 430MHz cumulative contest on October 16. That lot should keep you all busy!

## Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB77CM.

Photographs of you, your shack, antennas or any v.h.f. activity or personalities are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. These can all be returned if necessary.

## 144MHz QRB Table

### Top distances (km)

Tropo	3160	GM4YXI
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR

Deutsche Welle is reported to be working on a Radio Data System (RDS) for short wave transmissions. It is similar to a system developed by the German domestic broadcaster, ARD, for medium wave transmissions.

Deutsche Welle has already carried out some tests which show it is possible. The station is now preparing an operational test with real data on an inaudible data stream broadcast with DW's short wave broadcasts. Don't rush out and buy your short wave RDS receiver yet, for such a system is at least five years away from implementation.

# Back-Scatter

## Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

Japan is making its influence felt in various parts of the broadcasting community of the Third World. They now have agreements to re-engineer transmission and studio facilities in Sri Lanka and Bangladesh.

Radio France International has moved on to the f.m. band in Sofia, Bulgaria, with the inauguration of a round-the-clock 24 hour French service on 105MHz. As reported recently in *PW*, RFI's expansion includes a new

transmitting site in Jibuti.

The agreement has now been signed for three 500kW short wave transmitters and rotatable antennas to serve the Indian Ocean islands, the eastern part of southern Africa and the Near and Middle East.

It seems that the planned Voice of America/Radio Free Europe transmitter site in the Arava Desert in Israel may not go ahead. A High Court in Israel has ruled that before work can start, a survey must be carried out on the effect of the h.f. radiation on migrating birds.

Swiss Radio International is

Photo courtesy of  
Brown Boveri,  
Switzerland.

Meanwhile Bob Zanotti of the English service tells me that there could well be more diversification into satellites, cable systems and more. This column will be bringing you the news as it happens.

**Europe**  
**All times GMT(=UTC)**

Radio Sofia has a feeder in u.s.b./p.c. on 14.85MHz from before 0500 until past 2200. This has almost continuous programming including English, and it offers nominal S10442 although occasional bursts as high as S10544 are reported by **Roy Merrill**.

The RAI service in Rome has a 2025 transmission to the Near East. It's best heard on 11.80MHz, with the parallels of 7.235 and 9.575, both heard poorly.

**Radio Renascença in Portugal, a religious station which transmits Portuguese language programmes only, is heard to Brazil at 0015-0115 on 9.60MHz, SIO up to 544. The station is also heard at weekends at 1500 on 9.68MHz to Europe.**

Radio Romania has a feeder on 14.86MHz in a.m. with programmes including English from 0530 until at least 0900.

you the news that Radio Sweden is going to move on to Astra soon for listeners in Europe. The move will be implemented in the Spring of 1992, and the programmes will consist of English, German, French and Spanish together with Swedish domestic output.

Swiss Radio International's teletype service is on the air at 50 baud: 1830-1930 to Africa on 17.53MHz, 2000-2100 to Asia on 10.515MHz, 0030-0130 to South America on 10.515MHz, 0200-0300 to North America on 10.515MHz.

Estonian Radio in Tallin carries English on Mondays only, at 2030 on 9.56 and 5.925MHz, with Estonian programmes on other days at this time.

Latvian Radio carries English on its Riga transmitter on 5.935MHz at 0600 on Sunday and at 1730 on Saturday and weekdays at 2030. Radio Georgia has been heard, albeit very poorly in the UK, with programmes in English. The station has been noted on 12.07MHz at 1700.

There appears to be a problem with the transmitter or the feed from the studio since the audio is extremely muffled. More details as they become available, and I'm grateful for all reception reports to be used in this column.

RTV Ivoirienne Abidjan, can be heard with difficulty at 7.215MHz around 2000, although the channel is

Schweizer Radio International  
Radio Suisse Internationale  
Radio Svizzera Internazionale  
Radio Svizzera Internazional  
Swiss Radio International  
Radio Suiza Internacional  
Rádio Suíça Internacional  
Sviza Radio Internacia  
إذاعة سويسرا العالمية



Radio Nacional de Guinea Equatorial has been heard consistently from Malabo on measured 6.2502MHz around 1900 when it is a fairly weak and cluttered signal. It improves slowly, but has occasional heavy commercial QRM on channel. Clearly identifiable Spanish at news time, with vernaculars and much traditional music, both pop and local. Lots of drumming and chanting and can rate up to S10232.

Radio Jordan is heard sporadically on 9.56MHz from around 1500, with variable signals carrying English up to the abrupt close at 1630.

The Voice of Lebanon can quite often be heard from around 1800 with weak signals on a noisy 6.5494MHz. It improves to an occasional S10433, but more usually averages S10323. The station has mixed French and Arabic programming with Arabic news heard clearly at 2200 under light noise and some QSB.

The Voice of Nigeria on 7.255MHz in French, continues to be heard quite clearly until 1827 when Deutsche Welle signs on.

Roy Merrill suggests that Qatar Broadcasting Service rarely receives a mention, yet it can be heard surprisingly clearly at around 1715 on 11.9102MHz, although for the rest of the evening it is relatively weak with co-channel Radio Budapest. The station frequently identifies itself as "Qatar min al Doha".

Radio Mogadishu is back on the air on 7.198MHz. Roy Merrill has reported hearing the station originally on July 14 at 1745, with best reception on July 16 when the SIO peaked at 333 at 1800 GMT. The identification noted by Roy was "...Radio Mogadishu...democratiya...Somalia" heard very clearly.

Radio Tunis has Arabic on 12.005MHz at around 2030 until at least 2200 in parallel with a new 41 metre band outlet on nominal 7.45, but wobbling between 7.4497 and 7.4527MHz on July 15. On July 16 the transmitter started on 7.4612MHz, and according to Roy Merrill, in 35 minutes the transmitter varied between 7.4602 and 7.4615MHz, with occasional jumps in excess of 500Hz. The latest reports are that it has been logged on 7.493MHz.

To keep you up to date with news from the United Arab Emirates, here are the English schedules for UAE Radio in Abu Dhabi and Dubai. UAE Radio in Abu Dhabi has English at: 2200-0000 on 17.855, 15.305, 13.605, UAE Radio in Dubai has English at: 0530-0600 on 21.70, 17.83, 15.435MHz, 1030-1110 on 21.605, 15.435, 15.32, 13.675, 1330-1400 on 21.605, 15.435, 15.32, 13.675, and



# Back-Scatter

1600-1640 on 21.605, 15.32, 13.675, and 11.795MHz. Finally, the Voice of Turkey is now using 9.445 at 2000, replacing 9.795MHz.

## Asia And The Pacific

Radio Afghanistan has announced English to Asia at 0930-1030 on 21.60, 17.655, 15.255 and 4.94MHz. The 15MHz channel replaces 9.635MHz.

Radio Australia now seems to be carrying advertisements. The sports service at weekends on in the middle of the night here in Europe (0300GMT) on 15.24MHz, seems to have lots of commercials. Could this be an attempt to make the station pay its way in the face of cutbacks at the parent Australian Broadcasting Corporation? But I'm wondering what relevance the advertisements have for listeners outside Australia itself!

Meanwhile, Radio New Zealand International despite also suffering from extreme financial problems ("We're broke" said one executive talking to me on the telephone recently)

is launching test transmissions in Japanese from the end of August. This follows the closure of Japanese sections at Radio Australia and the BBC World Service. The transmissions are at 1100 for an hour on 9.70MHz on Saturday and Sunday only. The new schedule for September 1 onwards for English is: 1800-2200 on 15.12, 2200-0730 on 17.77MHz (2200 0630 from October 6) 0730-1210 on 9.70MHz, (0630-1110 from October 6).

Radio Japan can be heard strongly in English via RCI's Sackville site at 0100-0200 on 5.96MHz. RFO Tahiti, Papeete, has been heard clearly almost daily from around 0500 on 15.1707MHz with the parallel 11.827 occasionally audible in short bursts from around 0600. The 15MHz channel improves up to an occasional SIO243, but has Radio Moscow in French on 15.175.

## The Americas

Radio Nacional de Brasil is heard initially weakly on 6.18MHz under a

strong BBC World Service signal from Cyprus at around 2116. After 2159, the channel is relatively clear and the signals run up to SIO433 or better, although there is some QSB and echo.

There are many verbal and musical identents, in a mixed schedule of talks, interviews and music. The parallel 11.78 MHz tends to be weaker of late, but can rate up to SIO533.

Radio Havana Cuba, has English to North America from 0200 on 15.14MHz, noted at 0220 at SIO333 with QSB. A Honduran station calling itself Sani Radio, with a callsign of HRR1, has been noted on 6.30MHz in the evening from around 2100 until 2400 sign-off. Programmes are in Spanish and a local language.

Radio Surinam International is now operating on 17.835MHz at 1700 weekdays via Radiobras. Roy Merrall reports reception of a number of South American stations audible as early as 2130, with some offering fair-to-strong signals: 6.03MHz Radio Globo, occasionally blocked by strong SDR in Germany until 2300. On 6.135MHz he heard

Radio Aperecida slightly watery at around 2245, SIO up to 222; and on 9.735MHz he notes Radio Nacional Paraguay with very strong and clear signals at 2155. Up to SIO533 with some QSB and variable clutter; and on 11.78MHz there was Radio Nacional da Amazonas with a slight echo and QSB at 2145. Rated up to SIO433.

On the 11.805MHz channel Radio Globo was heard, with some echo and heavy clutter initially, up to SIO323; 11.925MHz provided Radio Bandeirantes with variable but SIO222 at 2215.

KHBI to Australia at 1200 has moved from 9.475 to 9.425MHz. The WCSN station has made some frequency alterations:

1800 now 21.545 from 21.64MHz  
2000 now 15.665 from 15.61MHz  
2200 now 15.665 from 15.30MHz  
**Reports to Peter via the PW Office please.**



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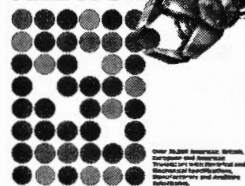
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WR231	"	"	9.40
WR230	"	"	...
WR228	"BLANDFORD" RECEIVE CONVERTER	APRIL 87	...
WR227	"	"	9.90
WR226	"	"	...
WR298	"ITCHEN" LCR BRIDGE	APRIL 87	5.97
WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.18
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.55
WR218	MASTHEAD PRE-AMP FOR 144MHz	FEB 87	4.28
WR224	"WESTBURY" BASIC WOBBLATOR	JAN 87	3.57
WR214	MOD SRX-300 (AUDIO)	DEC 86	3.05
WR223	HIGH-IMP MOSFET VOLTMETER	DEC 86	2.96
WR222	"TAW" VLF CONVERTER	NOV 86	5.92
WR216	LF BANDS ACTIVE ANTENNA	NOV 86	2.44
WR220	GET STARTED LOW-COST CONVERTER	OCT 86	2.44
WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.67
WR210	MOD FRG-7 (CARRIER Oso)	JUN 86	2.75
WR211	"ARUN" PARAMETRIC FILTER	MAY 86	6.27
WR209	"MEON" FILTER (SMALL)	APR 86	3.16
WR208	SIMPLE AUDIO OSCILLATOR	MAR 86	4.38
WR207	RF SPEECH PROCESSOR	MAR 86	4.18
WR206	CRYSTAL CALIBRATOR	JAN 86	2.13
WR199	RTTY/MORSE MODEM	JAN 86	5.51
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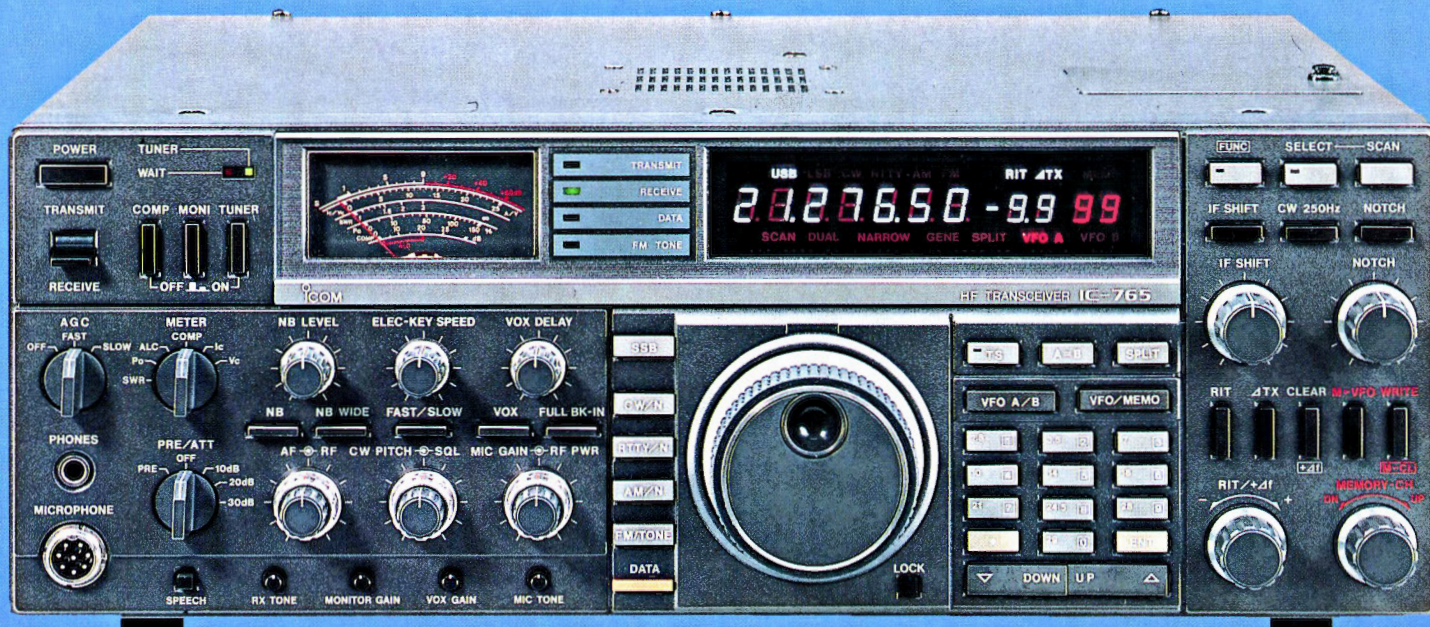
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