

# PW

## Constructional

*Rediscover Top Band*

*Build The PW Chatterbox AM Transmitter & Receiver*

## Reviewed This Month

*The Ramsey 50MHz Receiver Kit*

*The Ideal Novice Project*

### Plus

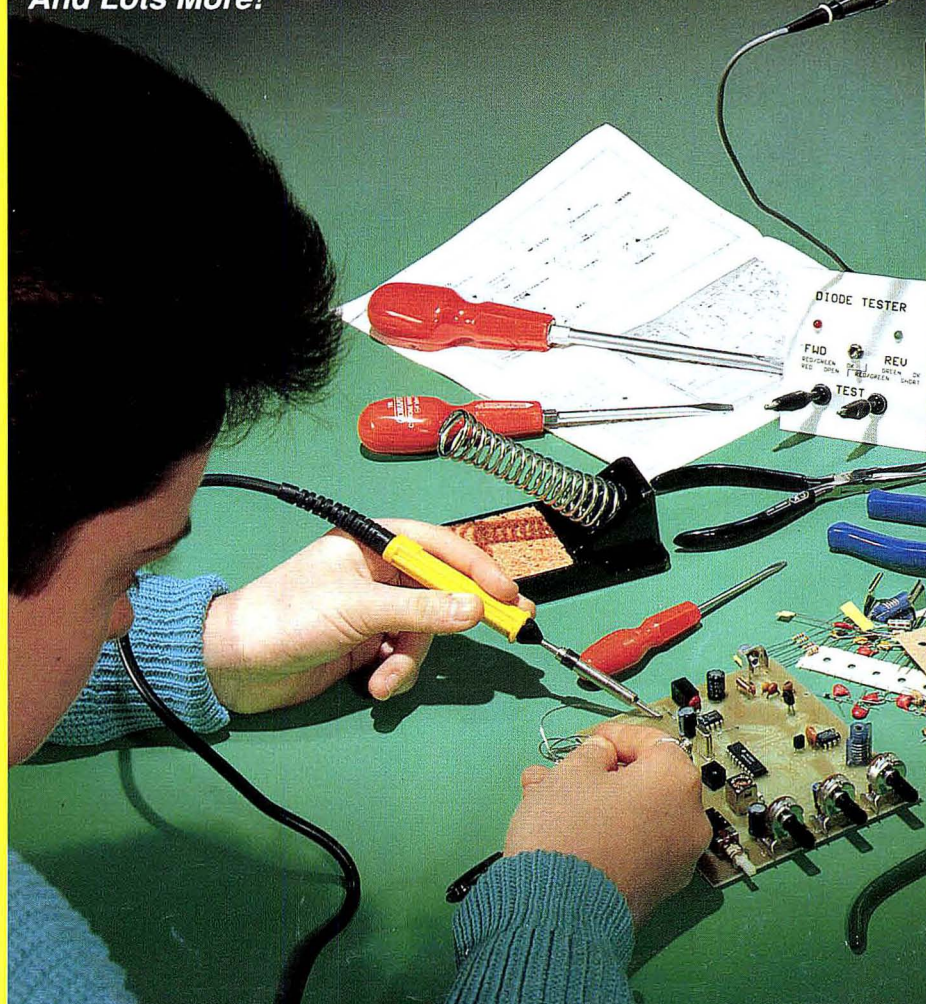
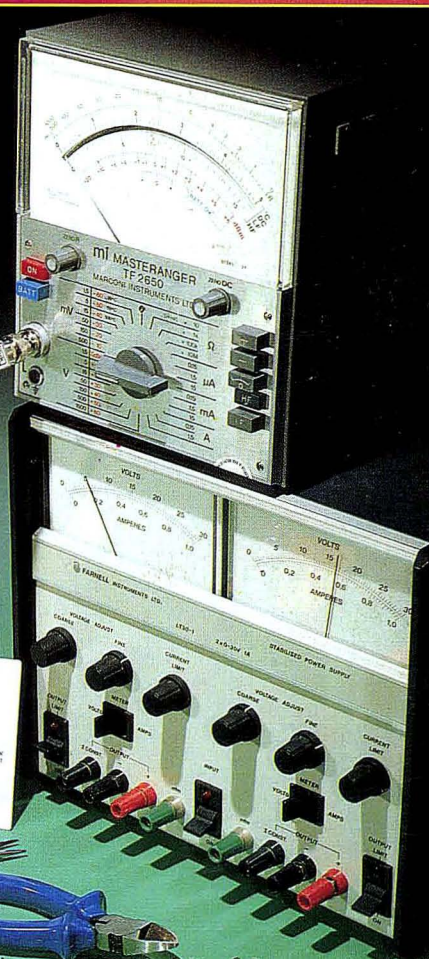
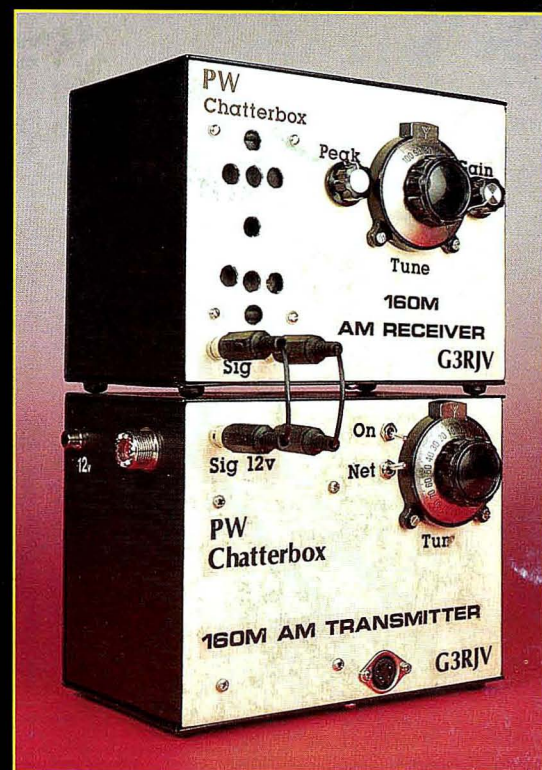
*Antenna Construction*

*The PW Natterpole Top Band Vertical Antenna*

*Come Fly With Us*

*How You Can Join The Dayton '92 Trip*

*Focal Point, CB High & Low, Competition Results,  
And Lots More!*



ISSN 0141-0857



9 770141 085006

AUGUST 1991

£1.60



THE NEW

# FT-1000

FOR DYNAMIC DX

YAESU

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.



YAESU

UK Sole Distributor

South Midlands Communications Ltd

S.M. House, School Close,  
Chandlers Ford Industrial Estate,  
Eastleigh, Hants SO5 3BY  
Tel: (0703) 255111

Prices and specifications are subject to change without notice



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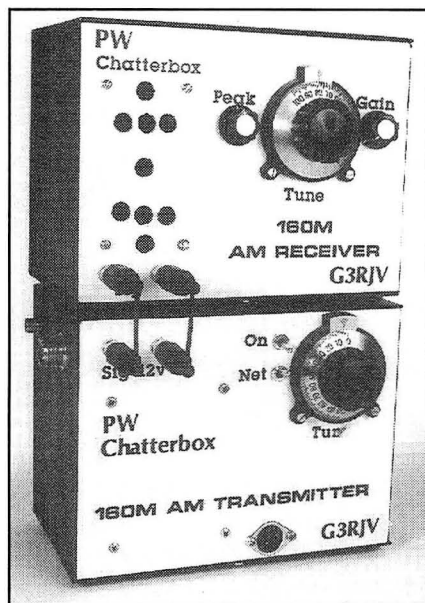
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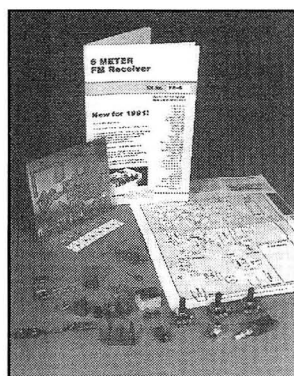
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Our thanks go to W E Boone & Co. Ltd., of 91 High Street in Poole, for the loan of workshop tools used in the cover photograph.

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# ICOM

## IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

Icom's tradition of building high quality, reliable handhelds continues with the IC-2SE an incredibly compact handheld designed with features that exceed larger, bulky handhelds. The IC-2SE proves that superior quality comes in all sizes.

### Slim and unbelievably compact.

The IC-2SE measures only 49(W) x 103.5(H) x 33(D)\* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. \*1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

### Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

### Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

### Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.

#### • Battery packs and case.

BP-81 .....	7.2V, 110mAh
BP-82 .....	7.2V, 300mAh
BP-83 .....	7.2V, 600mAh
BP-84 .....	7.2V, 1000mAh
BP-85 .....	12V, 340mAh
BP-86 .....	Case for six R6 (AA) size batteries

#### • BC-72E, AC Battery Charger.

Desk top charger for the BP-81 - BP-85.

• **CP-12, Cigarette lighter cable with noise filter.** Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.

• **FA-140BB, 144MHz flexible antenna.** Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.

#### • HM-46, Speaker/Microphone.

Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.

• **HS-51, Headset.** Headset with VOX function that allows you hands-free operation.

#### • Carrying Cases.

Carrying Case	Battery Packs, Battery Case
LC-53 .....	BP-81
LC-55 .....	BP-81, BP-83 or BP-86
LC-56 .....	BP-84 or BP-85

#### • MB-30, Mounting Bracket.

Mounts the IC-2SE in a vehicle or on a wall.

#### • OPC-235, Mini DC Power Cable.

For use with a 13.8 V DC power supply

4SE, 70cm  
VERSION  
NOW  
AVAILABLE

Actual Size



**Datapost:** Despatch on same day whenever possible.

**Visa & Mastercards:** Telephone orders taken by our mail order dept. instant credit & interest free H.P.





# Count on us!

## THE COMPACT HANDHELD WITH A ~~SPLIT~~ PERSONALITY

### 5 Watt Output Power.

Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W\* of output power. Bring those distant repeaters into range.

\* At 13.8V DC

### 48 Memory Channels.

The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

### Convenient Repeater Functions.

The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

### Power Saver for longer operating time.

The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

### Built-in Clock with timer functions.

The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

### Convenient Scan Functions.

The IC-2SE is equipped with VFO and memory scan.

- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.

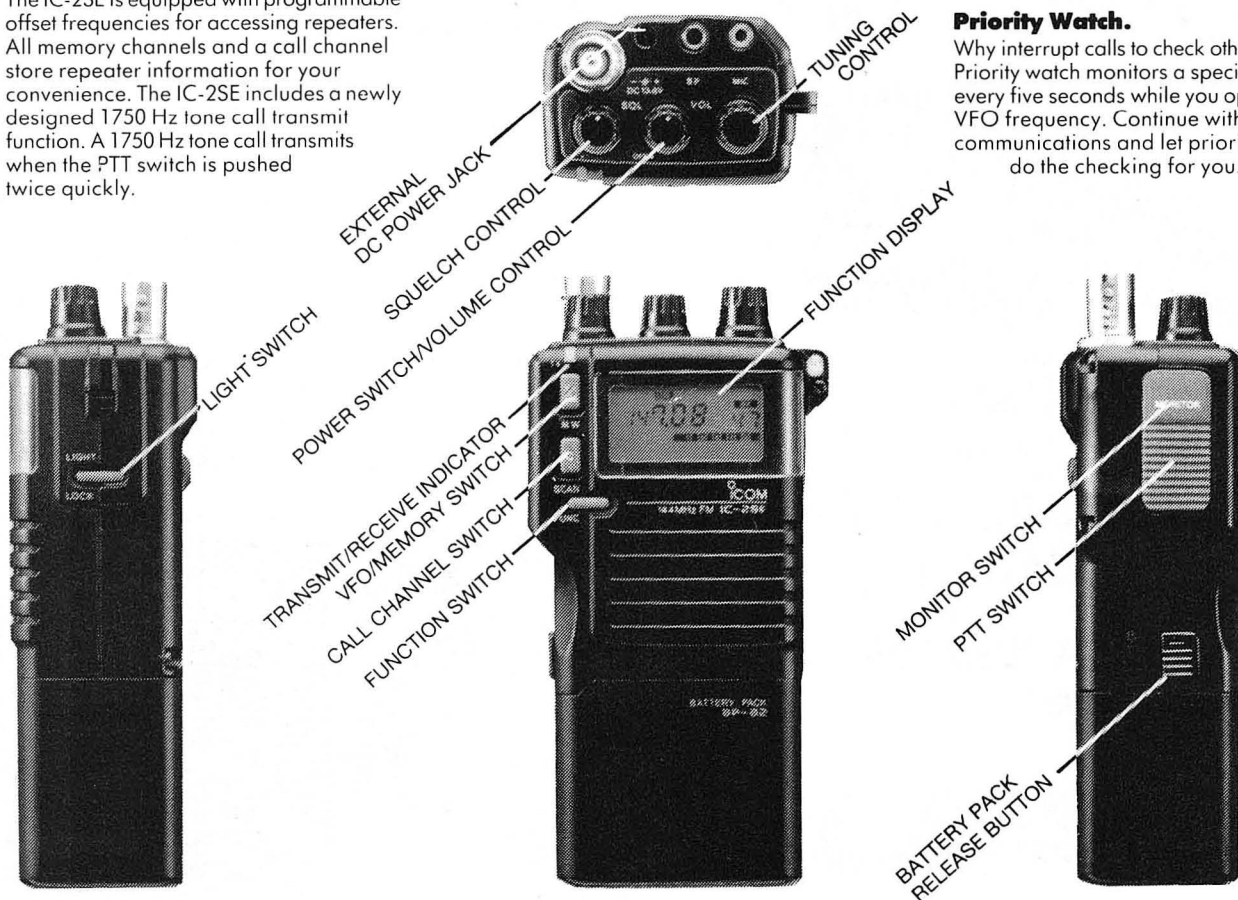
- **Memory Scan.** Memory scan repeatedly scans memory channels.

### Auto Power Off Timer Function.

If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

### Priority Watch.

Why interrupt calls to check other stations? Priority watch monitors a specified station every five seconds while you operate on a VFO frequency. Continue with your communications and let priority watch do the checking for you.



Icom (UK) Ltd.

Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 741741 24 Hour. Fax: 0227 360155



# South Midlands Co

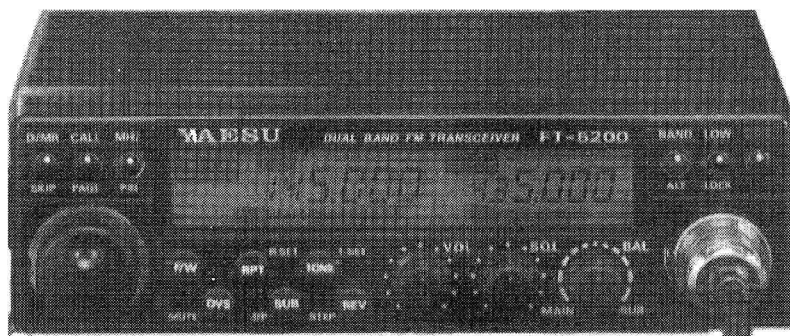
Southampton (0703) 255111 Leeds (0532) 350606 Chesterfield (0532) 350606

**NEW**

## A QUART IN A PINT POT?

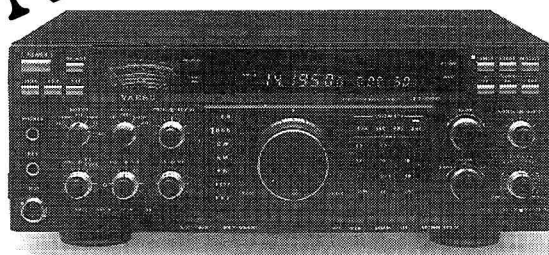
Never I hear you say, well **YAESU's** engineers have done it again with the **NEW** Dualband **FT5200**

- ★ Dualband 2m and 70cms
- ★ 50/5W on 2m and 35/5W on 70cms
- ★ Crossband full duplex operation
- ★ Reversed-mask dual LCD display
- ★ Built-in antenna Diplexer
- ★ Trunk Mount Cable Option 3m or 6m



**NEW**

## FT-990 HF TRANSCEIVER



- ★ Amateur Bands 160-10m
- ★ General Coverage Receiver
- ★ 100W Output (25W AM Carrier)
- ★ 50 Memories
- ★ Built in iambic memory keyer

Based on the remarkable performance and easy operation of the FT-1000, Yaesu's new FT-990, combines the basic technical features of that top-of-the-line model with several recent advances resulting in a spectacular performer at a very reasonable price.

Utilising Direct Digital Synthesisers (DDS) and the extremely quiet receiver circuitry of its big brother, the FT-990 delivers silky smooth tuning, pure local signals and clear reception of even the weakest stations.

So if you're looking for top performance in an HF transceiver, try out the FT-990.

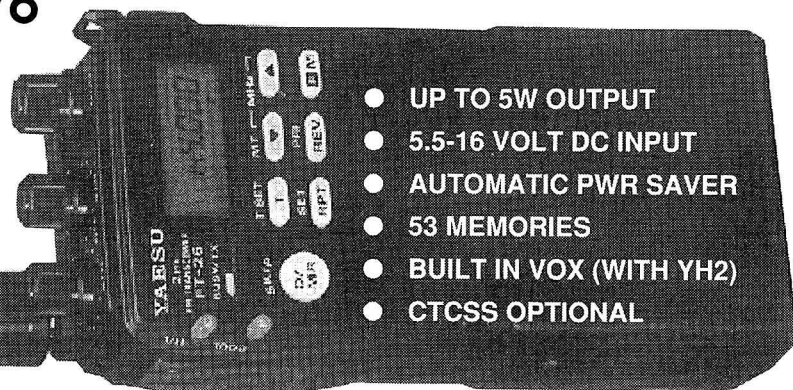
*You might just fall in love!*

**NEW**

## FT-26 & FT-76

2m & 70cms

**MINI HANDHELDS  
A REAL HANDFUL!**



- UP TO 5W OUTPUT
- 5.5-16 VOLT DC INPUT
- AUTOMATIC PWR SAVER
- 53 MEMORIES
- BUILT IN VOX (WITH YH2)
- CTCSS OPTIONAL

Not shown full size.

**Southampton** (0703) 255111  
SMC HQ, School Close,  
Chandlers Ford Ind. Est.  
Eastleigh,  
Hants SO5 3BY.  
9am.-5pm. Mon-Fri  
9am.-1pm Sat

**Leeds** (0532) 350606  
SMC Northern,  
Nowell Lane Ind. Est.  
Nowell Lane,  
Leeds LS9 6JE.  
9am.-5.30pm. Mon-Fri  
9am.-1pm Sat

**Chesterfield** (0246) 453340  
SMC Midlands,  
102 High Street,  
New Whittington  
Chesterfield,  
9.30am.-5.30pm.  
Tues-Sat

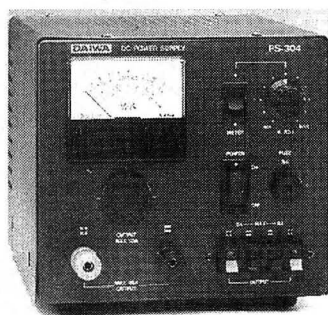
**Birmingham** 021-327 1497  
SMC Birmingham,  
504 Alum Rock Road,  
Alum Rock,  
Birmingham B8 3HX.  
9am.-5.00pm. Tues-Fri  
9am.-4pm Sat.

**Axminster** (0297) 34918  
Reg Ward & Co. Ltd.  
1 Western Parade,  
West Street,  
Axminster,  
Devon EX13 5NY.  
9.00am.-5.20pm. Tues-Sat



## DAIWA PRODUCTS

**SMC** are pleased to announce that we are now the official UK Distributor for the complete range of DAIWA products.



PS 304

### POWER SUPPLIES

PS120 Mk2	3-15v Variable	9A/12A max.	£69.95
PS304	1-15v Variable	24A/30A max.	£129.95
RS40X	1-15v Variable	32A/40A max.	£189.00

### COAX SWITCHES

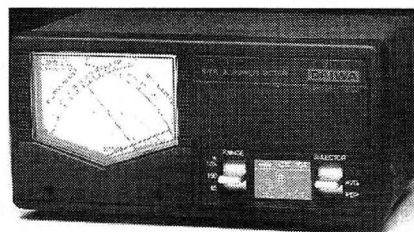
CS201	2 Way SO239	DC-600MHz	1kW	£13.95
CS201G2	2 Way N	DC-2GHz	1kW	£27.50

### SWR METERS

CN101	1.8-150MHz	15/150/1500W	£59.95
CN103N	150-525MHz	20/200W N	£69.95

### LINEAR AMPLIFIER

LA2080H	2m 1.5-5W in	30-80W out	£159.95
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CN 101

## SMC FOR ALL YOUR ACCESSORIES

### TOKYO HY-POWER

#### TRANSCEIVERS

HT106	6m Transceiver 10W P.E.P. SSB/cw	£305.50	C
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 6 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

#### TUNERS

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

#### LINEARS

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
HL16V	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
HX640	6m to HF as above	£254.50	B

### COMET PRODUCTS

#### BALUNS

CEL-30	1:1 1.7-30MHz 1kW P.E.P.	£18.95	A
CEL-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

#### METERS SWR/FWR

CM-420	2m/70cm 15-50W Mini	£36.75	B
CD-120	1.8-200MHz 15/60/200W	£76.60	B
CD-160H	1.6-60MHz 20/200/2000W	£90.85	B
CD-270D	140-525MHz 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

#### 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	

### STRUMECH VERSATOWER

#### STANDARD 13M20 SERIES

13M20P25	25FT POST MOUNT	£468.83
13M20P40	40FT POST MOUNT	£660.35
13M20P60	60FT POST MOUNT	£777.85
13M20FB25	25FT FIXED BASE MOUNT	£324.30
13M20FB40	40FT FIXED BASE MOUNT	£442.33
13M20FB60	60FT FIXED BASE MOUNT	£609.83
13M20BP25	25FT BASE PLATE MOUNT	£553.43
13M20BP40	40FT BASE PLATE MOUNT	£767.28
13M20BP60	60FT BASE PLATE MOUNT	£863.63
13M20M25	25FT MOBILE TOWER	£2226.63
13M20M40	40FT MOBILE TOWER	£2439.30
13M20M60	60FT MOBILE TOWER	£2613.20

#### HEAVY DUTY 16M20 SERIES

16M20P40	40FT POST MOUNT	£820.15
16M20P60	60FT POST MOUNT	£930.60
16M20P80	80FT POST MOUNT	£1457.00
16M20FB40	40FT FIXED BASE MOUNT	£658.00
16M20FB60	60FT FIXED BASE MOUNT	£780.20
16M20FB80	80FT FIXED BASE MOUNT	£1245.50
16M20BP40	40FT BASE PLATE MOUNT	£869.50
16M20BP60	60FT BASE PLATE MOUNT	£972.90
16M20BP80	80FT BASE PLATE MOUNT	£1563.93
16M20M40	40FT MOBILE TOWER	£2909.30
16M20M60	60FT MOBILE TOWER	£3031.50
16M20M80	80FT MOBILE TOWER	£3760.00

#### MIDTOWER SERIES

P30	30FT POST MOUNT	£500.55
BP30	30FT BASE PLATE MOUNT	£528.75
FB30	30FT FIXED BASE MOUNT	£429.09

#### 36FT VERSIONS OF ABOVE 1 EXTRA SECTION ADD £45.83

All towers except mobiles are available from stock 13M20 and 16M20 series all supplied with auto brake winches. All are supplied with H2R head unit drilled to take GS-065 bearing. Holding down bolts for BP and FB towers are available at £29.38 per set extra.

Alternative winches and head units are available at extra cost.  
Delivery is by quotation dependent upon distance.



- Free Finance on selected items, subject to status. Details available on request.
- Up to £1000 instant credit, a quotation in writing is available on request, subject to status.
- Yaesu Distributor Warranty, 12 months parts and labour.
- Carriage charged on all items as indicated or by quotation.
- Prices and availability subject to change without prior notice.
- Same day despatch wherever possible.



# Waters & Stanton 0702 206835 or 204965

BEST PRICES! FAST MAIL ORDER

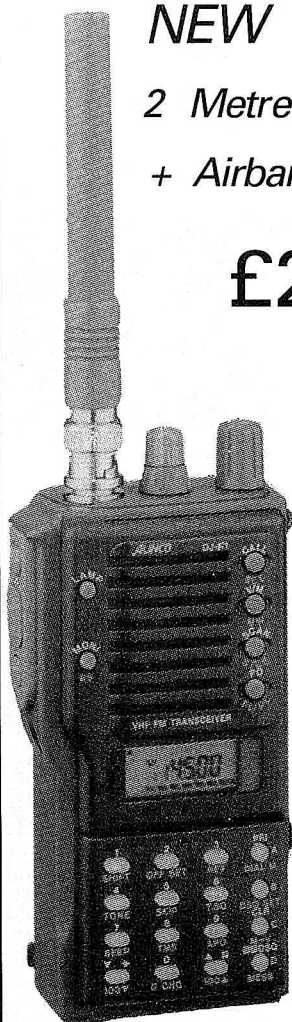
## ALINCO

### NEW DJ-1FE

#### 2 Metre Handheld

#### + Airband RX!

## £239



The DJ-1FE is a new generation of handheld from ALINCO. Its ergonomic design wins instant appeal whilst its compact size (110 x 53 x 37mm) and tailored shape allows it to sit comfortably in the palm. "Solid yet diminutive", "comprehensive yet simple to use", are phrases that best describe it. And in specification the DJ-1FE is up at the front leaving its competitors gasping!

Features include: 40 memories, digit 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.

## Best Airband Receiver Ever! VT-125MkII £169

It's a fact, the VT-125 mkII is the best and most sensitive airband receiver ever produced. That's not just our opinion, it is the opinion of the professionals who are buying this in quantities!



- 108-142MHz
- 30 Memories
- 25kHz steps
- Free ni-cads
- Free Mains charger
- Latest Mk-II version!
- Full accessories



## £349

### DJ-560E

INCLUDES  
TONE  
SQUELCH

2m & 70cm 2W • 130-174 & 400-520MHz Rx • Keypad entry • Rotary tuning • 2 x Vol/Squ controls • 5/12.5/25kHz etc steps • DTMF • Dual Watch • Scanning • Bell alarm • 40 memories • 12V DC-DC • Auto dial • AC charger • 700mAh pack • 169 x 57 x 32mm • Rubber Duck • Plus many other features. • Phone for details.

### DIAMOND ANTENNA

## Are A

## Ham's Best Friend!

If you want the very best antenna for VHF or UHF then choose from the range that is stocked by most amateur radio dealers! Diamond give you more gain and quality £ for £. They are tough, sleek, pre-tuned, and have a spares back-up that is second to none. All "X" series models are fibre glass encapsulated and knock down into sections for easy transport. And if after purchasing, you are not convinced that they are great value for money with super low VSWR's, simply return the antenna to us within 14 days for a full refund. Now that's the kind of confidence that our competitors don't have. Nuff said!

CP22J	2m 2 x 5/8th 6/5dB gain	49.95
The following have patented "C" load phasing.		
X-50	2m/70cm 4.5/7.2dB 1.7m	59.95
X-300	2m/70cm 6.5/9dB 3.1m	89.00
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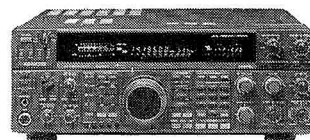
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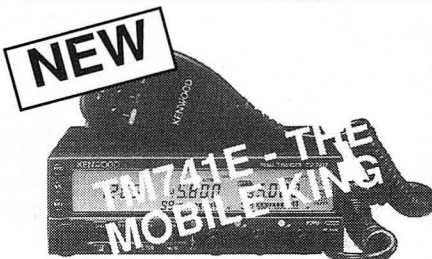
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# Keylines

I'm looking forward to working my first UK Novice amateur radio station. I can still remember the thrill I got when my licence arrived. Unfortunately for me though, it arrived when I was suffering from a very bad dose of 'flu' and I couldn't get on the air for a few, very frustrating days.

In the early 70s, and I've still got the log-book recording the QSO, I had another thrill when I managed to work QRP 'over the pond' to the USA. It was quite an achievement for me, because my rig was one of the early Heathkit HW7s running at less than 1W on 21MHz.

Hearing a station with slow, but impeccable Morse, I answered the CQ call. I ended up having an enjoyable QSO with a 12 year-old girl! My ego was somewhat deflated, when I learned that she was only running 3W into a home-brew rig using a tree-mounted antenna!

## Novice Prize

To show our support for the newly-licensed Novice stations, *PW* is offering a

year's subscription to the first five operators to send in photographs of themselves in action. The photograph must show the operator and their allocated callsign. We'd also be interested to know who the other station was and how the QSO went.

We're also very interested to hear about school radio club activities. Our 'Club News' feature in 'Newsdesk '91' is proving very popular, but how about letting us know what your school is getting up to on the air? I'm very much involved in assisting with radio clubs at my daughters' school, so I would be interested to hear your stories and achievements.

## Testing Time

The advent of the Novice Licence has not been without its difficulties. I've no doubt that much 'midnight oil' has been burnt to get the system underway.

There's also no doubt that there are still not enough Novice trainers and other essential volunteers. However,

there's one problem that's been highlighted by the recent Novice examination (the first), and that's the lack of examination centres.

Both the RSGB and the City & Guilds have expressed their concern at the small number of examination centres offering the Novice Examination. But, despite the fact that I share their concern, I know that this is not a new problem!

In my opinion, the situation has existed since financial pressures were placed on regional colleges and other educational establishments by local and central government. As a result, 'minority' interest subject teaching and examination facilities have suffered. Unfortunately for us, amateur radio falls into the minority interest category.

I've already mentioned my concern, regarding the diminishing RAE course and exam facilities, in a comment below Dave Mason G3ZPR's letter in the July *PW*'s 'Receiving You'. Dave's concern related directly to the RAE, but the problem is, I'm sure, going to apply to the Novice

Examination. We must all act now, if we're to overcome this problem.

Although it's only midway through June as I write, we're already receiving advance news of RAE classes. Please keep sending this information to *PW*. Don't forget, if **YOU** are running a class, with or without examination facilities at the completion of the course, please **DO** tell us.

All news on RAE classes will appear in 'Newsdesk '91', and we hope to have an up-to-date list available. Don't forget, even if you are not involved, but still have information on a class that's not receiving the necessary publicity, we'd like you to write and tell us **NOW**. Unless potential radio amateurs have full support from established radio enthusiasts, studying and preparing for the RAE could seem easy, when compared to the difficulty in finding an examination centre!

## Back To Earth

It's nice to know that Helen Sharman and her colleagues

from the JUNO mission are safely back on earth. Although I'm not directly involved in amateur radio 'in orbit' so to speak, I found the whole episode fascinating.

Although I wasn't able to play a part in the mission, I'm fairly certain that the MIR station was visible to the naked eye here in Dorset, when it passed over the UK on the Tuesday afternoon. In the past I have been able to see relatively low earth-orbiting spacecraft during daylight hours, but this time I'm not sure.

Did anyone else get a visual sighting? It would be interesting to hear if anyone else caught a glimpse of the craft. My possible sighting of the 'shack in the sky' made me feel that little bit closer to a magnificent educational effort. The JUNO mission has undoubtedly shown people both young and older, that science and technology are exciting and can make a wonderful hobby and a possible career.

73 DE Rob Mannion G3XFD

# Receiving You...

## Dear Sir

Please forgive my bad writing. For me, letter writing is something that nobody should have to suffer, but this is one letter I am determined to write!

I have to write the letter, for how can I otherwise thank *PW* for organising the Dayton HamVention tour. I can only describe the trip as the most enjoyable, and the greatest experience of amateur radio that I am ever likely to have.

The trip to Dayton itself was great (being the first time I have ever flown in an aircraft), but to arrive at the show and see so many people all sharing the same hobby is something that will stay with me for many years to come.

Unfortunately it will not be possible for me to go again in '92, but if you continue to organise the trips, **I WILL BE THERE IN '93**.

So to Rob G3XFD, to Roger G4TNT and the rest

of the gang, thank you all for making my trip, the holiday of a lifetime. I'll be thinking of you next year, but watch out in '93, I'll be first through the gate! I'm also grateful that *PW* even manages to get to us down here in Cornwall, so please keep up the good work!

**Brian Lucock G0LCJ  
Newquay, Cornwall**

**Editor's reply: We're glad you came Brian, and perhaps you'll be tempted by the Dayton '92 trip details in this issue. It was delightful to have two 'tastes of Cornwall' on the Dayton '91 trip. The second 'taste', much to everyone's surprise, was when the (American) airline served up scones and Cornish clotted cream, half-way over the Atlantic. Brian approved because the cream came from his home town!**

## Dear Sir

I have noticed the enthusiasm for the younger lads interested in valves.

I have boxes of ex-equipment valves, i.e. 6L6M, 6J7, 6K7, 6Q7, 6V6, 6K8, etc., and even a 25L6. These valves are mostly G and GT, with many 7, 8, or 9 pin types.

In fact, there must be at least 500 of all types. I even have some of my father's old valves such as types FC2, FC4, FC13C, MHD4, HL13DD and more.

The Octal-based valve line up for standard receivers may be had from me, for the lads at only the cost of the postage from me. I have no doubt that many more people are interested in valved equipment, including me.

**Rob Robins G8BSK  
St. Denys  
Southampton**



# Receiving You...

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

## ★★★★★STAR LETTER★★★★★

Dear Sir

I'm one of your regular readers, and a long standing admirer of *PW* from my small country - Bulgaria.

I would like to say many, many thanks to all who make *PW* so interesting, and so useful a radio amateur's magazine. I read many other magazines including: *Radio Rivista*, *CQ*, *DL*, *Radio Communication*, *DUBUS* and so on, but in my opinion *PW* is the best magazine. I read it with great pleasure.

The best, interesting and most useful reading for me is Amateur Satellites 'Satellite Scene', written by Pat Gowen. My most heartfelt appreciation goes to Pat, who spares no effort, and time to select and write the information for his articles. I'm also grateful for his highly readable style, and simple language form. Every month 'Satellite Scene' is very enjoyable.

Thanks must also go to all the authors who provide the wonderful constructional projects. Such articles are particularly important to Bulgarian radio amateurs.

To my great regret, I must say that prestige of Bulgarian radio amateurs is not good in the world of amateur radio. At least, it is not so good as I want it to be.

I am not going to deny that this evaluation is undeserved, but you must be told the reasons. In Bulgaria we do not have shops for amateur equipment or electronic components. It's impossible to buy materials for antennas, except for wire antennas.

There is no paper for QSL cards, and it's impossible to buy amateur radio books. The economic situation makes it difficult for our fascinating hobby. I'm sure that I can say that many good, intending radio amateurs give up due to difficulties.

There are few commercial transceivers in our country. Most amateurs here work with home-constructed equipment. Remarkable stations exist, despite this. For example LZ2US, Marko, has a good EME, with everything from antennas to receivers being home-built. Because of his excellent work, Marko has won many awards.

Because in Bulgaria we haven't the right to buy free currency, commercial equipment may be obtained only from the 'black' market, where it costs much more. A commercial transceiver, such as the FT-747, can cost 21 000 Levs, while a monthly salary in Bulgaria is approximately 250 Levs.

Many Bulgarians lose interest in the hobby because of the problems. In spite of this, I am optimistic and think that in future, conditions will change. Bulgarian radio amateurs will regain their international prestige. They won't be ashamed of their country, and they will be proud of their beautiful climate and new, friendly conditions for radio amateurs.

**Christo Mintchev**  
**Stara Zagora**  
**Bulgaria**

**Editor's comment: The *PW* team were delighted to receive your letter Christo. I had the great pleasure of meeting some of your countrymen at the Friedrichshafen show in Germany in 1990. We are all very pleased to hear you find the magazine so interesting. Perhaps you could send us an article, with lots of photographs, so we can learn more about amateur radio in Bulgaria. We look forward to hearing more from you and your friends.**

Dear Sir

Reference 'Keylines' in the June issue of *PW*.

My inner feelings, since becoming a 'B' Licensee, have been totally expressed by G3XFD, and I doubt anybody could have done it better.

Paragraph three on page 16, makes no bones about it. I would only change **ONE WORD** in 'Keylines'. Instead of saying, at the end of column three in the paragraph "Surely, if ....." it might better start: "Surely, since....."!

Are we not already on the hook? We are! I agree heartily with what you say immediately. It should also apply to all new radio amateurs.

I suggest that new A class licensees must

not use h.f. in their first year, even though they have their Morse ticket. In year one they must use a 'B' callsign **SUFFIX**, and on 30MHz+ only.

The suffix can be dropped after a year when they have experienced 'B' frequencies. A new G0ZZZ/7 on v.h.f. for a year, would drop the suffix and graduate painlessly to G0ZZZ, being backed up by his first renewal document.

The Radiocommunications Agency should give this suggestion a green flag. By the way, as a schoolboy in 1932, I enjoyed the *PW* number one issue!

**S. R. Bourne G1IAI**  
**Newport**  
**Isle of Wight**

Dear Sir

Like you, ('Keylines' June *PW*) I have on occasions sensed a condescending attitude to class B licensees. I find this rather odd, when I think of the historical background to the licence.

In the old days, most amateurs built their own equipment for transmitting. They learned Morse because c.w. was the easiest way to get on the air and work some DX. Self-trained Morse operators would also prove to be a valuable asset in wartime. At the same time, operation on 'phone required big amplifiers, massive modulation transformers and a deep pocket!

The class B licence was introduced much later for the benefit of the technical wizards who wanted to experiment with v.h.f. and TV. By this time, the authorities were presumably looking more for potential TV and radar technicians. For both parties, the Morse code was irrelevant and there were no implications of second class citizenship.

Nowadays, most amateurs operate with factory made equipment. This will often have synthesised oscillators and digital frequency readout, and be able to generate any mode required. Class distinctions between Class A, B (and CB for that matter) shouldn't persist. If knowledge of Morse code is not needed on 27MHz, it cannot be essential on 28MHz.

We can live with a little misplaced snobbery. But, the narrow-minded attitude which it infers, has affected current developments, particularly project YEAR and the introductory stages of the Novice licence.

**Phil Mayer GOKKL**  
**Poole**  
**Dorset**



# Competition Corner

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., August 1991 Spot The Difference Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP.

Closing Date 23 August 1991.

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

Name .....

Address .....

.....

.....

.....

.....

Postcode .....

☐ Subscription

☐ Vouchers (please specify)

## Services

### Queries

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

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

### Back Numbers & Binders

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

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 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 45p per minute peak time and 34p per minute off-peak. The number to ring is: (0898) 654632.



## New Catalogue

West Midlands based **T.A.R. Communications** now have details of their extended range of antenna and associated hardware products, published in a new 1991 Summer Catalogue edition.

This company's range of products concentrates on antennas, hardware and literally everything associated with rigging techniques. The free catalogue, complete with discount vouchers, clearly illustrates their particularly extensive range of hardware, rotators and antennas.

For further details of T.A.R. Communications's business, marine, p.m.r., air-band and custom-built antennas services, contact (0384) 390944.

## Help!

Could anyone help Ken Hatton, in locating a static voltmeter?

Ken G4IZW, represents 'The Not Forgotten' society, an organisation helping disabled ex-servicemen, and for over 23 years he has been engaged in the design and provision of various electro-mechanical aids for the handicapped.

If anyone could help, please contact Ken at:

**Hamilton House**

**Boat Road**

**Bellingham**

**Northumberland NE48 2AP.**

## Special Event Station GB4RAF

The RAF station at Valley in North Wales, is commemorating 70 years of No. 4 Flying Training School on Saturday 17 August. It's also RAF Valley's Open Day and Air Show. Assistance is being provided by Dragon ARC and RAF ARS. More details from:

**Dave Keeley GW00GI on (0407) 810396.**

## BBC To Close Daventry Shortwave Station

The BBC is to close its oldest transmitting station - The high frequency short wave operation at Daventry, Northamptonshire.

World Service programmes, currently beamed abroad from Daventry, will be transferred next year to the BBC transmitters at Woofferton in Shropshire. The transfer will begin in April 1992, and it's expected to be completed by the end of the year.

The transfer has been made possible by a reduction in the Voice of America's use of Woofferton. Under a reciprocal agreement dating back to 1943, Woofferton has been operated by the BBC for the transmission of VOA programmes as well as its own.

Between 30 and 40 jobs will be lost as a result of the closure, and the BBC will be seeking to resettle staff involved at other locations as vacancies arise.

Daventry was opened in 1925 as a long wave transmitter. Regional transmitter services were added in 1927 and the forerunner to today's World Service was inaugurated from Daventry in 1932. Until 1978, Daventry was also the home of the medium wave transmitter for the BBC's Radio 3 service.

The BBC will continue to have a presence at Daventry after the transmitters go off the air. The site will be used as a maintenance base servicing the BBC's domestic Radio and Television transmitting stations in the area.

## Radio Amateurs' Course

A RAE course is to be held at Rhondda College. The full session length is to be from September to May. Classes are to be held each week for two and a half hours per evening, on possibly, but not definitely Monday evenings. Students male or female, young or not-so-young, all welcome. Further information from the course tutor **John Howells GW4BUZ on (0443) 432187 or 432542.**

## Beginners' Guide

Siskin Electronics, probably better known for their support of packet radio, have a 71-page beginners' guide to IBM PC computing. Many of you will have ventured into the world of computing via this route, and may be finding that the manuals supplied are a little too vague or difficult.

Follow the easy-to-read chapters in the book by Don Bradbury and learn to 'drive' the beast a little better. Normally priced at £3.95, but mention that you are a *PW* reader and it's yours for only £2.95.

*A Guide To Personal Computing* by Don Bradbury, available for £3.95 (£2.95 *PW*) from: **Siskin Electronics Ltd.**  
**2 South Street**  
**Hythe, Southampton SO4 6EB.**  
**Tel: (0703) 207587/207155.**

## COMPETITION WINNERS

### December 1990: Wordsearch Competition

**Winner:** Mrs L. Jasper from Bognor Regis, Sussex  
**Runners-up:** Mr C. Howson from Norwich, Norfolk. Mr L. Ellison from Onchan, Isle of Man.

### January 1991: Crossword Competition

**Winner:** Mr P. Polson from Fife, Scotland  
**Runners-up:** Mrs M. Sables from Deepcar, Sheffield. Mr H. Wagg from Wirral, Cheshire.

### February 1991: Spot The Difference Competition

**Winner:** Mrs H. Studdart from Deeside, Clwyd  
**Runners-up:** Mr C. Sansom from Horsington, Somerset. Mr I. Maywood from Avoch, Rosshire.

### February 1991: What on Earth Competition

**Winner:** Mr C. Morse, from North Walsham, Norfolk  
**Runner-up:** Liz Emery from Kencot, Glos.  
**CORRECT ANSWER:** RF counter measures aircraft.

### March 1991: Wordsearch Competition

**Winner:** Mr Prasad from Hyderabad, India  
**Runners-up:** Mr C. Clark from Dingwall, Rosshire. Mr P. Murphy from Cork, Eire.

### April 1991: Spot The Difference Competition

**Winner:** Mrs M. Murray from Edinburgh, Scotland  
**Runners-up:** Miss P. West from Paignton, South Devon. Mr E. Gauci from Malta.

### May 1991: Smartuner Competition

**Winner:** Mr D. Walpole from Norwich, Norfolk  
**Runners-up:** J. Morris from Alford, Aberdeenshire. P. Jordan from Reading, Berkshire. E. Trowell from Sheerness, Kent. K. Hemmrich from Olching, Fed Rep. of Germany.

### May 1991: CB Loop Competition

**Winner:** Jack Pellam from Wittering, Cambridgeshire. Name suggested: CAP 27 Commander.  
**Runners-up:** D. W. Friend from Horley, Surrey. Wayne Haverson from Emsworth, Hants. R. S. Bibb from Kettering, Northants.

## BARTG

Membership of the British Amateur Radio Teledata Group for 1991 is £10 for the year. You can join by sending your £10, name and address to:

**Miss Ann Reynolds G6ZTF**  
**169 Bell Green Road**  
**Coventry CV6 7GW.**

**BARTG News** is now put onto packet using the callsign of GB2ATG and sent to GBR. Some transmissions on 14MHz RTTY continue, this depends on the willingness of the local newsreaders to continue transmissions. The 3.5 and 14MHz transmissions still continue using RTTY.

### Software Sales

are now handled by:  
**John Barber G4SKA**  
**32 Wellbrook Street**  
**Tiverton**  
**Devon EX16 5JW.**

### Publication Sales

are now handled by:  
**Ted Batts G8LWY**  
**27 Cranmer Court**  
**Richmond Road**  
**Kingston-on-Thames**  
**Surrey KT2 5PY.**

### Secretary and Publicity Officer is:

**Ian Brothwell G4EAN**  
**56 Arnot Hill Road**  
**Arnold**  
**Nottingham NG5 6LQ.**

## Air Training Corps 50th Anniversary

The above special event station 'GB50ATC' will be on the air from the 20th to 23rd November 1991 from 1365 Squadron in Aylesbury, Buckinghamshire.

Operating on the 3.5, 7, 14 and 144MHz bands using f.m., s.s.b. and c.w., depending on time, radio conditions and the operators available.

Primary frequencies are 3.710, 7.045 and 14.290MHz. For long distance communications they'll be on air 1200hrs GMT daily on 14.290MHz.

There will be special QSL cards sent to all stations worked and for s.w.l.s and you can QSL via the Bureau or direct to G4PSH.

For further information, contact:

**Terry Owen**  
**4 Stonehaven Road**  
**Aylesbury**  
**Buckinghamshire HP19 3JQ.**  
**Tel: (0296) 85760.**

## Try-Before-Buy Software

Venus Electronics are continually updating their shareware catalogue. This 12-page short form catalogue has sections covering business to games, word-processing to flight training. These shareware disks are a wonderful way of building up programs that suit you. It really is try-before-buy!

For a catalogue contact:

**Venus Electronics**  
**26 Pevensey Way**  
**Frimley**  
**Camberley GU16 5YJ.**  
**Tel: (0252) 837860.**

## Blue Rose Electronics

Surface mount technology is becoming more popular with radio construction enthusiasts. Blue Rose Electronics, based in Warrington, have published their latest catalogue which is packed with all the necessary details on surface mounting devices, related materials, prices and applications.

In reality, this A4-sized booklet which costs £1.50, should be regarded as a comprehensive combined designer's handbook and catalogue, dealing with the steadily growing application of the surface mount device. For further details contact **Blue Rose Electronics on (0925) 727848**.

## Morse Class

A new Morse code course will commence in September 1991 at Oldswinford Hospital School, Heath Lane, Stourbridge.

Primarily aimed at the 12w.p.m. Amateur Radio Morse Test, the course will run until Easter 1992, and will include hints on operating procedures and a weekly on-air net.

For enrolment details, please contact the tutor, **Phil Harris G4SPZ on (0299) 403025**.

## Shropshire Morse Course

Wellington College of Arts & Technology will, for the first time, be running a Morse course. Enrolment dates are Monday 9th and Tuesday 10th September 1991. The course will run for 10 weeks on a Thursday evening 7 to 9pm. The cost will be £22 and the course objective will be 12 words per minute. For more details, contact the course tutor John Christopher GOISI at: **Wellington College of Arts & Technology Heybridge Road Wellington Telford Shropshire**.

# Newsdesk '91

## Radio Scouting

The National HQ of the Boy Scouts of America K2BSA, will soon have their own station at Camp Wilson in Dallas County. The site is being sponsored by numerous groups including K2BSA, ARA, AMSAT International, Southwest Dallas ARC, Texas Utilities ARC and the Dallas remote imaging group.

Operations are planned to include h.f., v.h.f., u.h.f., packet, satellite, AmTOR and ATV.

The station will be the main control station for an amateur radio network of 29 Scout stations worldwide.

## Radio Amateurs' Course

North Trafford College are offering another Radio Amateur's Course this year. It starts in September, with the Course Tutor being J. T. Beaumont G3NGD. Theory will be covered on Monday evenings or Wednesday afternoons, amateur television on Tuesday evenings or Wednesday afternoons, advanced Morse code on a Monday evening. The full day course (Wednesday) should appeal to retired or unemployed people, as a successful student could apply for an 'A' licence at the end of the first year. **Enrolment dates are September 2nd, 3rd and 4th. North Trafford College Talbot Road Centre Stretford Manchester M32 0XH. Tel: 061-872 3731.**

## Amateur Radio Class

The popular Cambridge class will run on Tuesday evenings, 7 to 9pm, from September 24, until the examination in May 1992. It is being held at Chesterton Community College, Gilbert Road, Cambridge. The enrolment evenings are Tuesday 10th and Wednesday 11th September, 7 to 9pm. The fee for the whole course is £73, and early application is advised. The course tutor is **Martin Mann G4FFO, telephone (0223) 860150**.

## Scottish Tourist Board RA Expedition Group

On July 20/21 - GB60NTS will be on the air for the National Trust for Scotland Diamond Jubilee Celebration Weekend. The event will be held in Pollok House, Pollok Park, Glasgow. This is where NTS was born and where six men discussed forming the organisation 60 years ago.

The Trust was founded as a Charity in 1931 by a Private Act of Parliament. It was founded to promote the permanent preservation, for the benefit of the Nation, of lands and buildings in Scotland of national interest or national beauty. There's a special QSL card for every contact.

**John (Paddy) McGill GM3MTH Tel: (0236) 40495.**

## Radio Amateurs' Exam

Havering College of Further & Higher Education, will run a Radio Amateur Examination preparation class starting on Monday September 9, and a Morse Examination class starting Thursday 12 September. For more information write to Stuart Woosnam G0NKP or Chris Potarzycki G0NJR at: **Havering College of F & HE Quares Campus Tring Gardens Harold Hill Romford Essex RM3 9ES. ortelephone (0402) 381460 Ext. 7131.**

## Club News

**Derby & District ARS** meet Wednesdays, 7.30pm at 119 Green Lane, Derby. July 17 is a Barbeque - Drum Hill, Little Eaton, the 24th is 'PMR Peripherals' talk by Mobicom Ltd., the 31st is 'Satellites and High Definition Television' by Chris Muriel G3ZDM and August 7 is a Junk Sale. Details from **Richard Buckley G3VGV on (0773) 852475**.

**Salisbury Radio & Electronics Society** meet at Grovesnor House, Churchfields Road, Salisbury, 7.30pm. On July 23 a Video will be shown all about 'Aerials and their Design' from a lecture given by Louis Varney G5RV. For more information, contact **David Kennedy, 'Celeborn', 11 Silverwood Drive, Laverstock, Salisbury SP1 1SH. Tel: (0722) 330971** evenings and weekends.

**Wakefield & District RS** meet Tuesdays, 8pm in the First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. July 16 is a Car Treasure Hunt - G0FLX, the 23rd is Morse Operating - G0BQB, the 30th is On the Air (CW) and August 6 is a Visit to Rally Site (Rodillian School). Details from **John-Lloyd Bailes G0MVA, 239 Towngate, Ossett, West Yorkshire WF2 0QE. Tel: (0924) 220048**.

**Bromsgrove ARS** meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. July 23 is a 145MHz Direction Finding Contest (G2FTY). **Mr D. Edwards G4ZVR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075**.

**Norfolk ARC** meet Wednesdays, 7.30pm at 'The Norfolk Dumping', The Livestock Market, Harford, Norwich. July 17 is an Informal & Committee meeting, the 24th is 'Keeping the Trains Running' by Mike Rowe of British Rail, the 31st is a Quiz - with a difference, August 4 is a Club outing to Woburn Rally and the 7th is HFSSB NFD/Town & Country Show briefing. Details from **Jack Simpson G3NJQ on (0603) 747992**.

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Tennis Club, Midgeland Road, Blackpool. July 25/August 8 are Informals. **Eric Fielding G4IHF on (0253) 726685**.

**Braintree & District ARS** meet 1st & 3rd Mondays at the Community Centre, Victoria Street. July 15 is 'Tools & Techniques' by David G3PEN and August 5 is 'Travel Talk' by David G0KQV. **M. Andrews, 22 Arnheim Grove, Braintree, Essex CM7 5UQ. Tel: (0376) 27431**.

**Loughton & District ARS** meet in Room 14 of Loughton Hall at 7.45pm. July 12 is 'Computers in Banking' by Mike G4KCK. More details from **Mike Pilsbury G4KCK on 081-504 4581**.

**Couldson ATS** meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. July 8 is a 144MHz Fox Hunt, assemble at Grovelands Road. **Andy Briers G0KZT on 081-668 7004**.

**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. July 18 is an extraordinary general meeting plus Video evening, August 1 is a Committee meeting at G3CDK, the 4th is the Woburn Rally and the 5th is a natter night. Further details from **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA**.

**Three Counties ARC** meet every other Wednesday, 8pm at the Railway Hotel, Liphook. July 17 is 'Telecommunications in the North Sea' and the 31st is a Computer night. More info from **Kevin G8GOS on (0420) 83091**.

**Aylesbury Vale RS** meet 1st & 3rd Wednesdays, 8pm at the old Village Hall in Hardwick, except during June, July and August, when there is only one meeting on the 1st Wednesday of the month. August 7 is a talk by Dave Thorn G8EOW on 'Getting Properly Connected'. Details from **Martyn Baker G0GMB on (0908) 560026**.

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. July 16 is 'Planning Permission for Aerials' by Peter G3WYK, the 21st is the McMichael rally and August 1 is a 144MHz Fox Hunt. For further information, contact **Neil G8XYN on (0628) 25952**.

**Grafton RS** meet Fridays, 8pm at Holy Trinity Church Hall, Stapleton Hall Road, London N4. July 19 is 'WWII Radio Interception'. Further info from **Rodney Harrigan G0JUZ on 081-368 8154**.

**Prudential ARS** is open to employees of the Prudential companies and you can get details from Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF6 4TE. Tel: (0222) 512959.

**Mansfield ARS** have a Junk Sale on August 1. They meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield, 7.45pm. **Mary G0NZA on (0623) 755288**.

**Bradford ARS** meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Servicemen Club, Shearbridge Road, Bradford, West Yorkshire. August 8 is a discussion evening on 'The Novice Licence'. For more details, contact **Charles Bolt G0ACX, 55 Leyside Drive, Allerton, Bradford, West Yorkshire BD15 7BY. Tel: (0274) 494694**.

**Gloucester ARS** meet at St. John's Ambulance HQ, Heathville Road, Gloucester, 7.30pm. August 7 is 'Something Different'. Details from **Mrs J. Beckingham on (0425) 28533 Ext. 2741**.

**Wimbledon & District ARS** meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. July 12 is 'Weather Satellite Update' by Dave Young G8VXB, the 26th is camp briefing and August 3-11 is annual camp, Barwell Estate, Chessington, Surrey. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427**.

**Echelford ARS** meet in the Community Hall, St. Martin's Court, Kingston Crescent, Ashford, Middlesex, 7.30pm. July 25 is Chairman's evening. More details from **P. Townshend G6PMT on (0344) 843472**.

**Ipswich RC** have a new secretary, **RS S. M. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ**.

**Nottingham ARC** meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. On July 18 they have a 144MHz Fox Hunt & Activity on the Air, the 25th is a demonstration of 'Mast and Aerial Erection' by Martin G6ABU and August 1 is a talk on 'AMTOR' by Alan G3XOF. They are also running a special event station at Gedling Comprehensive School on July 13. Further details from **Rex Beastall on (0602) 733740**.



# Come Fly With Us

*Last month we brought you the Dayton Show report. This time, Roger Hall G4TNT shares some of the highlights and adventures of the first readers' trip to Dayton. Then he lets you in on our plans for the 1992 trip.*

I had dreamed about going to the Dayton HamVention for many years. In 1990, expansion plans at PW Publishing meant that at last, I had my chance.

The trip was marvellous. I met so many people who were interested in *PW* and *Short Wave Magazine*, that we decided to have a booth there in 1991. I also thought it would be an excellent idea to share the experience with our readers, and so the Dayton Readers' Trip was born.

## Good Idea

It seemed like a good idea at the time, but snags appeared as soon as work started on the project. I was about to discover that there were to be one or two problems on the way.

The Gulf War, and airlines not wanting to give me firm prices, caused a few headaches. More aspirins were needed, when I realised that the RSGB show at the NEC clashed with Dayton. I began to wonder if we would ever get there!

## Dayton Departure

I needn't have worried. It was alright on the night! The airline tickets were issued, the rooms organised, and the booth was booked. Suddenly, it was time to go.

I went out a couple of days before the main party to help get the booth ready. Another job was to smooth the way at the Hotel, and arrange buses, etc.

By Thursday evening the booth had been set up, the three day tickets to the show collected and the Hotel was ready for us. I had also managed to get into Cincinnati to find out about coaches for next year. Flying this route will save us having to change planes during the Dayton 1992 trip.

## Dayton Arrival

When I arrived at Dayton airport that evening, I found Rob Mannion G3XFD, and about 30 readers standing outside. It had been a long flight, although some of the party had taken just as long to reach Gatwick from their homes. They'd come from as far away as Cornwall and Newcastle!

A quick phone call to our Hotel, the 'Radisson Inn', soon brought the buses to pick us up. It wasn't very long before Rob's party were hurrying to their rooms to sleep off the effects of the journey.

## Airport Adventures

The *PW* party members had enjoyed the trip and I managed to have a chat to several before they headed off to bed. This was when I first heard about the Gatwick adventures.

The adventures started when one of the party simply vanished, but luckily he reappeared just before the flight was due to leave. Then another member of the party, who'll remain nameless in print, very nearly missed the flight because he upset the security staff.

It reached a stage where the Special Branch were called in, and it was only one of life's little coincidences that saved him. It turned out that the Special Branch Officer knew Rob from years ago, AND that he turned out to be a *PW* reader!

I don't know what was said, but the Special Branch officer eventually decided to leave the telling-off for Rob to do. So, accompanied by a lot of finger wagging, the party thankfully headed for the aircraft.

The flight was uneventful, but Mike Stott G0NEE, brightened up the journey. Generous Mike endeared himself to everyone, by providing decorative blankets and luggage straps. The cabin staff were amused, and impressed, when they saw everyone wrapped in blankets embroidered with the logo "PW RULES OK!"

## Early Start

Although the show opened officially at 12pm on the Friday, most of our party went a lot earlier because the flea market opened at 8am! An early start is needed, because as Les G0SKF said, "Even after three days I didn't get to see it all".

If you've never been to America, it's almost impossible to appreciate how cheaply you can eat. Rob G3XFD, all six foot eight inches of him, with matching giant-sized appetite, ate regularly at the appropriately named 'Big Boys' restaurant. Here, even Rob could have all he could eat for around \$5!

## Free Buses

It's easy to get there. Free buses run to and from the Hara Arena, the local malls, hotels and tourist attractions. So, you don't need a car on this trip!

Most people found the time to use the buses to visit one of the other attractions or a shopping mall. The nearest, the Salem Mall, is just five minutes away by bus, and it contains more than 100 shops and 22 eating places. The Dayton Mall at the other end of town has almost 140 shops, 25 eating places, 8 cinemas and parking for 7000 cars!

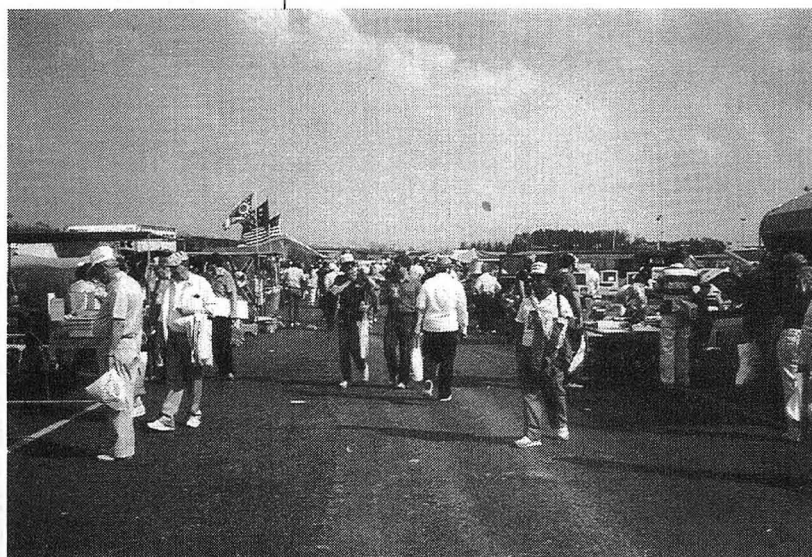
Shopping in America is a revelation to most visitors. Almost everything costs the dollar equivalent to the amount we pay in pounds, or less! I bought Ralph Lauren, Yves Saint Laurent shirts (they were on special offer at about \$20 each) and a couple of pairs of trousers (Levi Dockers at \$18) to accommodate my expanding waistline.

Now I wish I'd taken a bigger suitcase and bought more, especially when I noticed that the 'Sears' shop had a sale on, and Levi 501s were going for \$18.95. One of our readers had been given a shopping list by his children, and he spent \$600 on trainers for them!

## Never Crowded

During the day the HamVention was always busy, but never crowded. This is surprising when you consider that more than 30 000 people attended each day. On the booth I met many of our American and Canadian readers, and had the chance to get the latest news from readers coming to chat about their latest discovery or bargain buy.

I didn't manage to attend any of the 50 or so forums



**The Dayton HamVention giant flea market is an Aladdin's Cave of delight for everyone.**

# To Dayton '92

that were taking place, but I heard later that they were very interesting. Unfortunately, there just wasn't enough time.

Elaine Richards G4LFM, from *Short Wave Magazine* went to the talk for SWL and Scanner Listeners, where she picked up some hot news on the new Drake receiver. The good news is that *Short Wave Magazine* will be reviewing the receiver, as soon as one becomes available.

## Alternate Activities

Unfortunately, I also missed all the 'Alternate Activities' which are aimed mainly at visitors' wives and girlfriends. This year, there were 35 talks and craft classes covering Glass Etching, Wheat Weaving, Shrink Art, Counted Cross Stitch and so on. We heard that they were very well attended, so they must have been good if they kept people away from the shopping malls.

The show organisers know that Dayton is a family affair, so they also arrange lots of activities for children. That's how I met 'Presto The Clown', who was there to entertain at a childrens' party.

We swapped balloon models, I showed him a poodle I'd made, and he showed me his teddy bear and so on. But I had to admit defeat in the end, when he made a motorbike large enough for a child to sit on!

Parents were also given a chance to rest on Sunday morning. Mum and Dad were able to relax while the children went off on a trip, where they had fun and food before they were returned to suitably refreshed parents.

## Ray And Alan Entertain

Most people were happy with eating at 'Big Boys', but one evening there was the chance of a real treat. The surprise came when Ray Withers and Alan Hooker, both well known to *PW* readers, decided to organise something different.

Alan and Ray took a group of readers to a local restaurant and bought everyone a meal. We provided the drinks, and when I say the party poured itself into the bus back to the Hotel, I've chosen my words carefully!

I learnt a lot at the party. If you ever need any advice on how to make an antenna out of drinking straws, just ask Tony G4IMZ. With only the aid of Elaine's penknife and a torch borrowed from Liz' G0JWN, he constructed some wonderfully intricate beam antennas.

## Early Shopping

I'm afraid that there's not enough space to tell you everything about the official and unofficial evening events. But I can tell you about the night we went shopping at 2am, only to find the enormous store was packed out with shoppers and their children!

Other party members had found time to visit the huge aircraft museum. It's particularly good and Dayton can never be accused of forgetting that the pioneering aviators, the Wright brothers, came from the city.

## Honesty Rewarded

To round off, I must pass on a delightfully true story that Terry Edwards of Radio Shack told me. He was in the main arena listening to Jim Simpson, a friend of his, drawing the winning tickets for the \$100 000 worth of prizes given away this year.

Suddenly, Jim broke off in the middle of the draw because he said he'd an important announcement to make. Jim announced that early that day, someone had lost an unmarked envelope containing \$1800. Fortunately it had been found, handed in to the office and returned to its grateful owner.

The announcement drew a gasp of admiration and a



round of applause from the audience for the honest amateur who had returned the envelope. The draw then restarted, but a few minutes later Jim stopped again, because there was something to add to the story.

Jim announced that the people on the Icom stand were so impressed by the honesty of the person who'd returned the money, that they were presenting one of their top-of-the-range transceivers as a reward. This was greeted by even louder applause from the crowd. This reaction, to me, typified the show. It was full of good people having an excellent time.

## Planning Next Year

For the Dayton '92 trip, we're planning to fly straight into Cincinnati. We'll then go by coach for the last 50 miles into Dayton, to avoid changing planes.

We've overcome any possible Hotel problems, but the number of places available for next year is strictly limited. If you're interested, fill in the coupon below and we'll send more details as they become available.

The cost should cost be around £500-£600, but don't send any money now. If you decide to come with us, we'll ask for a deposit nearer the time. We're also hoping to offer options such as extended holidays to enable you to explore America independently. As another alternative, complete holidays in Florida or California can be arranged.

All you have to do is to send the **Freepost** coupon to me at the address below and I'll look forward to seeing you on the Dayton '92 trip.

**George Dobbs G3RJV (right) introduces some of the *PW* party to US and Canadian QRPers. Liz G0JWN is wondering why *PW* Editor (G3XFD) comes so big! The jovial character with the black beard and box on his head is Mike Stott GONEE.**

I am interested in the Dayton '92 Trip. Please put me on your mailing list and send me further details as they become available.

Name .....

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.....

.....

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# The PW Chatterbox 1.8MHz AM Transmitter And Receiver

## Part 1

The amateur band between 1.8 and 2MHz is a little odd, in that we rarely hear anyone calling it 1.8MHz. More often it's referred to by its affectionate nickname 'Top Band'.

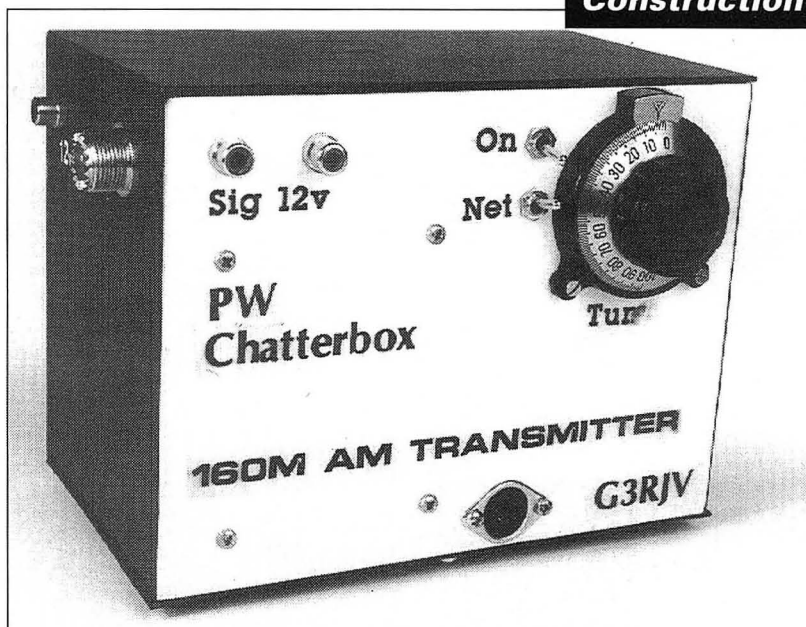
If you talk to any radio amateur who has been licenced for 20 years or more, and mention 'Top Band', you'll see his eyes glaze over! The corners of his mouth will then begin to rise, and you'll hear endless stories of the Sunday morning nets on a.m.

The local 'natter' on Top Band, particularly using a.m. equipment, has a firm place in the folklore of amateur radio. It's something many of us have grown up with, and now you can join in too!

### The Idea

In recent years I have had few excursions on the band, except for the occasional relaxing c.w. QSO. It's a pleasant band, a place to relax and make friends. Despite this, I must admit to being a little surprised, when PW's editor asked me if I had thought of designing an amplitude modulated transceiver for 1.8MHz.

Apparently, the idea originated as a request from readers. It seems that, almost unknown to me, groups of radio amateurs had been forming a.m. nets on the band. It sounded like fun, and so the 'Chatterbox' project was soon under way.



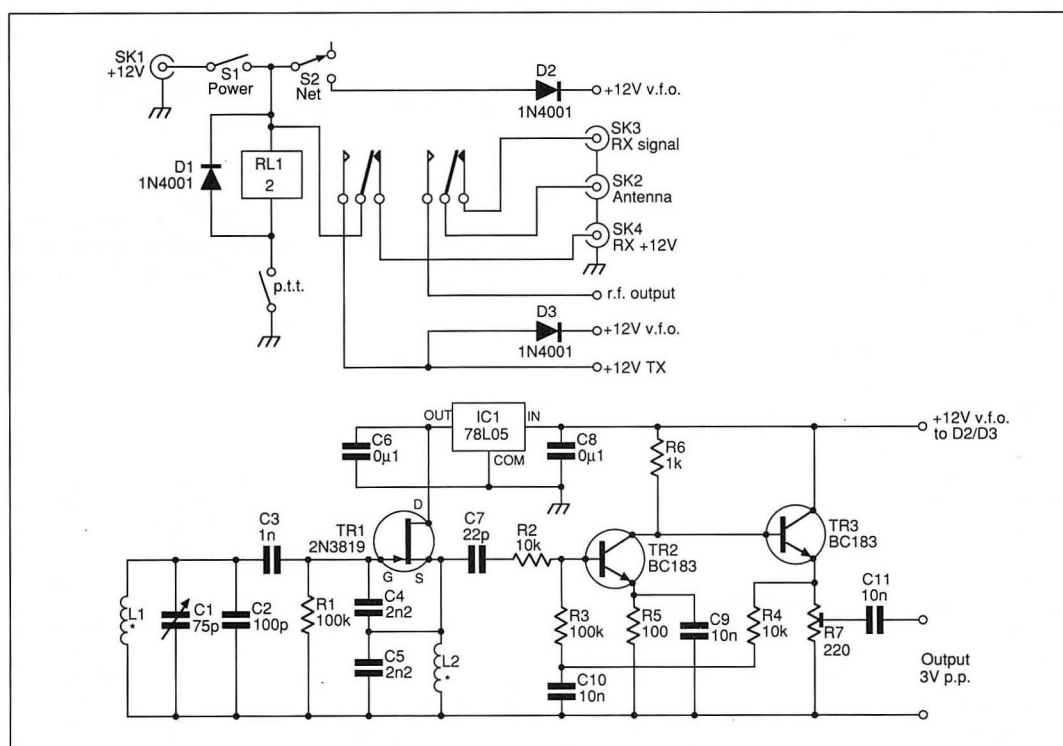
### The Chatterbox

The Chatterbox is designed as a rig for the local 1.8MHz a.m. net, although I will describe how it can be used on c.w. with up to 10W input. But you should bear in mind that the basic design is dedicated to a.m. use.

The Chatterbox is made up of a separate transmitter and receiver. This approach goes back to the old days of 1.8MHz equipment, but I must admit that nostalgia was not the primary aim.

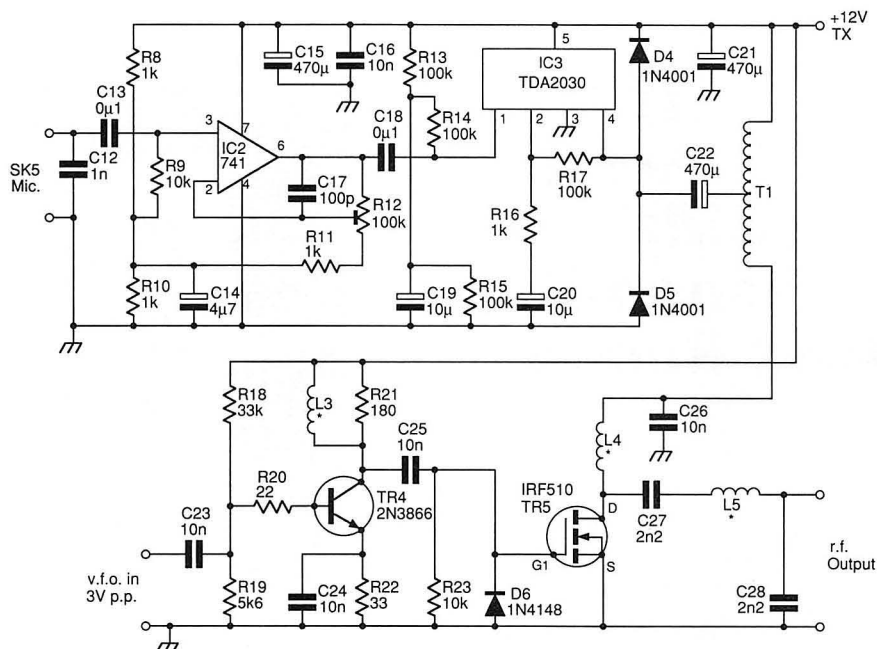
I decided that when building an a.m. receiver for local use, it's very much easier to have separate units. I also think that many people will only want to build the transmitter, as they'll already have a suitable receiver.

*There's been a lot of interest in 1.8MHz a.m. operation recently. To get you on 'Top Band', the Rev. George Dobbs G3RJV and Ian Keyser G3ROO, have come up with the PW Chatterbox, a complete a.m. station.*

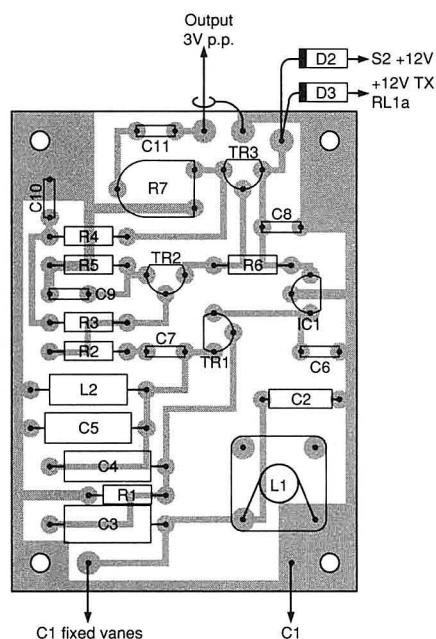


**Fig. 1.1: The PW Chatterbox v.f.o. circuitry (below) with the switching and control circuitry shown above.**





**Fig.1.2: The Chatterbox modulator (above), driver and power amplifier stage (below) circuitry.**



**Fig. 1.3: Layout of the v.f.o. p.c.b. with component overlay (left) with the underside of the single-sided p.c.b. showing copper tracks, on the right.**

### Simple Receiver

The receiver portion of the Chatterbox is a simple a.m. only design, capable of matching the performance of the transmitter. If you require a 1.8MHz DX receiver, you'll have to look elsewhere!

To fall in line with these ideas, the prototype transmitter and receiver were built in separate, but linked, boxes. The styling is rather like the famous B2 'Spy' transmitter-receivers, once so popular on the bands.

When I began work on the project, I spoke to Ian Keyser G3ROO, and we were soon working jointly on the idea. There are few problems in getting a solid state, 10W c.w. signal on 1.8MHz. The problem comes when you're looking for the easy production of amplitude modulation.

Ian told me of the excellent a.m. signal put out on the band by Doug G4RGN, on a 1.8MHz net in Kent. Doug very kindly supplied us with his circuit, which

is simple, neat and works very well and it forms the basis of the Chatterbox transmitter.

The transmitter is a real joy to use. The p.a. stage is almost 'bomb-proof' and is very efficient. You can obtain 10W out for approximately 12W input. I could almost claim that it's a solid state switch working at a frequency of 2MHz!

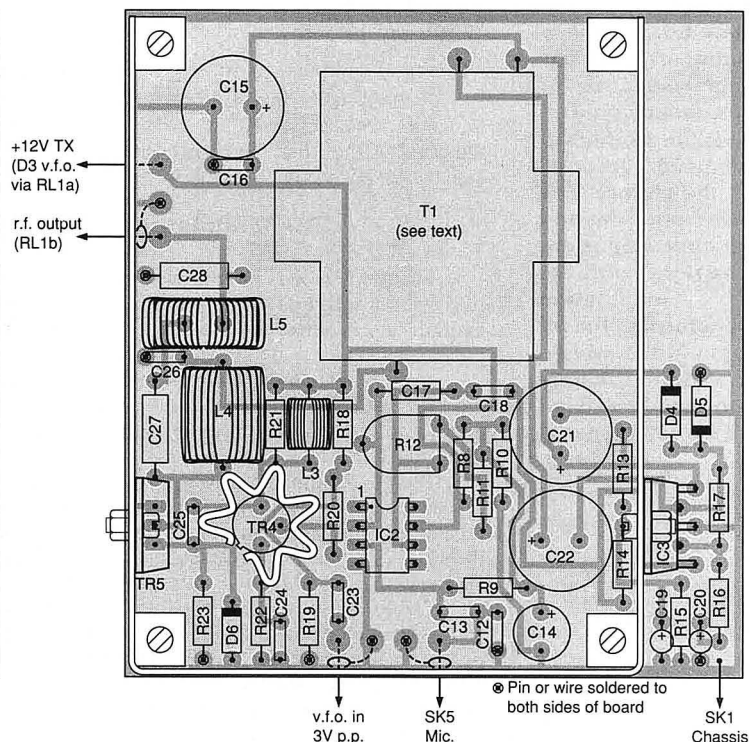
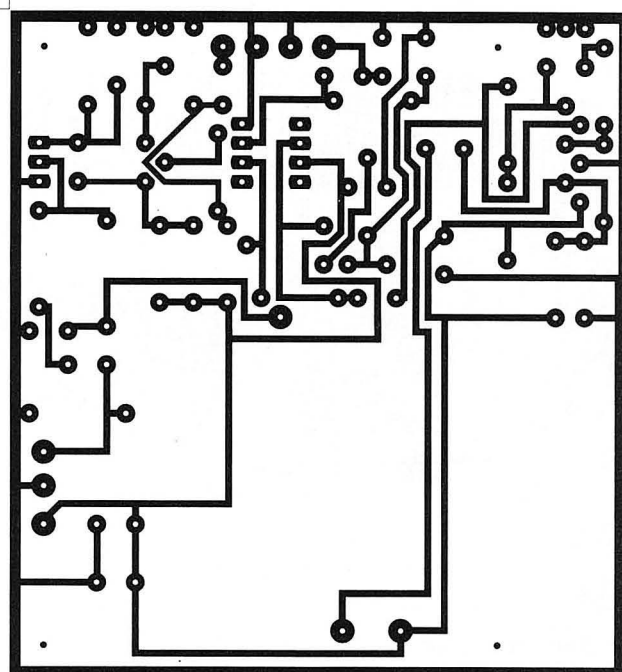
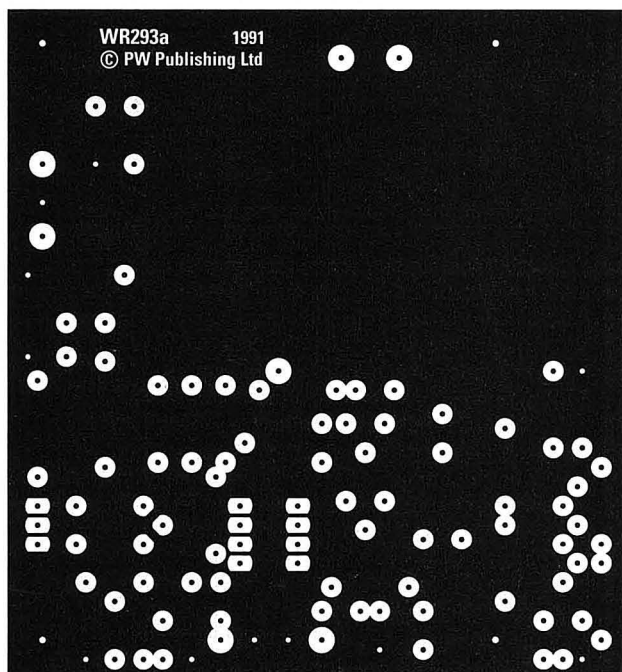
### Familiar Circuit

The circuit of the v.f.o. is shown in **Fig. 1.1**. It's that familiar favourite, the parallel tuned Colpitts circuit that I, and hundreds of others use whenever a v.f.o. is required for the h.f. bands.

The v.f.o. is capable of high output and has a preset, R7, to control the output. This may require adjustment for optimum results, and the best modulation quality.

Good quality polystyrene capacitors are used for the frequency determining portions of the circuit. The

**Fig.1.4: The component overlay and copper track layout of the double-sided Chatterbox p.a. and modulator p.c.b.**



capacitors involved are C2-5.

The v.f.o. tuning inductor, L1, is close-wound on a 7mm former with a core (Maplin LB17T or similar surplus former). I hold the turns in place with bees wax to add stability. Mechanical stability is important throughout the v.f.o. Although oscillator stability should present few problems at 2MHz, a badly built v.f.o. will drift.

Extra stability is provided by two stages of buffering amplification, coupled with a regulated supply line for the f.e.t. oscillator stage. The v.f.o. should be built in its own screened box. It also requires a slow motion drive and I used a 6:1 vernier drive and dial in the prototype.

### Transmitter Board

The circuit for the main transmitter board is shown in Fig. 1.2. This board contains both the transmit stages and the amplitude modulator.

The modulator forms the top part of the circuit diagram and the transmit driver and power amplifier the lower portion. We'll consider the r.f. portion of this stage first.

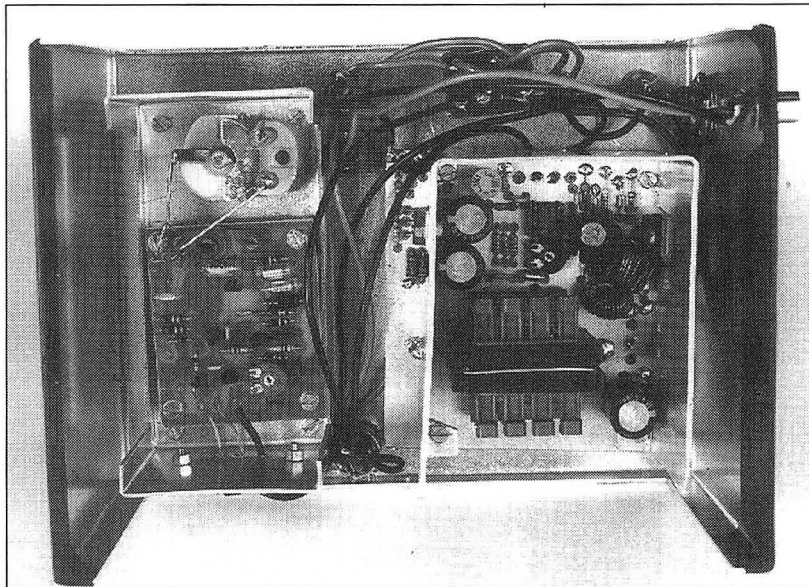
The output from the v.f.o. is fed into a single driver stage, which is a 2N3866 bipolar transistor. A homewound r.f. choke, L3, damped by a 180Ω resistor forms a wideband load.

### Power Amplifier

The power amplifier is an IRF510 power f.e.t. with an r.f. load comprising L4. This stage is modulated with the aid of an audio frequency transformer, T1. The output has a low pass filter formed around L5 and C28.

The diode, D6, acts as a d.c. restorer. The f.e.t. requires a turn-on voltage of 3V. This voltage is obtained by rectifying the drive, so that if the drive fails, the p.a. stage turns off so it won't overheat.





**The completed Chatterbox transmitter section. The v.f.o. section is to the left, with the variable capacitor for frequency control visible in the top left hand corner of the picture. The power amplifier and modulator stages are to the right, with the modulation transformer shown located in the middle of the 'u' shaped combined heatsink and screening panel (see text).**

The d.c. restoring action ensures that the drive waveform is positive-going, and the negative half is not wasted, and as the required drive for full output is at least 20V peak-to-peak, it avoids possible damage from excessive negative gate voltage.

The output low pass filter also looks rather odd. But it works! As the internal capacitances of the f.e.t. are large, it's necessary to use series capacitance on the input of the filter. The power amplifier stage is capable of delivering 8 to 10W of r.f. output.

### The Modulator

The modulator is built around two i.c.s, a 741 preamplifier and a TDA2030 power amplifier. The overall gain is set at the preamplifier stage with a preset control.

The circuit closely follows the manufacturers data for the TDA2030. This is a very useful, beefy audio amplifier which works very well and reliably in this application.

The modulation transformer, T1, is a centre-tapped transformer in series with the power f.e.t. The transformer is a homewound job using a special former, the R.S. Components Ferroxcube 228-264. This is also available from Maplin Electronics as part FT33L.

The cores used are designed for power oscillators and switch mode power supply systems. The component is made up from the two 'E' shaped halves of the ferrite core, and a moulded former.

Take great care when handling the ferrite sections, as they are very brittle. During the testing of the prototype transmitter, two cores were damaged in the post. Broken ferrite sections can be glued together, and still used, but it's better not to break them in the first place!

### Transformer Winding

The transformer is wound on the moulded former, and the E shaped ferrite cheeks are then added to the assembly. The transformer requires 300 turns of wire, centred tapped for the audio input.

The transformer can be made by winding on 150 turns, making a tapping and then adding a further 150 turns. I tried several methods and wire gauges and decided upon a bifilar winding of 150+150 turns of 0.4/0.5mm (26s.w.g.) enamelled copper wire.

The original prototype had 300 turns, centre tapped and wound with 0.71mm wire, but this can only be achieved with careful winding on a lathe. In practice however, the bifilar winding using the wire suggested above produced the same results without

overheating problems.

The easiest method of making the transformer is to buy two small reels of 0.4/0.5mm wire, and then use them both in the winding process. The windings are made side by side. To make the job easier, you can mount the reels on a thin rod to act as a spindle, allowing them to turn freely as the wire pays out.

The winding consists of turns made with the **two wires** side by side. You should treat the wires as one wire. Start the operation carefully, and as neatly as possible, wind on 150 turns.

Distribute the winding as evenly as possible over the whole width of the former. Don't forget to leave about 150mm of wire free at both ends of the turning. The completed job will result in four ends of wire, two starts and two ends. If you've got more than this - something's wrong!

The necessary tapping is made by joining the end of one winding to the beginning of the other. The correct wire for the connection may be sorted out using a testmeter. These connections **MUST** be correct. If they aren't, the transformer won't work. If there's any doubt, carefully check. Don't forget that the order of the windings to complete the transformer is: **beginning-to-end to beginning-to-end**.

### Chatterbox Switching

Shown in the top half of **Fig. 1.1**, are the switching arrangements for transmit and receiving on the Chatterbox. The press-to-talk switch on the microphone, controls a 12V two-pole change-over relay.

One pole of the relay moves the antenna input from receive to transmit. The other pole, places 12V on to the v.f.o. and transmitter boards when the p.t.t. switch is pressed.

Unusually, the v.f.o. is switched off during the receive periods. This is not usually advised in normal transmitter practice, because of switch-on drift. In this application however, with an a.m. transmitter on 2MHz, the effects of short term drift is relatively unimportant.

Should the transmitter be required for frequent use on c.w., it would be advisable not to switch the v.f.o. off on receive. It may be better to provide an offset to remove it from the receiver passband.

The switch, S2, is a net switch to locate the transmitter frequency prior to transmitting. It switches the v.f.o. on, which then provides enough r.f. to locate the transmitter frequency. For accurate netting it may be advisable to switch on the receiver b.f.o. The switch, S1 is the main on-off switch.

### Building The Boards

Layout of the v.f.o. board is shown in **Fig. 1.3**, and the layout of the main transmitter board is shown in **Fig. 1.4**. Following usual practice, the v.f.o. board is single-sided, although the transmitter board is double-sided to aid stability.

Just visible running around the edge of the p.c.b. is **Fig. 1.4**, is the simple wrap-round heatsink which is used for the p.a. f.e.t. and the audio amplifier chip. The heat-sink is homemade from aluminium and is 70mm high. The best method of making the heatsink, is to cut and file the metal to suit the individual p.c.b..

### Heat Precautions

The f.e.t. used in the p.a. requires an insulated mounting kit to isolate the device from the heatsink. However, the TDA2030 audio amplifier i.c. doesn't require insulation from the heatsink in this single rail configuration.

At this stage, I recommend that TR5 and IC3 are attached to the heatsink before their leads are soldered to the board. This simple precaution will dissipate the heat involved during the soldering process.

## Testing Time

I suggest that you should start by building and testing the v.f.o. first. It's easy to locate the oscillator on a suitable 1.8 MHz receiver, when its in the c.w. or s.s.b. mode.

The core of the tuned circuit should be adjusted for the required band coverage. With the values given, the v.f.o. will cover the whole of the 1.8 to 2MHz band, and you should check carefully to see that the v.f.o. doesn't stray 'out of bounds'. This is best done with an accurately calibrated receiver, frequency meter or crystal calibrator.

In practice, the ability of the v.f.o. to cover the entire allocation is useful for c.w. Don't forget that the whole band is not used for a.m. operation, and you wouldn't be popular if you used an a.m. signal on the bottom sector of 1.8MHz!

## Setting Up

The transmitter is easy to set-up. It may be done by ear, or by using a cheap audio oscilloscope to monitor the signal.

If an oscilloscope is available, you should set it up on an high input audio range. The transmitter must be fed into a 50Ω dummy load capable of dissipating 10W.

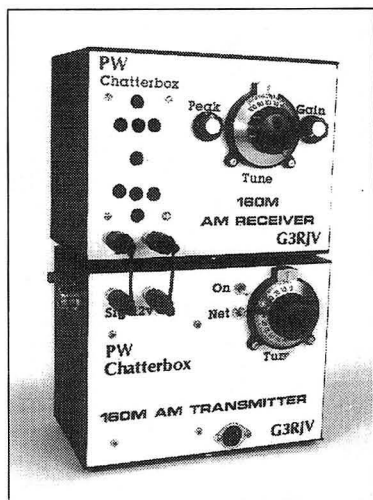
There should be enough r.f. available, for you to lay the probe close to the dummy load, enabling the 'scope to display the classic trace of an a.m. signal.

The next stage is to adjust the r.f. level using the v.f.o. preset control, and the audio gain preset control on the transmitter board, to obtain the best modulation level consistent with good quality. If a 'scope is not available, connect the transmitter into the dummy load, and monitor the signal on an a.m. receiver. The presets are adjusted for the highest, good quality output.

## Microphone Surprise

Surprisingly, I found that a cheap CB-type microphone produced the best quality. If you don't have a microphone handy, the Maplin Electronics Communications Microphone type WF05F gave very acceptable results.

The transmitter is easy to use, and all you do is point and fire! The only other adjustment is to net onto the required frequency. Then you press the microphone switch and talk. I know there's at least six Chatterbox transmitters already in use, and they're all producing good quality signals on 1.8MHz.



The finished project ..read next month for the receiver part of the 'Chatterbox'

**How Much? £27 + p.c.b.s + boxes**  
**How Difficult? Intermediate**

## Shopping List

### Resistors

Carbon Film 0.4W 5%

22Ω	1	R20
33Ω	1	R22
100Ω	1	R5
1kΩ	5	R6, 8, 10, 11, 16
5.6kΩ	1	R19
10kΩ	4	R2, 4, 9, 23
33kΩ	1	R18
100kΩ	6	R1, 3, 13, 14, 15, 17

Carbon Film 1W 5%

180Ω	1	R21
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Variable horizontal mounting

220Ω	1	R7
100kΩ	1	R12

### Capacitors

Polystyrene

100pF	2	C2, 17
1nF	1	C3
2.2nF	4	C4, 5, 27, 28

Miniature Disc Ceramic

22pF	1	C7
1nF	1	C12
10nF	8	C9, 10, 11, 16, 23, 24, 25, 26
0.1μF	4	C6, 8, 13, 18

Electrolytic Radial 16V (working minimum)

4.7μF	1	C14
10μF	2	C19, 20
470μF	3	C15, 21, 22

Variable

75/100pF	1	C1, Jackson ceramic type C801 recommended, with 6:1 slow-motion drive
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### Semiconductors

BC183	2	TR2, 3
IRF510	1	TR5
TDA2030	1	IC3
1N4001	5	D1, 2, 3, 4, 5
1N4148	1	D6
2N3819	1	TR1
2N3866	1	TR4
78L05	1	IC1
741	1	IC2

### Inductors

- L1 32t of 0.2mm enamelled copper wire, close wound on a 7mm former with ferrite core.
- L2 1mH axial leaded inductor.
- L3 15t 0.2mm enamelled copper wire on a ferrite bead.
- L4 15t 0.4mm enamelled copper wire on a Cirkut 'jumbo bead' (order No 55/06301) ferrite bead.
- L5 32t of 0.4mm enamelled copper wire on a T50-12 toroidal core.
- T1 See text for details, wound on a Ferroxcube transformer (Maplin order No. FT33L)

### Miscellaneous

Printed circuit boards will be available from the PW PCB service. Two suitable aluminium boxes, (Minfford), 1.5mm aluminium sheet for the heatsink, coaxial plugs and sockets as required, interconnecting wire, miniature coaxial wire, 0.2mm and 0.4/0.5mm enamelled copper wire, short lengths of heavy (0.8/1.0mm) copper wire, two single pole switches, suitable microphone with p.t.t. switch, one d.p.c.o. 12V relay.

*Next month, I'll bring you the full details of the companion Chatterbox receiver. In the meantime, get building and I hope to work you on 'Top Band' a.m. very soon!*

## Suppliers

Cirkut  
 Park Lane  
 Broxbourne  
 Herts. EN10 7NQ  
 Tel: (0992) 444111

Maplin Electronics plc  
 PO Box 777  
 Rayleigh  
 Essex SS6 8LU  
 Tel: (0702) 552961

Minfford Engineering  
 Sun Street  
 Ffestiniog  
 Gwynedd LL41 4NE  
 Tel: (0766) 762572

Electromail  
 PO Box 33  
 Corby  
 Northants NN17 9EL  
 Tel: (0536) 204555



## The Ramsey 50MHz FM

I was very pleased to find that home construction is very much alive in the USA. At least, that was the impression I got from my thoroughly enjoyable trip to the Dayton HamVention.

As I'm very much involved in running a series of school radio clubs, I was on the look-out for constructional projects, ideas and kits. I fully intended to bring some home if there were any that proved suitable for my young club members.

There's something about a kit that really encourages you to have a go. There's no excuse, it's all there, ready to go! All you have to do is to apply the ingredients, such as time, patience, a little expertise in soldering and a large helping of enthusiasm.

### Kits On Show

To be quite honest, I'd never heard of the Ramsey kits before I went to the HamVention. But, after I'd been able to wander around the show, I soon noticed the kits on display at various booths and I was very impressed at what was on offer.

Eventually I found my way to the Ramsey booth, where the New York based company had their full range of kits on show. In fact, I was able to see many of the projects built and working, including the newly-launched Ramsey 144MHz f.m. 3W fully synthesised transceiver.

At first sight, the Ramsey kits, neatly packed in see-through plastics bags, don't look as if they're anything really special. The surprise comes when you open the bag, empty the carefully packed contents and glance through the manual.

I was most impressed with the quality of the components, and the simple but very effective way of presenting the kits. However, in my opinion the secret of the Ramsey kit success must surely be the manual. I can honestly say that the manual impressed me very much indeed.

The manual isn't a glossy, full colour job. It's not large, and it doesn't come packed with photographs. But it is a 'no frills' simple-to-use book, extremely well written, and with all the information you require. In fact, I regard the Ramsey manual as being so well-prepared and so readable, that other manufacturers should take another look at their own kit instructions.

### Getting Started

My only regret is that I did not have the room or enough money to bring back more of the Ramsey kits. The variety on offer are ideal for newcomers to the hobby. After building a receiver or transmitter, newcomers will have gained much experience and learned much more about the equipment they're using.

As our front cover photograph illustrates, I consider

**The first-time Ramsey kit builder gets a surprise when they see the quality of the manual, the p.c.b. overlay and the p.c.b. itself.**



*Kit building is still very popular, especially in the UK. Rob Mannion G3XFD, discovered the full range of Ramsey kits when he was attending the Dayton HamVention and was very pleased he did!*

# Receiver Kit

that the Ramsey kits will prove no obstacle to constructors of any age. The step-by-step approach, with component overlay charts on nearly every page, will guide the constructor to successful completion. Additionally, Ramsey also provide a full technical description of the particular project undertaken, and this is backed up by a block diagram showing what each section does.

Ramsey advise constructors to read the manual thoroughly before starting to build. I took their advice, worked my way through the manual, and ended up being even more impressed!

To simulate a very basic workshop, I worked on our lounge table. The lighting wasn't very good, so I rigged up a table lamp. Good lighting is essential and I recommend an adjustable-position light for this work. Some of the components are very small and have even smaller lettering and numerals for identification.

## How It Works

The 50MHz f.m. receiver kit I chose for this review, is based around the Signetics NE602 integrated mixer, product detector and oscillator, and the Motorola MC3359 i.c. with suitable filtering and audio amplification. A block diagram of the receiver is shown in Fig. 1.

The completed receiver is very sensitive, and Ramsey claim a sensitivity of under  $1\mu\text{V}$ . More than adequate audio output is provided by an LM386 i.c. stage, making this kit a very useful project for anyone requiring a basic receiver.

The p.c.b. supplied with the kit was of very good quality. All the major components are easy to identify and Ramsey supply a two-colour p.c.b. overlay (approximately twice full size) to assist in component placing.

## Progress Summaries

As I worked my way through the kit, I found the progress summaries very useful. At the end of each particular section, the manual tells you exactly what you've done so far and what the stage of the project does.

I brought back two Ramsey 144MHz f.m. receiver kits and two of the 50MHz versions. Both 144MHz kits were built by my young radio club members (their ages range between 13 and 16), and they found the progress summaries invaluable. In fact, my help wasn't needed, because the summaries told them everything they wanted to know!

Finally, when the kit is completed, the manual tells you about alignment, testing and boxing the project up. There's also a fault-finding and test procedure to accompany the alignment section plus a separate trouble-shooting section. I'm pleased to say that in my case, the fault-finding sections weren't needed.

## The Finished Project

When you've finished any kit project, it's a good idea to make the most of your efforts by placing the finished job in a decent box. The smaller Ramsey kits aren't supplied with a box, but I had no problem in buying a suitable aluminium container at a rally.

Ramsey offer a suitable enclosure for each kit, but I've found that a home-made box (using copper laminated p.c.b. material) does the job very well. The

## Conclusions

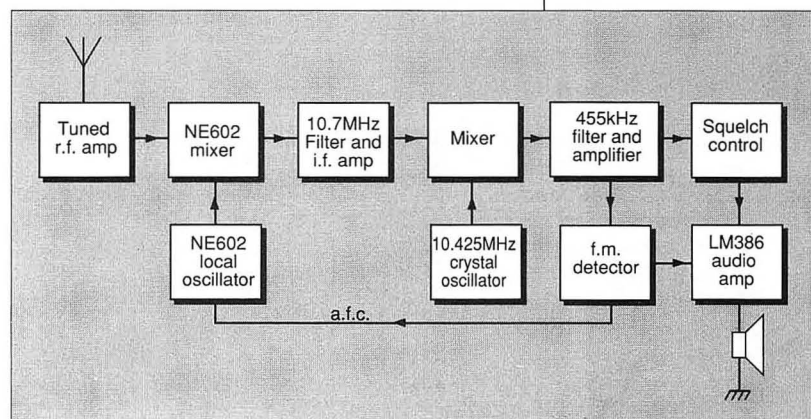
*I like the Ramsey kits very much indeed. I think the manuals are excellent. Their range of kits is expanding all the time, and the 50MHz f.m. receiver kit featured in this article was only introduced in April 1991. We're planning to review their newly-introduced 144MHz f.m. transceiver kit later this year.*

*Although we have excellent kits available here in the UK, I consider that the Ramsey v.h.f. range will prove very popular with constructors on this side of the Atlantic. I also feel that the author and designer of the manual, Dan F. Onley K4ZRA, should be congratulated for his excellent work. His manual will surely encourage other people's constructional efforts.*

*The full range of the amateur radio kits made by Ramsey Electronics Inc., and the cases to hold the completed projects are now available in the UK. The 50 and 144MHz f.m. receiver kits cost £29.95 plus post and packing. The kits are available from: Raycom Communication Systems Ltd., 963 Wolverhampton Road, Oldbury, West Midlands B69 4RJ. Tel 021-552 0073.*

finished kit has three identical potentiometers for tuning, audio volume control and squelch, plus an on-off switch. I fitted extensions to the knobs so that the receiver would fit into my home-brewed box. Once the receiver was safely housed, I mounted one of the small epicyclic slow motion vernier-type dials, to provide tuning. This is an approach that works very well, and I thoroughly recommend anyone to try it out on one of the receiver kits.

My school radio club members intend to build six or so of the 144MHz receivers for club use, and I've made the enclosures so that they can be hand-held. The next stage is to organise a fox-hunt and to test the club members' map reading and direction-finding abilities!



**Fig. 1: Block diagram of the Ramsey 50MHz f.m. receiver kit built by Rob Mannion G3XFD.**

REVIEW

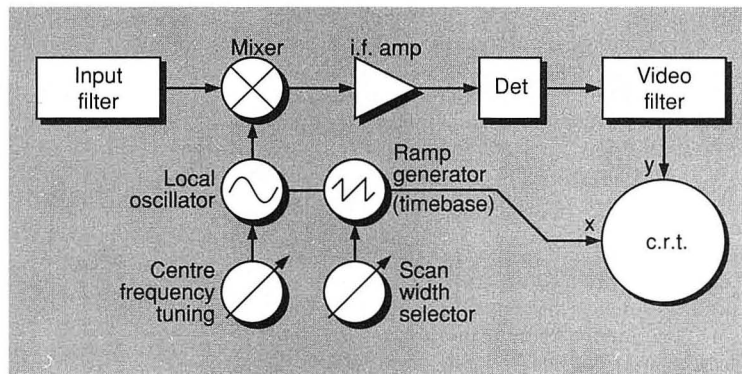
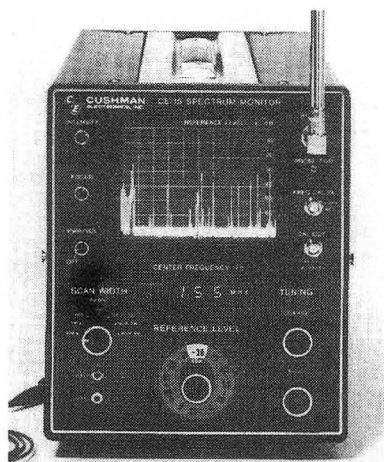


# The Oscilloscope In Your Workshop

## Part 4

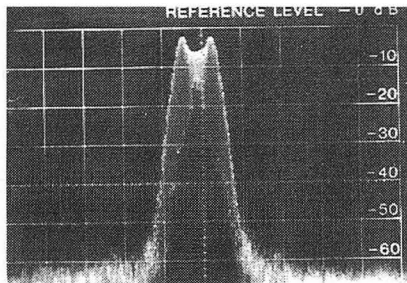
*To round off his short series on the 'scope in your workshop, Fred Judd G2BCX looks at specialised instruments based on this most useful, and perhaps the most neglected 'tool' in the amateur workshop.*

**Fig. 1: The CE15 spectrum monitor by Cushman Electronics Inc.**



**Fig. 2: Circuit block diagram of the Cushman CE15 spectrum monitor.**

**Fig. 3: Transmission at 150MHz. Frequency modulation of a single audio signal at a frequency of 1kHz. The deviation is 5kHz (see text ).**



I thought that in this final part, we should have a look at three different types of instruments employing the c.r.t. for special applications. At the top of the list are spectrum monitors, or analysers, which could be regarded as 'scopes incorporating other special circuitry.

Also in this category are large screen v.d.u.s of 220 x 180mm. These should **not** be confused with computer v.d.u.s. This type is also known as the X-Y display. They are almost complete single-trace 'scopes, requiring only a variable 'ramp' wave for a timebase and provide a black and white display.

The final category is the long persistence display. I've already briefly mentioned that some cathode ray tubes have what is known as a long persistence screen. This type of c.r.t. is sometimes called a 'long afterglow tube'. With this type of c.r.t., the time trace and any deflections produced by signals can remain visible on the screen after the event for many seconds, minutes and (for particular applications) even an hour or so.

### Spectrum Monitors

Spectrum monitors are perhaps better known as 'spectrum analysers', and were at one time used almost exclusively in laboratories. However, continued development has resulted in simplification and considerable reduction in cost.

The spectrum monitor is a combination instrument, with its own c.r.t. display. It functions as a tuneable r.f. voltmeter for alignment of transmitters, checking modulation levels, receiver performance (stage gain and other measurements), antenna tuning, analysing different forms of interference and for the detection and measurement of harmonics and spurious signals generated by transmitting and audio equipment.

A low-cost spectrum monitor, the Cushman model CE15, is shown in Fig. 1. This instrument incorporates what might be regarded as a superhet receiver with a 'sweep tuned' local oscillator. The l.o. sweep rate is synchronised with the c.r.t. timebase (ramp generator). Thus the horizontal deflection on the c.r.t. is directly proportional to signal frequency. The vertical deflection does of course depend on input signal amplitude. A simple block diagram of the CE15 circuitry is shown in Fig. 2. This is an arrangement common to most low-cost spectrum monitors.

The frequency range of the acceptable input signals is determined by the tuning range of the local oscillator. In the Cushman CE15 for instance, the l.o. tuning range is 2.1 to 3.1GHz. This l.o. range allows the instrument to accept input frequencies from 1MHz to 1GHz.

### Practical Uses

Space permits only a few examples of practical uses. The oscillogram, Fig. 3, which should be of interest to narrow band f.m. users, shows a 150MHz transmitter carrier modulated by a 1kHz sine wave.

Frequency modulation produces a large number of sidebands, even when the signal is modulated with a single frequency. The bright trace indicates the outside

envelope of the sideband power and which makes it easy to check for excessive deviation. In this example deviation has been adjusted for 5kHz peak.

The oscillogram, **Fig. 4**, shows a strong harmonic from a rather poorly designed, unmodulated 27MHz CB transmitter virtually swamping a weak TV signal. Significant interference can be caused by high order (8th, 9th, 10th and higher harmonics) from poorly designed transmitters, as well as from the local oscillators of receivers.

### Radar Displays

Former radar screen displays, employing 300mm diameter long persistence c.r.t.s can be modified for other uses. The example shown, **Fig. 5**, and virtually stripped of its original circuitry, was a Raytheon marine radar display. This had rotating deflection coils which allow the use of a rotating timebase with its start at the centre of the tube.

With new transistor and integrated circuits installed, I used this modified unit for displaying the radiation patterns of transmitting antennas. The antennas were scaled down to operate at a very high frequency.

The photo, **Fig. 5**, shows (to the right) the model antenna rotator, which is synchronised to rotate with the display timebase with the aid of 'Selsyn' motors. Beneath the display (on the left) is a linear dB meter for checking radiation magnitudes.

The display also incorporated a special device for producing a perfect 'dipole radiation pattern' for use at any amplitude on the screen. This facility could be superimposed over the radiation patterns of real (rather than mathematical) model antennas for comparison and related 'gain' measurements. The pattern of the electronic dipole is shown, **Fig. 6**, on the display screen.

The radiation pattern from a 914MHz model of the 12-element ZL special, designed for 144MHz, is shown in **Fig. 7**. I also used a transparent screen over the c.r.t. on which specific marks could be made with a 'Chinagraph' pencil.

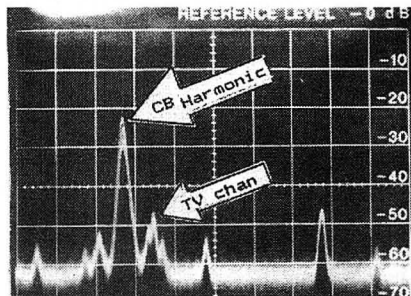
Illuminated transparent Perspex screens, with maps traced on them, as in **Fig. 7**, could also be fitted over the display screen. The full details, techniques and working examples were originally published in the PW reprint book *Out of Thin Air*, which is available from the PW Book Service.

### Long Persistence

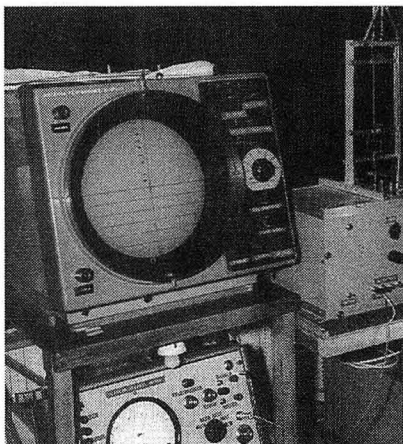
Extra long persistence but smaller diameter c.r.t.s, are most suitable for very slow timebase operation. This is because the image formed, is retained for quite a long time after the event.

I built a special 'scope to help with Sporadic-E observation, which was carried out over four years, in conjunction with the Rutherford Appleton Laboratory.

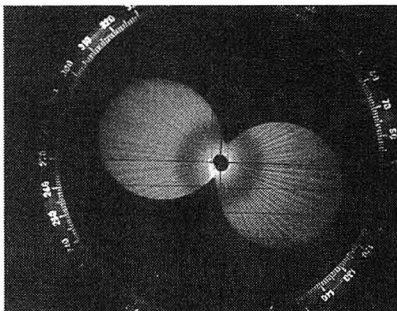
It operated with a timebase that could be made to run for up to about two minutes maximum with a very long afterglow 18mm c.r.t. This 'scope was particularly useful for observing photographically and recording variations in the amplitude of h.f. band signals reflected from Es clouds and other phenomenon. Good



**Fig. 4: Harmonic analysis. High order harmonic from an unmodulated 27MHz CB transmitter, interfering with a weak u.h.f. TV signal.**



**Fig. 5: Modified marine radar unit, used for displaying radiation patterns from antenna models scaled-down to u.h.f. (see text ).**



**Fig. 6: Electronically generated radiation pattern of a half-wave dipole, used with the display unit shown in Fig. 5.**

photographs could be produced, as the example, **Fig. 8**, clearly shows.

### Large Screens

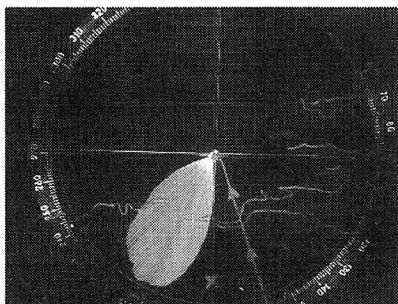
Larger visual display units, again not to be confused with computer displays (v.d.u.s), have a large c.r.t. with an average size of 23 x 18mm. They are normally used in conjunction with a conventional 'scope, as in **Fig. 9**.

The 'picture' displayed on the 'scope can be reproduced on a much larger scale. For this purpose, X-Y v.d.u.s normally have a white trace. Such instruments incorporate most of the facilities common to ordinary 'scopes, such as: timebase amplitude control, trace shift, brilliance control, d.c. inputs (with amplifiers), image inversion, Z modulation input, etc., and as mentioned before, only requires a timebase waveform.

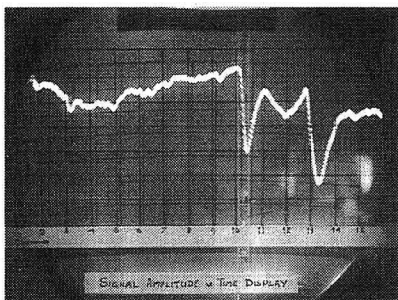
Timebase ramps are available as an output from most modern 'scopes. The amplitude required is from 5 to 10V. Note: Earlier models such as the Marconi Instruments TF 2212A X-Y v.d.u., which is the type I use, have a limited frequency Y amplifier frequency response.



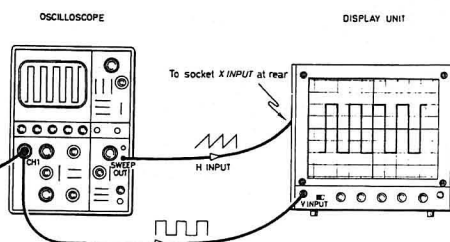
**Fig. 7: Radiation pattern from a model of the 12-element ZL Special beam antenna, operating at 914MHz. (The other marks on display were for reference purposes only) .**



**Fig. 8: Use of very long persistence cathode ray tube. The trace duration is 25 seconds and it indicates variations in the amplitude of signals reflected from a Sporadic E cloud.**



**Fig. 9: How a large screen X-Y display unit is used in conjunction with a conventional oscilloscope. (see text).**



## Series Summary

*Although I appreciate that most of the items mentioned in this final part, are outside the normal applications for a 'scope, they may well be of interest to serious experimenters. However, even a good secondhand instrument can become a valuable and instructive electronic diagnostic 'tool' in any amateur radio shack. It's my wish in summing up the series, that you'll now get much more from the 'scope in your workshop.*

**Fred Judd G2BCX**

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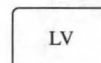
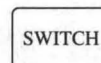
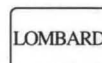
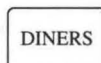
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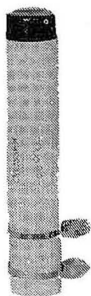
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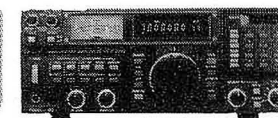
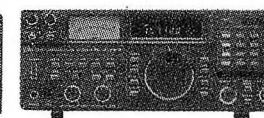
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# Mathematics For The RAE

## Part 5

### Theory

*This month Ray Fautley G3ASG finishes off on indices and decides that it's time for a very gentle introduction to algebra. Ray assures everyone that there's no need to be afraid of this subject, as it's quite user-friendly really!*

For those of you who would like the answers to the indices questions I left you with last time, here they are:

- (i) d            (ii) a
- (iii) d          (iv) c
- (v) b           (vi) a
- (vii) d        (viii) a \*

With answer (viii) above there wasn't a possible answer. However, if you ignored the '[' ']' brackets then (a) was the answer. But if you didn't ignore them, then the answer would have been  $10^2 + 4 \times 10^3$ . Our apologies for the confusion!

I'm sure you had them all correct, didn't you? Even the one we accidentally made more difficult!

### Algebra Time

It's time to change the subject now, as we turn to Algebra. What does algebra mean to you? Is it a name that conjures up fear? A lot of people seem to go to pieces as soon as that word appears!

However, they don't seem to worry about simple formula like Ohms law, which is itself a bit of algebra. So why the difficulty?

Algebra isn't difficult, but we've got to start somewhere. The fear of algebra seems to stem from the use of letters instead of figures. The reason for using letters (or other symbols) is that by their use, a general statement can be made which can be used to solve real problems. This is done by substituting numerical values for the symbols used in the general statement or formula.

As I've said, algebra isn't difficult, but we've got to begin somewhere. So, to get to the level where formulae becomes meaningful, we must start by understanding simple algebra.

### Simplicity Rules

Taking something really simple, such as:

$$Y + Y = 2Y$$

If the answer isn't immediately obvious, then try reading it as 'one Y plus one Y equals two Ys'. Still not got it? Then how about 'one transistor plus one transistor equals two transistors', is that obvious? If we call a transistor 'Y' then we get the original  $Y + Y = 2Y$ , perhaps you've got it now?

That's why its called a general statement as 'Y' (or any other symbol or letter) can be used to represent anything we like.

Algebraically, we can write:

$$Y + Y = 2Y$$

$$\text{as } 1 \times Y + 1 \times Y = 1(Y) + 1(Y) = 2(Y).$$

Anything inside brackets (), sometimes called parentheses, is to be multiplied by whatever is immediately outside the brackets. For instance:

$$3(Y) + 6(Y) + 1(Y) = 3 \times Y + 6 \times Y + 1 \times Y$$

$$= 3Y + 6Y + Y \text{ (one times Y is the same as just Y)} = 10Y.$$

Brackets (Parentheses) are also used to separate terms in algebra, so that there is less likelihood of errors. We'll discover more about this later.

Whenever symbols and/or figures are written exactly next to each other, they're considered as having to be multiplied together. Sometimes a full stop ('.') is used to represent the multiplication (or of course the 'x' or 'times' with which we are more familiar).

More often than not, no sign is used at all. This **ONLY** applies when terms are **MULTIPLIED** together. With the widespread use of computers in the office and home, the star '\*' symbol is commonly used. This can sometimes clarify an 'x' (for multiplication) or an 'x', used as a term.

### Addition And Subtraction

Additions and subtractions use the familiar + or - signs. Of course, the letter Y (or y) is not the only letter used in algebra! My choice of Y was quite arbitrary as any letter or symbol can be used.

Different symbols are employed to identify different things. We can't add 3 rabbits to 4 cats, can we?

In algebra, this potentially difficult job could be written as:

$$3r + 4c, \text{ or } 3x + 4Y \text{ (the 3 and 4 are coefficients).}$$

The rules for adding and subtracting in algebra are:

(i) Write down the addition or subtraction to be made.

(ii) Move the terms about to get everything of **ONE TYPE** together.

(iii) Add (or subtract) the coefficients of the **SAME TYPE** terms.

Just to show you, here's an example of algebraic addition using the rules I've mentioned:

(i) Add together 4a, 3b, 6c, 5b, 7a and 11c

$$4a + 3b + 6c + 5b + 7a + 11c$$

$$= 4a + 7a + 3b + 5b + 6c + 11c$$

$$= 11a + 8b + 17c \text{ (the answer)}$$

### Common Symbol

Where any symbol is common to two or more terms, it can be used as a multiplier outside a bracket as in:

$$4a + 7a + 3b + 5b + 6c + 11c$$

$$= a(4 + 7) + b(3 + 5) + c(6 + 11)$$

where coefficients of 'a' are grouped together, as are those of 'b' and 'c'. The answer is still  $11a + 8b + 17c$ .

Another way of using brackets for the same example would be:

$(4a + 7a) + (3b + 5b) + (6c + 11c)$  showing 'a', 'b' and 'c' terms more clearly. The answer would still have been the same!

### Important Signs

It's **VERY IMPORTANT** in algebra that the + and - signs are always written, for if a sign is accidentally omitted then terms could incorrectly be multiplied together instead of being added or subtracted.

Well, that wasn't so bad was it? You can rest easy for now, as I'm not going to set any questions, but don't stop practising!



# Getting Started - The Practical Way

*This month, the Rev. George Dobbs G3RJV starts probing and sniffing around electronic circuits, with the help of the common-garden diode!*

We've already looked at meters and multimeters and met the diode. Now I'm going to show you how a diode can become a useful, but simple, accessory using a multimeter. But let's begin with a look at a classic application for the diode in that old favourite, the crystal set.

## Receiver Circuit

The circuit, **Fig. 1(a)**, is the classic circuit of a 'crystal set'. It employs a suitable (long!) antenna and earth connected to a tuned circuit consisting of a coil, L1, and a variable capacitor C1, which 'gathers' and tunes the radio signals.

A diode, D1, detects the signal and extracts the required audio (sound) signals which can then be heard on a pair of high impedance headphones. The capacitor across the headphones shunts unwanted radio signals to earth.

## Simple Radio

The crystal set got its name because the original receivers, built in the 1920s, used lead-ore (Galena) or other crystalline materials for the detector. It's a very simple circuit and the result is a very basic radio receiver.

No batteries are required. The receiver is powered by the radio signals themselves. However, the audio output is low, even with a good signal strength and it requires a decent antenna.

With only one simple tuned circuit to select the required signal, it also has difficulties in 'sorting out' individual stations. Despite the disadvantages, crystal sets do work, and they're fun. If you have never built one, you must!

The coil, L1, can be approximately 80 turns of enamelled copper wire of about 0.4mm (24-28 s.w.g.), closely wound on a toilet roll former (wait until the roll is finished please!). The tuning capacitor, C1, can be any variable capacitor of around 500pF. If you don't have one, the Maplin FT78K is suitable.

Any ordinary diode will work, but if you wish to be precise and use a germanium diode, the OA91 (Maplin QH72P) will do. The capacitor can be a disc ceramic type. For best results, the headphones must be a high impedance type.

Modern, low impedance 'phones (portable cassette types) will not work very well. The receiver can be laid out like the circuit diagram. You can then build it by soldering the parts onto brass drawing pins, pushed into a piece of soft wood, as in **Fig. 1(b)**.

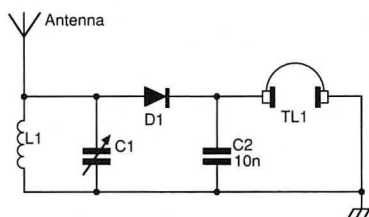
## Another Application

The crystal set 'detector' is only one application of the diode. Another variation of the idea can prove useful when you're building and testing radio circuits. It can then be used to detect whether a radio frequency signal is present and check its relative strength.

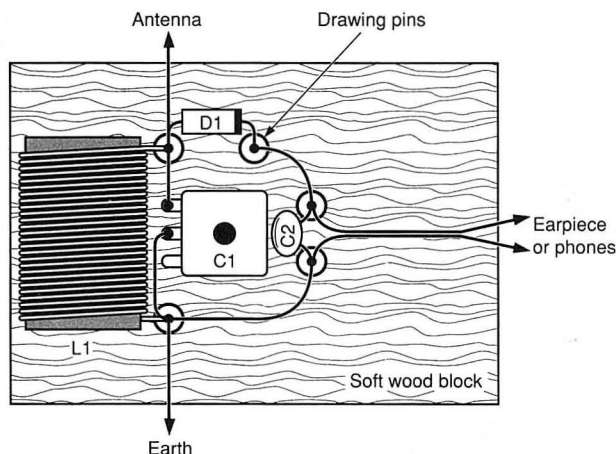
The circuit, **Fig. 2(a)**, shows a diode probe. This is for use with a meter, enabling r.f. (radio frequency) signals to be detected and measured.

The circuit has two diodes. The first, D1, works like the crystal set diode, producing a positive voltage at the cathode (the marked end) when a signal is detected. The second diode, D2, doubles on this action by producing a negative voltage at the anode (the unmarked end) in the presence of a signal. Since both positive and negative-going parts of the signal waveform are detected, this probe gives what is called a **peak-to-peak** reading of the signal.

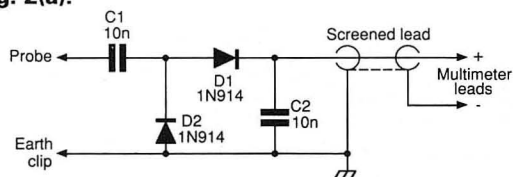
**Fig. 1(a).**



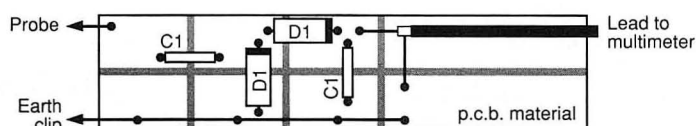
**Fig. 1(b).**



**Fig. 2(a).**



**Fig. 2(b).**



## Probing The Works

Now it's time for us look at the action of the whole circuit. You'll see that one side of the probe is connected to the earth (or ground) of the circuit to be measured.

The part of the circuit to be tested, is connected via a stiff wire probe. The capacitor, C1, couples the signal to the diodes. It also blocks any d.c. voltages present at the testing point. Remember that the capacitor allows an alternating current (the signal is a.c.) to pass, but blocks any d.c.

This characteristic is also used by C2. This action does not affect the d.c. voltages produced by the diodes, but it 'shorts out' any remaining signal from D1 and D2.

Following rectification, the signal will have been changed into a d.c. voltage which can be measured by a multimeter. The positive supply will be at the cathode end of D1, and the negative side at the earth end of the probe.

The probe is connected to the multimeter by means of a screened lead which can be made from coaxial cable. Diode probes are often used near circuits which can radiate r.f. signals. These can be picked up by the meter leads, producing confusing readings.

The illustration, Fig. 2(b), shows a simple way to build a diode probe. It's built by surface mounting the components onto a narrow piece of blank p.c.b. material. The layout is shown with the copper side up. The lines on the board are made by carefully drawing a hacksaw blade across the surface of the copper. This method produces a series of 'pads', as in Fig. 2(b).

It only takes three or four firm strokes of the saw blade to cut through the thin layer of copper, so be careful! The size of the board is not very critical, and mine was 70mm long by 10mm wide. This makes the pads only 5mm thick, just enough for the components.

Inspect the channels for burrs and slivers between the pads before making any connections. Then clean the p.c.b. with soapy water after de-greasing it by using a scouring powder.

The soldering connections are clearly shown in Fig. 2(b). It's essential to get D1 and D2 connected the right way round in the circuit. The small bar painted on one end of the diode indicates the cathode end of the component.

I used 1mm (20s.w.g.) tinned copper wire for the probe, but any scrap stiff wire will do the job. The braiding on the screen wire must be exposed by cutting back the plastic sheath. This is then pulled away from the inner conductor and twisted to form a pigtail and soldered carefully to the p.c.b. The next job is to fit plugs suitable for your meter, on the other end of the lead.

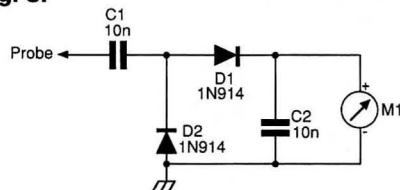
When I want to make measurements, I use a lead with crocodile clips at either end, connected to the probe earth pad. Finally, due to the way the p.c.b. is made, you should ensure that all the pads at the 'earthy end' of the probe are connected together.

## Probing About

Using the probe is easy, as you only have to connect it to your multimeter, set to a voltage range. The range selected will depend upon the signal level in the circuit to be measured.

Unless you're testing transmitter power stages, the

Fig. 3.



range selected will be in the order of a few volts. If the reading is very low, a mA or even  $\mu$ A range can be used to tune or peak low level signal circuits.

An easy way to test the probe, is to apply it to an audio signal. Try connecting the probe across a loud speaker with the multimeter on a low voltage range. It should produce a reading which will vary with the loudness of the signal.

One interesting version of this circuit, called a 'sniffer', is shown in Fig. 3. It's basically the same circuit, but this version uses a small, surplus tape recorder meter of around 200 $\mu$ A full-scale deflection (f.s.d.).

If you can't find a surplus meter, the Maplin LB80B will do the job. The whole circuit can be built on the terminals at the back of a suitable meter if required.

## Relative Strength

The sniffer is only designed to show that r.f. is present and give a relative indication of its strength. A short length of wire, connected to C1, will provide a suitable antenna. There are no ranges or sensitivity adjustments in this circuit. The length and placement of the probe wire is used to get a suitable reading.

In the past, I've used the sniffers for field strength meters when working portable away from home, or when tuning up my mobile whip. An r.f. sniffer is a handy item to have around. If you don't build one now, you may find you'll do so later when the need arises. Keep building, and I'll see you next time. **PW**

## Shopping List

**Crystal Set:** Variable capacitor 300 to 500pF, (Maplin FT78K).

Diode OA91 (Maplin QH72P), 10nF disc ceramic capacitor (Maplin BX00A), enamelled copper wire, high impedance headphones, brass drawing-pins, connecting wire and solder and wood for base-board (see text).

**RF Probe and Sniffer:** Diodes D1, D2 1N914 type or similar (Maplin QL71N), C1/C2 10nF disc ceramic type. Blank p.c.b. material, screened lead, crocodile clip. For sniffer: surplus meter or Maplin LB80B.



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R5000	General Coverage HF Receiver	£895.00	£10.00
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R 1	Hand portable Receiver	£399.00	£10.00
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2MCVS	3dB 2m Colinear	£73.07	£6.00
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154CD	Cushcraft 15-4CD 4E1 15m Beam	£185.22	£13.00
203CD	Cushcraft 20-3CD 3E1 20m Beam	£244.24	£13.00
204CD	Cushcraft 20-4CD 4E1 20m Beam	£417.36	£13.00
215WB	Cushcraft 15E1 2m Yagi Antenna	£101.17	£13.00
4218XL	18 Element 2m Boomer	£155.52	£13.00
A3SS	Cushcraft 3 Ele Tribander SS	£331.79	£13.00
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MFJ401B	Econo Keyer Kit	£60.52	£3.00
MFJ407B	Electronic Keyer	£80.45	£3.00
MFJ422B	Electronic Morse Key Bench	£149.43	£3.00
MFJ422BX	Electronic Morse Keyer W/O Bench	£91.95	£3.00
MFJ484C	Grandmaster Memory Keyer	£165.85	£3.00
MFJ722	CW/SSB Filter	£93.74	£3.00
MFJ723	CW Filter	£49.60	£3.00
MFJ752C	Tunable Filter	£106.47	£3.00
MFJ815	SWR Meter 2kW	£80.45	£3.00
MFJ840	2m Wattmeter	£21.48	£2.00
MFJ841	2m In-line Wattmeter	£43.05	£2.00
MFJ901B	200 Watt ATU	£71.92	£6.00
MFJ931	Artificial Ground	£88.42	£6.00
MFJ941D	300 Watt Basic Tuner	£107.72	£6.00
MFJ945C	Versa Tuner 11 Mobile	£99.54	£6.00
MFJ949D	De Luxe 300W ATU	£172.85	£6.00
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DL1	De Luxe 1.5kW 160-10M Dummy Load	£77.17	£3.00
KS 2	Koyo Coaxial switch 2 way 1.0kW	£23.03	£2.00
SA 450M	Toyo Coaxial Switch 2 way 2.5kW 1-1500MHz SO239	£18.50	£2.00
SA 450N	Toyo Coaxial Switch 2 way 2.5kW 1-500MHz 'N'	£26.00	£2.00
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SX400	Diamond 140-525MHz 15/50W handheld	£36.75	£2.00

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SC3000	Discone 300-512MHz	£65.99	£5.00

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IC-AT150	Automatic Antenna Tuner 100W	£335.00	£10.00
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TT 217	9.0MHz 500Hz Filter	£65.63	£2.00
TT 218	9.0MHz 1800Hz Filter	£65.63	£2.00
TT 219	9.0MHz 250Hz Filter	£65.63	£2.00
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## The PW Robin Frequency Counter Part 2

Before we continue, there are some corrections to be made from last month. In **Fig. 1.3** of the first part of the article, the centre pole of S1b should be shown connected to +5V, not left floating as shown.

In the parts list, this switch should have been described as double pole changeover (d.p.c.o.) not s.p.c.o. There were some supply rail labels missing in the circuit diagrams of **Fig. 1.2** and **Fig. 1.3**. Pin 16 of ICs 1-3 should be shown as connected to +5V, as should pin 13 of IC6. The junctions of R25, 23, 21 and R19 should also be shown connected to +5V. Sorry about that!

### Building Stage

Let's begin the construction with the main p.c.b., starting by placing all the links on the board. You should use insulated wire links if there is a possibility of a short circuit.

Don't forget to thoroughly check the positioning of these links as many are under i.c.s. and any mistake will be very difficult to correct afterwards. You'll also see that many components are soldered to both sides of the p.c.b., so they can provide low impedance earth paths. Sockets are used for all i.c.s except for the prescaler chip, IC5.

The next stage is to fit all the resistors, capacitors and diodes. The choke, RFC1 is made by winding four turns of enamelled copper wire (diameter about 0.3mm) on a ferrite bead.

After fitting RFC1 on the board, the transistors, crystal, trimmer, p.c.b. pins, fuse-holder and fuse are mounted and soldered. Don't overheat the crystal and trimmer as both are easily damaged. Now you can, with the exception of IC3 & 5, fit all the i.c.s into their sockets, making sure they're the right way round!

### Display Board

Following the methods I've mentioned, you can now make up the display board. Make sure that the seven segment displays are the right way up. The decimal points must be at the bottom. The resistors R1 and 17, are fitted on the track side of the p.c.b., with insulating sleeves over the end wires.

The display board can then be fitted to the main p.c.b. Line up the display board with the right hand edge of the main board, and at right angles to it. The next stage is to check that the holes for the limiting

resistors line up with the 4511 driver i.c.s. You should carefully position the display board, so that the holes are no less than 3mm above the surface of the main board.

When you are satisfied with the alignment, make two small solder joints to hold the two p.c.b.s together. Re-check the alignment, and solder the boards securely together. Fit all the limiting resistors (fitted with insulated sleeving), starting from the bottom.

### Testing Time

Now it's time to start testing. Start by temporarily mounting the 5V regulator to a heatsink, attaching it to the main board with the shortest leads possible. You should then check for 5V on each of the i.c.s. Finally, and assuming everything's in order, you should remove power and make the following temporary links:

- (a) IC3 pin 7 and IC3 pin 10 to 0V
- (b) IC7 pin 15 to IC2 pin 5.

Now you can re-apply the power. The display should now light up and the right hand (units) digit should increment by one every second. If it doesn't, check, with an oscilloscope, that the clock is running or by listening on an h.f. receiver.

The display should continue to increment by one count per second. Leave this connection until you have checked the last three digits for correct counting and display.

Remove power and transfer the link from pin 5 of IC3 to pin 10. Re-apply power and verify that the display counts at approximately one thousand, every four seconds or so.

Allow the system to count, until all digits have been checked out. This takes time, but it does help in testing both the display and counter sections. Any miscounts are usually caused by solder bridges between pins, or by dry joints which cause non-displaying segments.

### Setting Up Inputs

To set up the input, you should switch off the power and fit IC3 and IC5. Switch on again and check the d.c. voltage at the collector of TR1. This should be in the range 2.5 - 3.0V. If it's not, you should adjust the value of R5 to correct this reading. Increasing the value of R5 will increase this voltage and vice versa. The

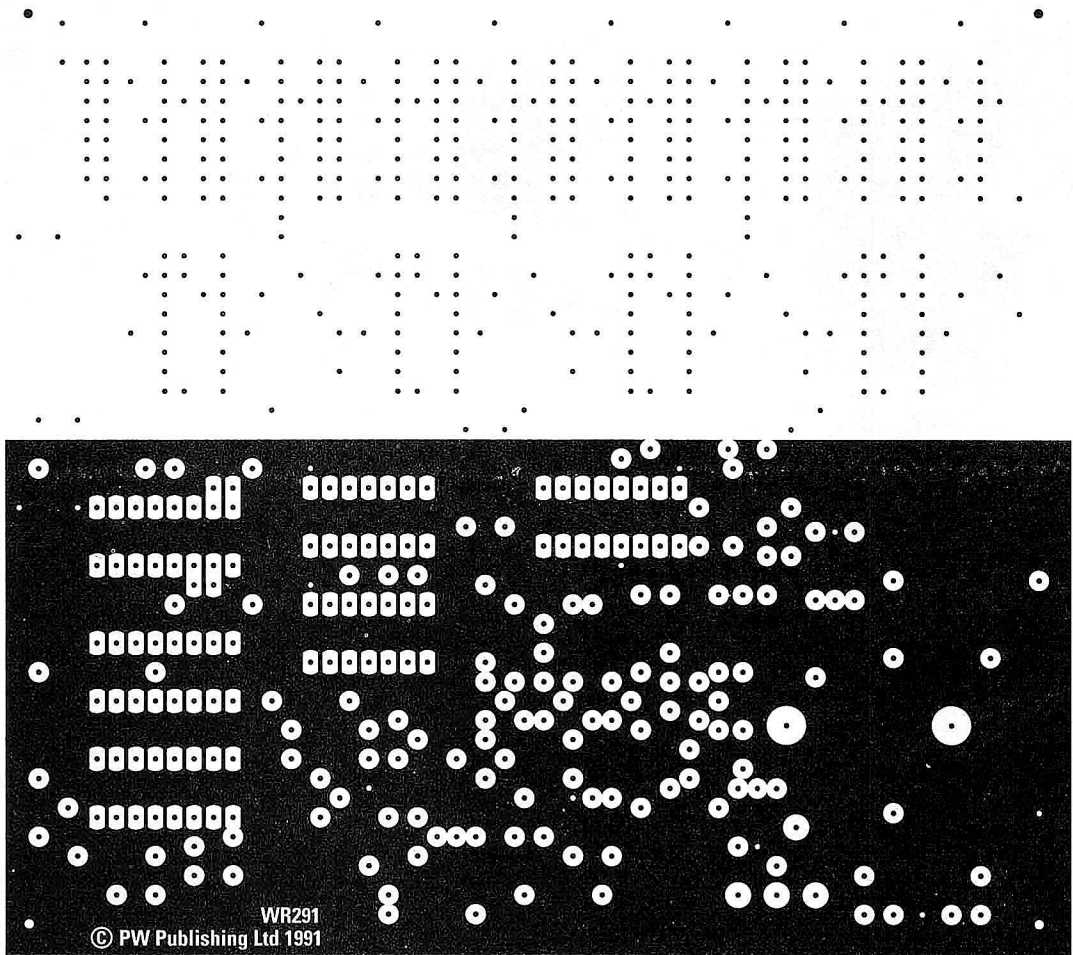
*After describing the circuitry in the first part of the PW Robin, Mike Rowe G8JVE gets into the 'nitty gritty' and describes the assembly of the frequency counter.*

### Addenda

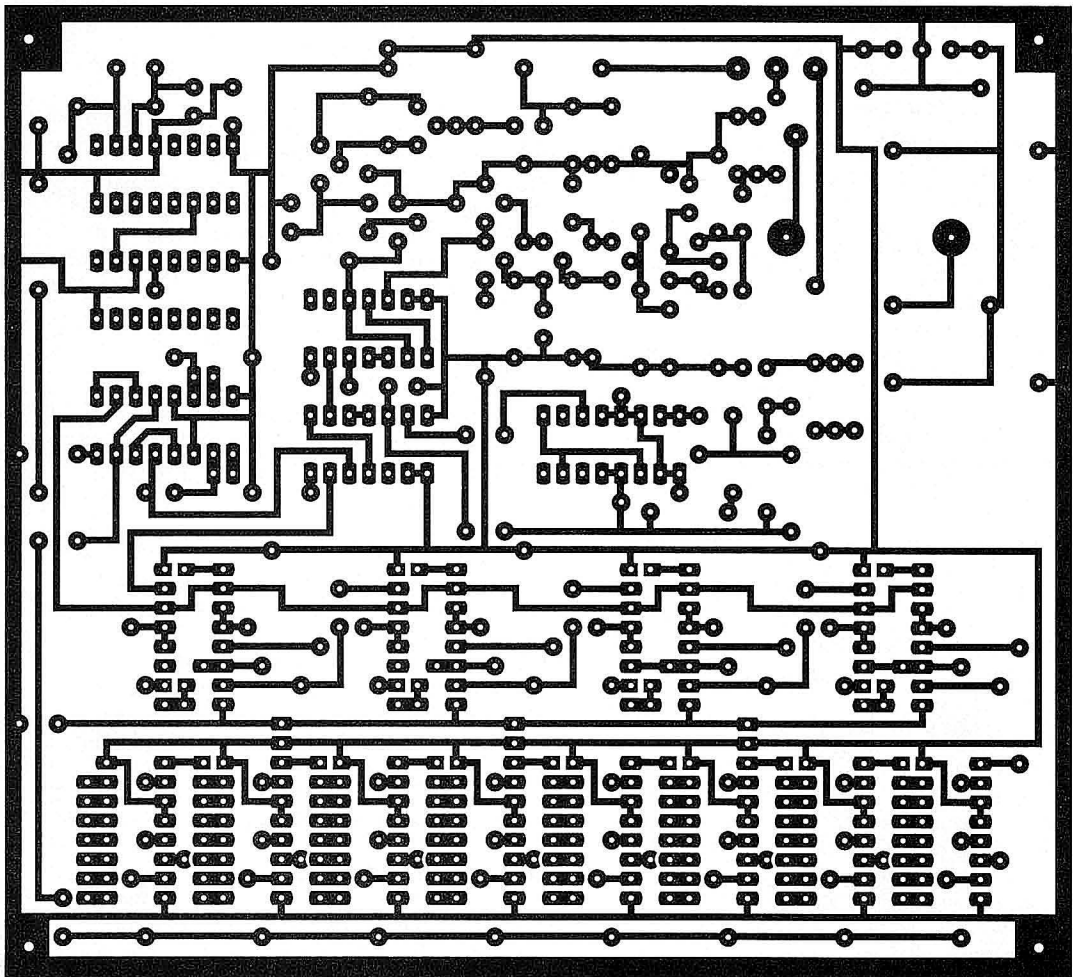
Transistor TR1 (BFR34A) may be difficult to source. A BFR90/90A may replace it. Similarly with TR2 (BF241), a BF167/198, or similar, may be substituted. A kit of PW approved electronic components are available for the price of £46 inclusive of post and packing, from: DJ Electronics 46 Ensbury Park Road, Winton, Bournemouth BH8 2SL Tel: (0202) 515073 The crystal, switch and BNC sockets are included, but not the case or cabling.

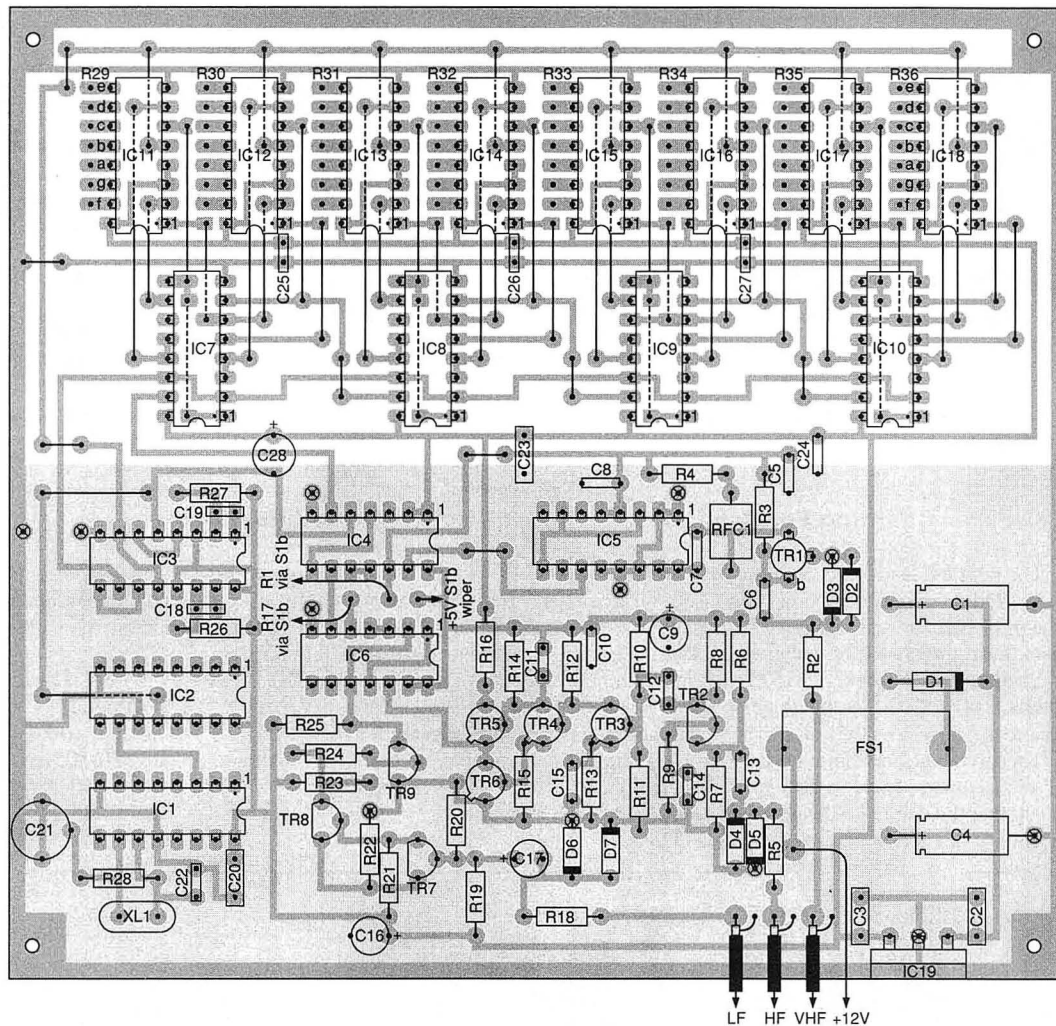


**Fig. 2.1:** The component side of the PW Robin's display p.c.b. The processor and prescaler circuits are on the lower, double-sided portion of the board.

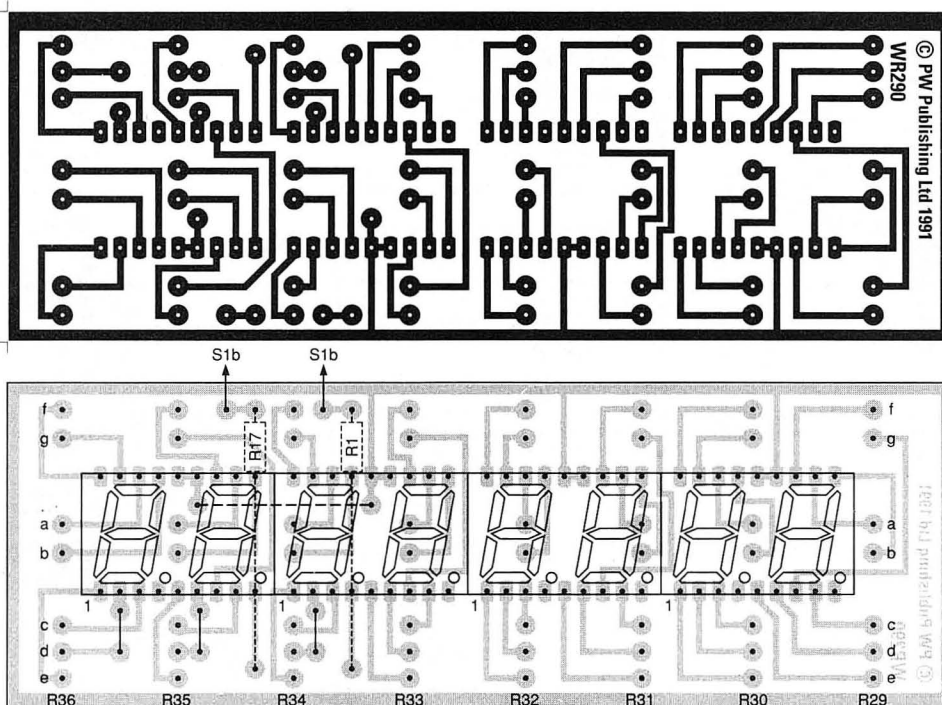


**Fig. 2.2:** The track pattern side of the PW Robin frequency counter. See Fig. 2.3 for the position of the links on the component side of the p.c.b.





**Fig. 2.3:**  
Component  
placing on the  
p.c.b. It's essential  
that the links  
shown are made  
first, as some pass  
under other  
components. The  
links in the  
'ground plane'  
area should use  
insulated wire.



**Fig. 2.4:** The display board,  
track and component  
overlay. The links should be  
made first. Resistors R1  
and R17 are fitted on the  
track side of the p.c.b.



**Table 1: The measured voltages, obtained from the working PW Robin. All voltages in the prototype unit were measured with a +5V rail and no signal input.**

Table 1			
	E	B	C
TR1	0.0	0.7	2.8
TR2	0.1	0.8	3.7
TR3	0.02	0.72	1.5
TR4	0.75	1.5	0.85
TR5	0.0	0.75	0.14
TR6	0.14	0.85	4.9
TR7	0.1	0.8	0.8
TR8	0.1	0.8	1.4
TR9	0.0	0.7	0.0

values in **Table 1** are the value of voltages found in the prototype and may be used as the basis of any fault-finding.

### Counting For Real

The next job is to temporarily wire up the 5V side of S1, and reconnect the power. The display should now only show zeros. If it doesn't display all zeros, check for the presence of the reset and latch pulses.

You can now feed a signal to the h.f. and l.f. inputs in turn. But don't forget that the displayed frequency may not be correct, as the unit still has to be calibrated.

The next stage is to remove the 5V supply to the l.f./h.f. section and connect up the v.h.f. side of the circuit. Check that the display still shows a frequency, but at a figure of one tenth the previous value displayed.

### Calibration

To calibrate the counter, a known frequency must be used. A crystal calibrator checked against a 'standard' signal is suitable. To set the calibration, you should adjust the trimmer C21, to give the correct frequency on the display.

### Casing The Counter

Don't forget to allow for the height of the mounting pillars when cutting the slot on the front panel for the displays. Also, you shouldn't forget to allow for the thickness of the display filter when you're drilling the mounting holes for the p.c.b.

### Modifications

If you only want to use the Robin as an l.f./h.f. frequency counter, omit all components associated with TR1 and IC5. You should then permanently connect pin 5 of IC6 to 5V.

With this variation, S1 needs only to be an s.p.s.t. type, switching the 12V input. This will reduce the cost by about £10, and leave you with a counter capable of counting up to approximately 40-50MHz.

Happy Counting!

PW

**Acknowledgements.**  
My thanks go to STS Communications and G4UAW for the help, assistance and use of test equipment to produce the prototype.

# Radio Diary

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

**\*July 13:** The Cornish RAC will be holding their rally at Penair School, St. Clements, Truro. All the usual attractions, refreshments, free parking, etc. Doors open 10am, 9.30am for the disabled. Talk-in on S22. **Rolf Little Tel: (0872) 72554.**

**\*July 14:** The Sussex Amateur Radio & Computer Fair will again be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open at 10.30am. **Ron Bray G8VEH. Tel: (0273) 415654** office hours.

**July 21:** The 8th McMichael rally and car boot sale takes place at the Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham railway station). Starts at 10.30am and admission is £1. The car boot sale is £6 per pitch on the day. There is free parking on site and talk-in is available on S22. **Neil G8XYN on (0628) 25952.**

**July 21:** The Colchester Mobile rally will be held at the Sports & Leisure Centre, Brinkley Lane, Colchester. Easily accessible site with free car parking and an extensive area under cover for traders and radio societies.

**July 28:** Rugby ATS have their annual Car Boot Sale, venue to be advised nearer the time. The event opens at 10am and talk-in will be provided by GB8CBS on S22. **Kevin G8TWH on (0203) 441590.**

**\*July 28:** The Scarborough ARS will be holding their annual rally at The Spa, South Foreshore, Scarborough. Doors open at 11am until 4pm. Many trade stands, large Bring & Buy, Tombola, licenced bar and refreshments. Morse tests followed by a demonstration by the North Yorkshire Morse test team. Entrance 50p including a prize draw. **Ian Hunter G4UQP (QTHR). Tel: (0723) 376847.**

**August 11:** The 32nd Annual Derby Mobile rally will take place this year at a new venue, Littleover Community School, Rykneld Road, Littleover, Derby. The school is situated on the A5250 road, just north of its junction with the A38. Talk-in on 144MHz. All the usual attractions, including the famous monster Junk Sale. **Martin Shardlow G3S2J, QTHR. Tel: (0332) 556875.**

**\*August 11:** Hamfest 91 will be held at the Flight Refuelling Sports & Social Club Grounds, Merley, Wimborne, Dorset. The event opens at 10am and will feature a Bring & Buy, trade stands, radio and electronics car boot sale, craft fair, field displays and attractions for the whole family. Special disabled parking is available in the grounds and overnight camping can be arranged. **John G0API. Tel: (0202) 619649, Rob G6DUN. Tel: (0202) 479038.**

**August 18:** The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level, with facilities for the disabled. Refreshments and bar available all day. Doors open at 10.30am for disabled and 11am for the general public. Admission £1, children free. **Dave G1100 on (0204) 24104 evenings only.**

**September 1:** Preston ARS will be holding their 24th Annual Rally at the University of Lancaster, as in previous years. **Godfrey Lancefield G3DWQ, QTHR. Tel: (0772) 53810.**

**\*September 1:** Telford amateur radio rally will be held at the Telford Exhibition Centre, Telford Centre, Shropshire. Doors open 11am (10.30 disabled). **John Bumford G0GTN, 19 Bewdley Avenue, Monkmoor, Shrewsbury SY2 5UQ.**

**September 8:** Vange ARS will be holding their annual rally at the Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. The centre is only a short walk from Laindon Station (British Rail) on the Fenchurch Street to Shoeburyness Line. Doors open from 10.30am to 4.30pm with admission at 50p. The rally will include many traders, Bring & Buy, refreshments and a free raffle. Talk-in is on S22. Approach roads will be signposted. **Doris Thompson on (0268) 552606.**

**\*September 8:** The Lincoln Hamfest will be held at the Exhibition Centre, Lincolnshire. Doors open 10.30am to 5.30pm (10am disabled). **Sue Middleton, 14 Toronto Street, Lincoln.**

**\*September 8:** The Scottish Amateur Radio Convention will be held at The Northern College of Education, Gardyne Road, Dundee. Parking available for 1000 cars. **Alan Glashan GM4JCM, 35a Lochinver Crescent, Dundee DD2 4UA.**

**\*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 licenced 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 is being held in Swardesdon, about 8km south of Norwich. The rally itself will be held within the grounds of G3LDI. All normal trade stands will be attendance along with a Bring & Buy, food and drink, etc. Talk-in will be available on S21 and the gates are open between 1000 and 1600. **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.**





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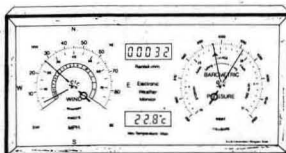
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I'll start at the 'high end' this month with a letter from **Les Jenkins GB37** who writes from Godalming in Surrey. Les mentioned, in a short but very interesting letter, that he's changed his 934MHz cables and achieved better results on the air.

He reports that "At the start of the 934MHz days, people either used the usual RG-213 or RG-58U cables, which are both a bit lossy for this band. The only other alternative that was readily available was the Pope H100 type. This offered a considerable improvement, in spite of the fact that no N-type plugs fitted accurately".

"Then at last", Les continued "there appeared a suitable range of cables and plugs, and since I replaced the H100 with some of the 10D FB cable, there has been a noticeable improvement in transmission and reception. My s.w.r. readings have improved and the new cable has the advantage of being more flexible with losses per metre of only 0.105dB".

Thanks for that information Les, there's a lot of us, even on lower frequencies, who lose out because of 'lossy' cables. We could all learn something. There have been many occasions when I've seen excellent quality home-base antennas on 27MHz, fed with poor quality (often wrong impedance) cables.

The operators can't understand why their high-mounted antenna performs badly! Finally, as we're talking about antennas, I'm pleased to say that the 934MHz project from Fred Judd G2BCX, is in the *PW* office and ready to go. We've only got to wait for the editor to 'get his finger out' and publish it for us! (**Hint taken *Quaynotes*, we'll publish the design as soon as we can. Editor**).

To round off this month, I must comment on a fascinating and detailed letter from York-based **Keith Chapman**. Keith's letter came via the editor, and although Rob Mannion will reply separately, I thought that the letter would encourage 934MHz operators.

Keith's letter is encouraging because he reports that there has been an upsurge in activity in his area with three active

operators in York, while others are busy in the West and South Riding of Yorkshire. "Many new stations are 'popping up' on the air" Keith says. From Keith's letter it appears there's also much activity in the Newcastle area. He also mentions that many of the operators active in the north of England, keep in touch through regional newsletters which in their own way firmly support the 934MHz Club UK.

Thanks for the newsletter Keith, and I look forward to seeing a few more examples. That's the lot for the 'high end', keep the letters coming in and I'm looking forward to seeing the 934MHz antenna design in print!

#### Scene On Twenty-Seven

Well, I've got no doubt whatsoever that 'High & Low' readers were interested in the CapCo. 'Loop' competition. Altogether, I must have read over 400 entries!

The entries were read by

myself, *PW* editor Rob Mannion and Helen & colleagues at CapCo. There were some really good names, one or two were 'naughty' and unfortunately unusable (but they were funny all the same!).

Judging the competition was fun. It also made me realise what a difficult job manufacturers have, when it's time to choose a name for a new product. Despite that, you all entered into the spirit of the competition and enjoyed yourselves at the same time.

The winning entry was from Jack Pellam from Wittering in Cambridgeshire. Jack suggested the name 'CAP 27 Commander', and he'll soon be in command of his own antenna. Well done Jack, and I can assure you that your threat to go ahead and buy a CapCo. Loop anyway, win or not, didn't sway the judging team in their deliberations!

By the time this edition of 'High & Low' appears, the three runners-up will have been informed, but I must also thank



By 'Quaynotes'

***This month, Quaynotes passes on some advice to improve your u.h.f. CB signal, information on PW's forthcoming 934MHz antenna design and glad tidings to the winner of the rather 'loopy' May competition.***

#### Slow Scan TV Illegal On CB Channels

Although there has been much interest shown in slow scan TV on the 'CB High & Low' page recently, we now understand that such operation is definitely illegal within the terms of the CB radio licence. As *PW* does not wish to seem to encourage unlicensed activities, and has a definite policy to avoid doing so, the topic will not be covered in the future unless there is a change in the licence conditions.

Editor.

D. W. Friend (Horley, Surrey), Wayne Haverson (Emsworth, Hampshire) and R. S. Bibb (Kettering, Northamptonshire) for their excellent efforts.

#### Loopy Review

To round off at the 'low end' this time, I think it's an appropriate time to tell you what my thoughts were on the newly-named CAP 27

Commander. You can see from the photograph in the May issue of 'High & Low', that the antenna is a very rugged design and so I decided to try it out from my home.

I'd already made up my mind that this antenna would be popular as a 'roof-space' job. So, obviously, the first place I tried it, was in our loft. From this position the antenna worked very well, but I found that it was necessary to be fairly near the loop to adjust the tuning to my working frequency.

Once the loop was tuned, it worked very well indeed. It certainly proved very useful in reducing interference and splatter from nearby channels. Having to tune the loop turned out to be no real problem either, because I quickly found that I mostly used my favourite channels anyway.

I compared the loop with my own vertical CB base antenna (based on the *PW* RB10 design from July 1990). After lengthy trials, I found that the loop wasn't as good as the base antenna when working stations more than 20km away. However, the loop proved far superior when working local stations and the reduction in electrical noise was dramatic.

To sum up, I would say that the loop would be an ideal antenna for someone who is limited to a roof-space installation, or tends to work on a small number of closely-related channels. However, having said that, I now understand that CapCo. have introduced a remote controlled, motor-driven version. I've no doubt that there'll be one or two of you out there who'd like to try one of those!

See you next month, keep working on CB channels both high and low.

*Quaynotes.*



# Antenna Construction

## The Natterpole 1.8MHz Vertical Antenna

*Ian Keyser G3ROO, found that his appetite for 1.8MHz work was whetted after the Chatterbox project, so he designed the Natterpole, a simple Top Band vertical antenna.*

After working with George G3RJV on the PW Chatterbox, I found that the 'Top Band Bug' had bitten me well and truly. I was determined to put out a better signal on 1.8MHz.

After trying several wire antennas for 1.8MHz, I decided that there was not a lot to choose between them. So, I decided to tackle the problem from the vertical direction!

Although more difficult to construct than wire antennas, the PW Natterpole's performance is far superior in both groundwave and DX working. If it's properly constructed and maintained it should prove trouble-free for several years in our climate.

I started the design process off, knowing I had the constraint of a 10m square garden. My computer, when fed with the design information for a vertical antenna, produced an azimuth plot showing a truly omni-directional pattern, as I hadn't written details about house, tree and other items into the program.

The elevation plot showed, as expected, the greatest radiation to be at approximately 30°. The effect of this would be, I thought, a good groundwave signal at up to 30km range and then a skip zone of a few hundred kilometres. In other words, the Natterpole is good for local and DX working but I can't talk to the English Midlands from my QTH in Kent!

### Natterpole Recipe

I decided that the simple approach was best, and you'll find that the main ingredients are easy to find, borrow or buy. The diagram, **Fig. 1**, shows the basic circuit of the final version of the Natterpole.

Two scaffold poles are required. If you can't afford two brand new poles (and the alloy tubes aren't cheap), it's a good idea to visit to your local scrap metal

merchant where you'll probably find a shorter length of steel material for the base of the antenna.

I've tried to make it clear in the diagram, that the antenna is based around two poles and a section of alloy TV antenna mast material. The main radiator is actually insulated from the supporting length with layers of pvc insulating tape. This is done so that the scaffold-pole clamps can grip the vertical sections, without 'shorting' the system out\* (see **Editorial note in shopping list**).

### The Centre Coil

The Natterpole centre coil was wound on a 100mm diameter former that I'd bought at a rally. My coil already had 40 turns of thick wire on it, and I calculated that I needed to wind another ten turns of heavy (2.5mm section will do) pvc insulated wire. I worked out that the final inductance was approximately 150µH.

The finished coil was fixed over the glass fibre centre insulating section of the pole, by two 125mm long lengths of 4BA brass studding and 12 nuts. I made some heavy braiding by stripping old lengths of coaxial cable, to use as straps to connect the coil to the poles and to bond all the joints.

### Heavy Currents

There'll be heavy current flowing in the bottom section of the antenna, so you will have to keep the resistance in the system to the lowest possible value. You don't want to waste valuable power heating up the pole!

The prototype Natterpole was temporarily lashed to a gate post with polypropylene rope, and a piece of Perspex to stop it shorting to the fencing. The assembly was mounted on a glass bottle to keep it clear of the ground. Very much 'Heath Robinson' style but perfectly acceptable for the first tests!

Using the fencing around the garden as a ground plane radials, I started my tests. I loop-linked my dip-meter to the antenna and found that it resonated at 1.990MHz.

My computer program showed me that the feed impedance was in the order of 6Ω, which is very low and difficult to match. Very high current will be flowing, and as I've already mentioned, you must use as thick a wire as possible for all connections.

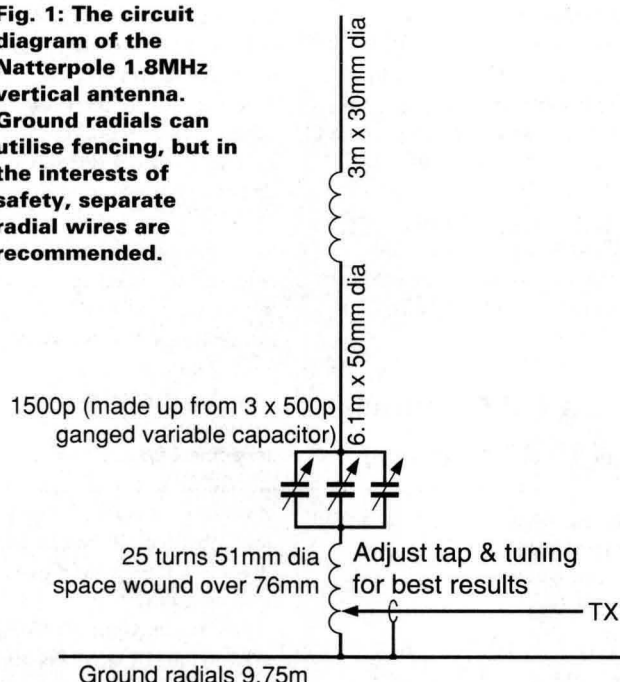
### Matching Solution

One solution to achieve matching, would be to make a 9:1 transformer, but that approach wouldn't allow the antenna to be used over the whole band. Electrically short antennas have a high Q and therefore have a narrow bandwidth. I wanted to tune the system over the whole band and enable a good s.w.r. to be maintained on the 50Ω coaxial feeder cable.

After several attempts I decided to use a series tuned circuit at the bottom of the antenna. At resonance, the series tuned circuit has a low impedance across it, and a match can be found on the inductor to feed the antenna from the transmitter at 50Ω. Using crocodile clips on the base coil, to select a suitable matching point, I found a good point within seconds and achieved a 1:1 ratio.

On your finished antenna, the tuning and matching  
Practical Wireless, August 1991

**Fig. 1: The circuit diagram of the Natterpole 1.8MHz vertical antenna. Ground radials can utilise fencing, but in the interests of safety, separate radial wires are recommended.**



system can be protected by making a housing from a suitable plastics container, such as the types used to hold cooking oil, detergent, etc. You can arrange the bottom of the radiator pole to terminate in the neck of the container (cut the bottom of the container away) which then acts as rain shield.

You'll have to make a water-tight seal at the point where the radiator pole passes through the neck of the container. Bathroom-type, flexible silicone-based sealants are ideal for this job! The bottom of the container can then be held back in place (after you've tuned and tested the system) with pvc tape.

### On Air Tests

After extensive testing on the air, with a lot of help from my friend Dick G2ACG, I was satisfied that the Natterpole was working well. Dick only lives about 8km away from me and he was receiving me at S-9 +20 when I was running 1W into the Natterpole.

I then changed over to my 40m 'long wire' which then provided a very slightly weaker signal at Dick's end. Finally, for the local tests I changed over again to my 1.8MHz dipole, which is 15m above the ground.

Changing over to the 1.8MHz dipole made the signal slightly weaker at Dick's QTH, and proved to my satisfaction that the antenna was working as expected. Various other QSOs showed beyond doubt that the antenna was good for local and DX working, but not so good, compared to the dipole, for intermediate operation (the English Midlands from Kent is one example I've mentioned).

### Conclusions

I've got to do many more tests on the Natterpole, but I'm thoroughly enjoying working with the antenna. The next project is to see if I can come up with the 'Natterwire' antenna!

Finally, I suggest that when you build your ground post pole section for the Natterpole, that you surround the base with broken bricks, etc., before pouring the concrete in. You can also protect the bottom of the pole from rusting by layering it with strong pvc tape.

Don't forget that the radiating sections must be insulated from the ground support post. I realise that many of you won't follow my own construction methods that closely, but please remember the safety aspect and make sure your version of the antenna is safely mounted. It has been known to get windy in the UK in recent years!

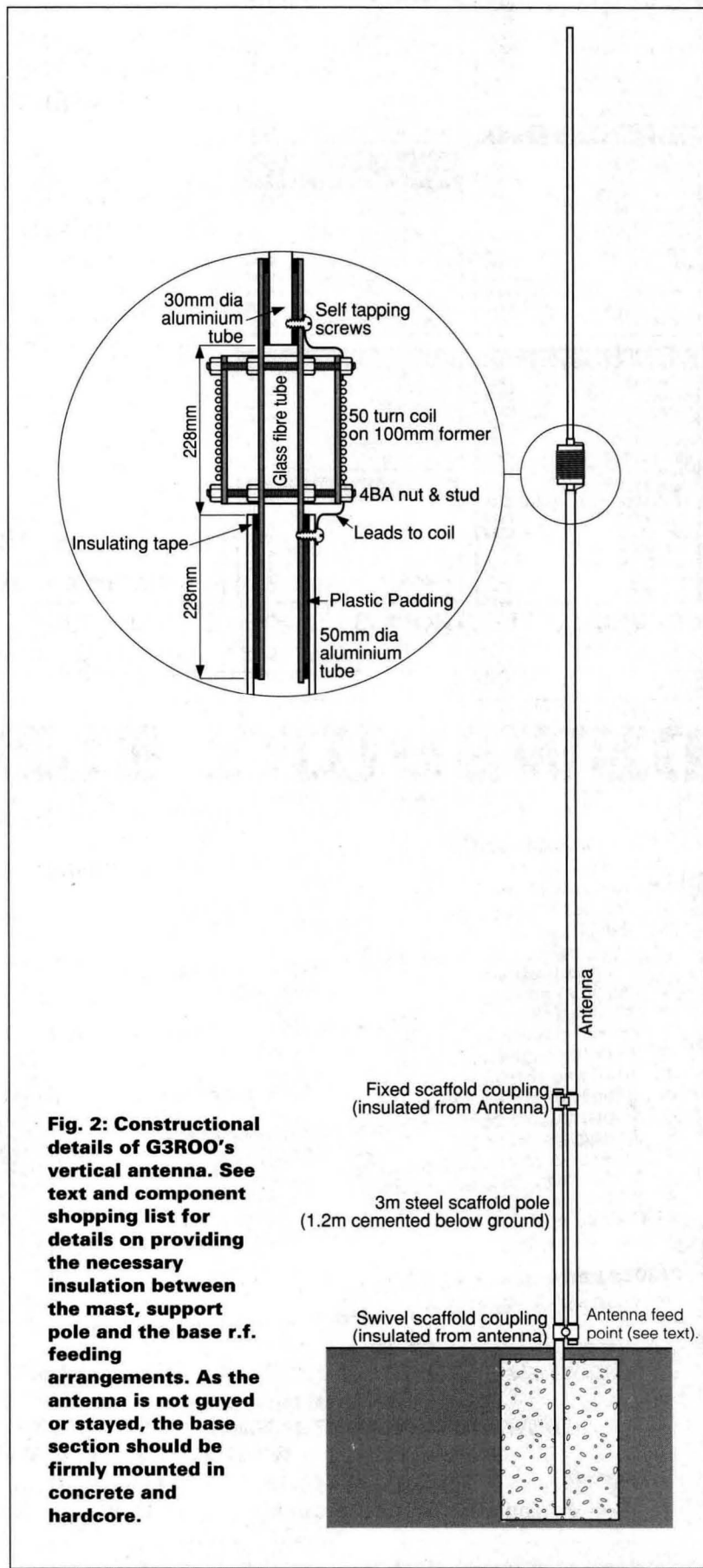
I hope you have as much fun on 'Top Band' as I have, and I look forward to working you on 1.8MHz using your PW Chatterbox transmitter-receiver and the Natterpole antenna.

PW

### Shopping List

One length of steel scaffold pole (ground post), one 6.1m length of alloy scaffold pole (radiator bottom section) and one 3m length of 30mm diameter alloy TV antenna mast tubing. Coil formers, heavy duty wire, crocodile clips, brass nuts and bolts, insulating tape, Plastic Padding filler-resin mixture (available from car accessory shops) and a short section of glass fibre tube. **Safety Note: Take care when mixing the Plastic Padding, because of the vapours given off from the mixture, it's a job best done out of doors and away from naked lights.** You'll also need a three section 500pF variable tuning capacitor, with as wide spacing between the fixed and moving vanes as possible.

**\* Editorial Note:** Non-metallic scaffold clamps and swivel joints are available, even if they are difficult to find. Such clamps are made from a nylon-like material and are used when insulating and non metallic materials are needed (for electrical use and where the danger of sparks from metal-to-metal contacts are a danger). Your local scaffolding contractor may be able to help you locate the materials needed.







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## SCANNING RECEIVERS

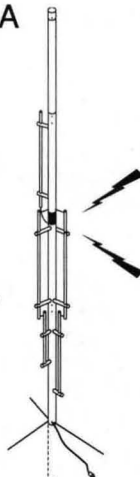
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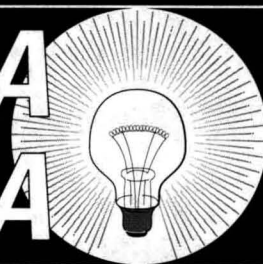
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**PLEASE NOTE:** that we at PW may not have built and tested the circuit, but present it on an 'as-is' basis. We do take the greatest care in preparation of the article, but cannot be held responsible for the suitability of the original suggestion, or for any damage that may occur to property or equipment in implementing this idea.

### Paddling At 50Hz

Fancy a paddle key, but can't afford one? I was in this situation some time ago, and I decided to do something about it. An old round-pin mains plug, a piece of broken hacksaw blade, coupled with some scrap pieces of plastics material became my paddle key.

The drawing, **Fig. 1**, should make it a little more plain. The pieces of plastics material are used to dampen the action of the paddle, and they may be changed to suit the action needed.

Take the plug apart, and fix the top half to a suitable base board. Take out each supply pin, drill and then tap suitable holes for the screws. These screws become the dot and dash contacts.

### Earth Pivot

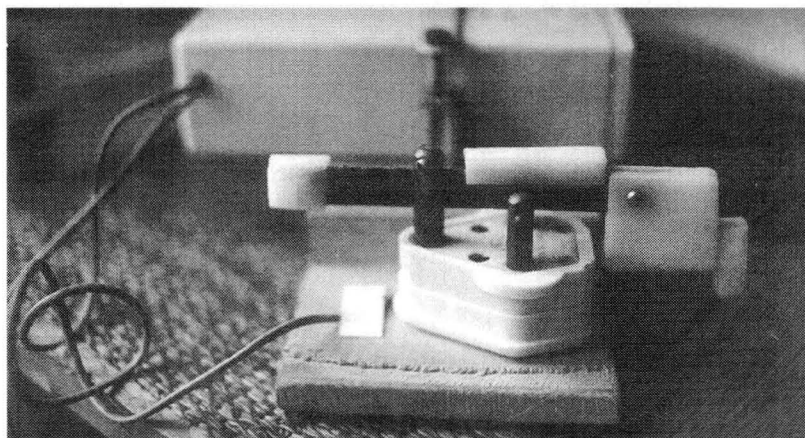
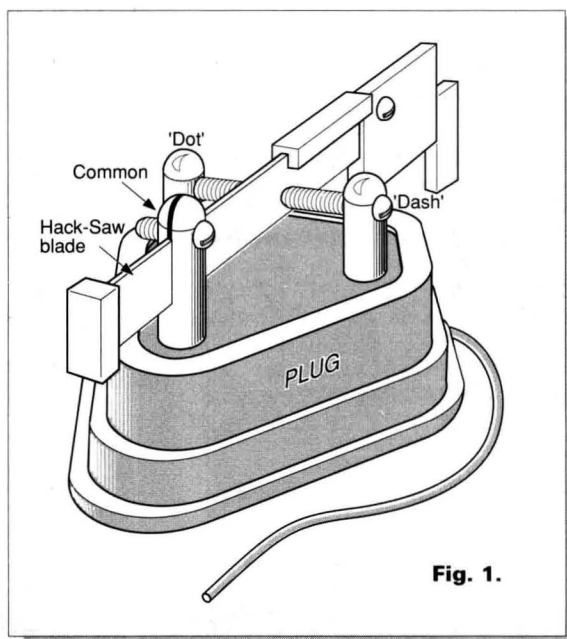
The next stage is to make a saw cut through the 'earth' pin so that the saw blade is held centrally between the other two pins. Then drill another hole at right angles to the saw-cut, to form the clamp for the blade. Scrape the paint from the saw blade, especially in the areas of the contacts.

Make yourselves a paddle handle from some plastics material and fix it to the blade. To finish off the paddle, pieces of old plastics material are added to the spine of the blade and to the clamped end. By adjusting the amount of material added and the length of the free blade, a suitable action may be created.

**P. Wilkinson G0IIT**  
Alford, Lincoln

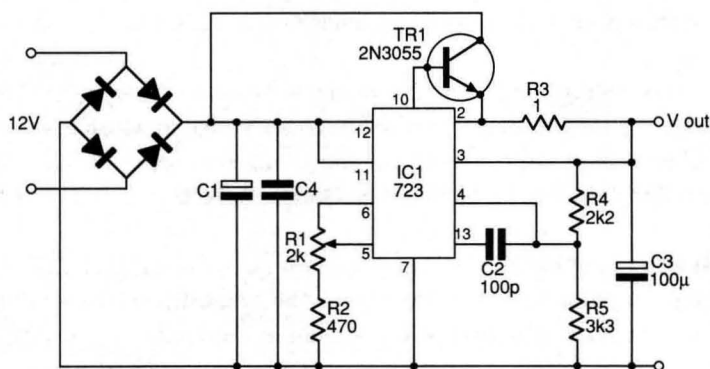
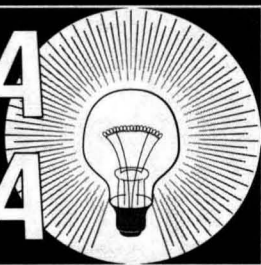
### Further reading.

'PW Iambic keyer', an article by J. Maynard G4EJA in *Introducing Morse* available from the PW Book Service, price £1.25 + p&p.

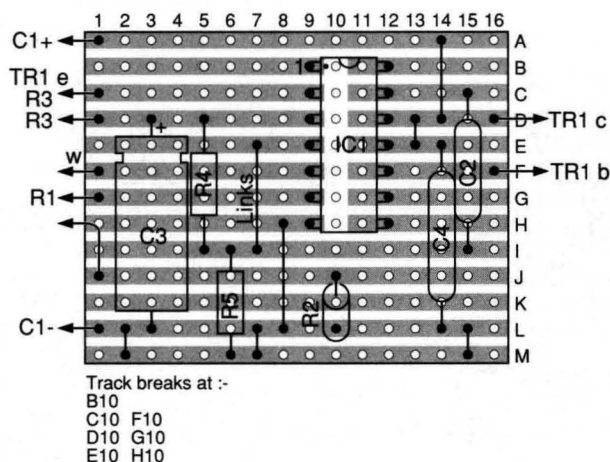




# WHAT A GOOD IDEA



**Circuit diagram of the YAPSU-2/11 power supply from a Malaysian reader.**



## YAPSU-2/11

(Yet another power supply unit 2-11V)

It's not always easy to find a suitable transformer to power low voltage projects. This unit uses any transformer with a secondary voltage of 8-15V. It could also be fed directly from a 12V battery or p.s.u.

I dislike having to buy batteries in large numbers for a personal stereo set. I already had a 12V source and so I set to and designed the circuit presented here. The diode bridge and capacitor C1 are only needed if the system is to be powered from a mains transformer. The working voltage of C1 should complement the transformer used, but it must have a capacitance value of at least 2000µF for adequate smoothing.

Based on a commercial design, but modified to give a range of lower voltages, it uses a portion of the reference voltage of the 723 i.c. This portion, controlled by the setting of R1, is fed to the internal comparator of the i.c. Transistor TR1 is a 2N3055 although almost any high power n.p.n. would do.

Resistor R3 gives short circuit protection at about 600mA. As shown, the p.s.u. should provide currents up to 600mA, at voltages between 2 and 11V.

**Mas'od bin Haji Latib**  
Johor, Malaysia

### Shopping List

#### Resistors Metal Film 0.6W

1Ω	1	R3
470Ω	1	R2
2.2kΩ	1	R4
3.3kΩ	1	R5
Rotary Variable		
2kΩ	1	R1

#### Capacitors

Disc ceramic		
100pF	1	C2
100nF	1	C4
Electrolytic 16VW		
100µF		C3

#### Semiconductors

2N3055	1	TR1
723	1	IC1

#### Optional components

For C1 and the diodes see text.

Further reading

*Practical Power Supplies* available from the PW Book Service, priced at £1.25 + p&p.

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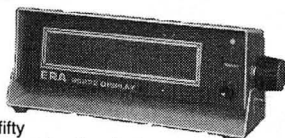
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**TRANSVERTERS** for <1mW 10 metre drive. Buffered versions of above types TRC2-10B, TRC4-10B, TRC6-10B. PCB KIT £64.25, PCB BUILT £94, BOXED KIT £85.75, BUILT £127.

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• Supports 2 drives, multiple formats: 5 1/4" Double Density (360Kb) 5 1/4" High Density (1.2Mb) 3 1/2" Double Density (720Kb) 3 1/2" High Density (1.44Mb)			
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• 3 Full length Slots (2x16-bit, 1x8-bit)			
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• Internal, programmable speaker			
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• Detachable, Enhanced PS-2 style • 102 sculpted keys • LED indicators for Num Lock, Caps Lock and Scroll Lock			
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• Centronics compatible parallel interface • DB25 female connector on the motherboard			
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MOUSE INTERFACE			
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MOUSE			
• Microsoft or Mouse Systems compatible mouse			
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VGA MONITORS - OPTIONAL			
Monitor	Description	Max Res	Specifications Price
MBH4335	Mono 14" VGA	640 x 480	64 Grey levels 11mm Pitch £100
GS4243	Colour 14" VGA	640 x 480	51mm Pitch £200
GS4435	Colour 14" SVGA	800 x 600	31mm Pitch £300
All Video Displays include a tilt and swivel base. All prices include VAT. The prices of £100, £200 and £300 are specially discounted and are only available if the monitor is purchased with a GT212 computer.			
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SOFTWARE INCLUDED			
• MS-DOS 4.01 with DOS Shell • GW-Basic V3.2 • Goldstar Startup & Diagnostics Programs • VGA Utility Program • GEM 3 Desktop - WIMP environment • GST's First Word Plus - Word Processor			
MANUALS INCLUDED			
• MS-DOS V4 User Guide • MS-DOS Shell Guide • GW-Basic Manual • GT212 Operations Manual • GEM 3 Desktop Guide • First Word Plus Manual			
SOFTWARE OPTION			
• Microsoft Windows v3.1 £99 +VAT			

NO MONITOR	MONO VGA	COLOUR VGA	COLOUR S-VGA
GT212 COMPUTER	640 x 480 £100	640 x 480 £200	800 x 600 £300
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# Reflections

*This month Ron Ham recalls his memories of meeting radio enthusiasts, both professional and amateur, from all walks of life, with a particular look at one or two 'Jack of all trades' who specialise in restoring historical equipment.*

Over a period of many years I have had the pleasure of meeting and talking to hundreds of radio enthusiasts in both amateur and professional circles. Although they may not realise it, their interests and technical ability often covers a far wider field than their prime subject. There has never been any doubt in my mind that the majority of radio people have to be a rather special 'Jack of All Trades' to carry out the work they do.

For instance **Chris Pearce** (Southampton) has renovated an ex-military wireless truck, **Fig. 1**, made by Humber about 1948 and powered by a Rolls Royce engine. Chris showed me the selection of aerials, masts and fittings, the complex ignition-interference suppression and the all important camouflage used to hide such a station when it's static.

Inside the vehicle were a variety of ex-army sets, wet-batteries and associated WT and RT equipment that he has fitted in the rear cabin. Believe me readers, this area is as carefully restored as the exterior and, when on exhibition, each section of the vehicle has its own dedicated spectators. To undertake such a task successfully you would require knowledge and skills of mechanical, electrical and radio engineering.

On May 26, I met **Dave Higginson G8JET** (Doncaster), **Fig. 2**, a TV service engineer and industrial photographer. He recently restored, "from tuner to tube", to good working order, a Thorn 2000 colour TV set for demonstration and exhibition by the **National Museum of Film, Photography and Television** in Bradford. This particular television was the first all solid state colour receiver. Dave is a collector and restorer specialising in the 1920s to 30s period of wireless and allied equipment. He is a member of two specialist groups, the **British Vintage Wireless Society** and the **405 Alive Club**. In addition to his expertise in electronics, Dave couldn't renovate the complex equipment without the ability to use a wide variety of tools and test-instruments and be able to freely work with blueprints, circuits, wood and metal.

Some of you may remember an old friend of mine, the late **Eric Cosh G2DDD** (Littlehampton), who was one of the pioneers of the

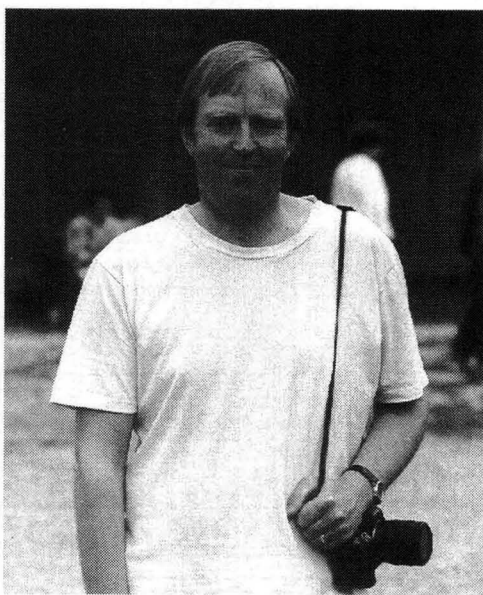


**Fig. 1: Chris Pearce's Humber Wireless truck.**

56, 144, 432 and 1296MHz bands. It sounds unbelievable today, but during Eric's time, as each of these frequencies were allocated for amateur use, the majority of requirements, from antennas to transmitters, had to be home-brewed. This was because there was little on the market to meet the new and advanced technology, demanded by the introduction of ever higher frequency bands. Eric had separate fully-tooled workshops for wood, metal and radio engineering and, like **Dick**

**Ganderton** the editor of our sister publication *Short Wave Magazine*, he was an active model and steam engineer.

There are thousands of people within the radio fraternity like Chris, Dave, Dick and Eric, who have these associated skills and use them for business and pleasure. I bet there are several among the members of your local radio club, so, if any of you want to become a home-constructor, don't be afraid to ask for their advice, I'm sure it will be willingly given. Furthermore,



**Fig. 2: Dave Higginson G8JET.**

how many 'Practical' magazines can you remember that were started by PW's first editor, the famous F. J. Camm? Did you know, for example, that his elder brother Sydney, another very practical man, designed the Hawker *Hurricane* fighter. This famous aircraft, along with the R. J. Mitchell's Supermarine *Spitfire*, helped to maintain British air supremacy during the Battle of Britain.

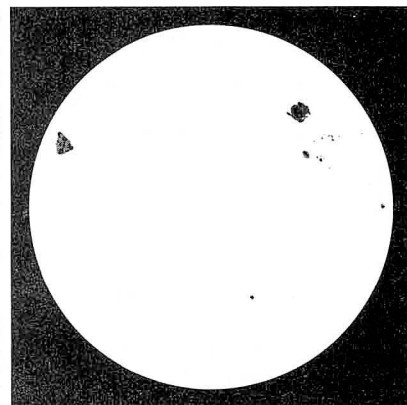
## Meeting The Navy

Equipment, however good, must be operated in the proper manner by people. During last October I was delighted to have another chat to **Mike Matthews G3JFF** and **Ron New**, left and centre respectively in **Fig. 3**, of the **Royal Naval Amateur Radio Society**. This reminded me that among my archives I have a copy of the official publication *National Service* published by H.M.S.O. in 1939. The opening of the foreword, written by the Right Honourable Sir John Anderson, M.P. Lord Privy Seal, says "Men and Women all over the country are today eager to fit themselves voluntarily for National Service. Some have already decided what service they can best give and are fitting themselves by training to give it". A sub-heading on page 30 reads, **R.N. Volunteer (Wireless) Reserve** and from the subsequent text I quote, "is formed for the purpose of training and providing telegraphists for service in the Royal Navy in emergency"...and..."The age limits are 18 to 45, and candidates should be amateur operators or should be interested in wireless telegraphy transmission work in the Morse Code".

Under another heading on page 42, **R.A.F. Civilian Wireless Reserve** the authorities required "Men who are proficient amateur wireless operators, preferably holders of General Post Office Transmitting and/or Experimental Licences"... and ... "Training is normally undertaken by members at their homes and with their own sets, and consists of pre-arranged programmes of transmissions from Royal Air Force W/T Stations and general liaison between members". I wasn't surprised when my research revealed that both organisations were mainly the

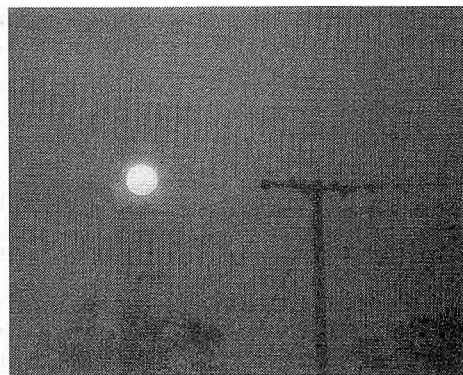


**Fig. 3: Mike Mathews G3JFF (left) and Ron New (centre) with Ron Ham.**



**Fig. 4: Sunspots observed by Patrick Moore on May 9.**

**Fig. 5: You can easily point your 144MHz antenna at the rising or setting sun for solar radio noise detection.**



brainchild of RSGB Council members, and were established in the early and late 1930s respectively.

## Astronomy

Last month **Clive Brook** (Plymouth), showed us how he built the sun projection screen attached to his telescope. However, if you don't fancy making one, you can see if a screen can be purchased as a separate unit. I thought of this approach while looking at the goodies in a photographic store. I had spotted a solar screen attached to a new, tripod-mounted, refractor telescope. A piece of good quality plain paper can be attached to the screen on which any visible projected sunspots can be pencilled in.

One of the solar projection methods was used by **Patrick Moore**, at his observatory in Selsey, to observe and draw the two large sunspot groups, **Fig. 4**, at 0900 on May 9. Readers who already watch Patrick's television programme *The Sky At Night*, will already know that items of current astronomical interest can be seen on BBC CEEFAX page 616, but for those who don't, it's to be recommended.

## Meteor Showers

While thinking of the night sky, the expected peaks of two of the Aquarids meteor showers should occur on July 29 and August 7, plus one of the Capricornids on August 2 and the Perseids on the 13th. For several days around those mentioned, the earth encounters

great swarms of meteors on its orbital path around the sun and they really are a beautiful sight to see.

These tiny but solid particles manifest themselves as streaks of sometimes colourful, bright light as they burn up on entering the earth's atmosphere. However, if the sky is overcast, or the moon too bright for viewing, those with scanning receivers can try setting a channel to 70.31MHz and listening for minute 'pings' of speech or music that suddenly jump above the receiver background noise. By this method, you will get some idea of the hourly rate of entry.

The received 'ping' signals will be from the Polish broadcast station at Gdansk, and are being deflected by the temporary ionisation created by the decaying meteor trails. During the peaks periods, many TV DXers tune through some of the more distant vision channels in Bands I and III looking for 'pings' of picture, so you will not be alone in your efforts. Do let me know how you get on.

## Observations

Last month I talked about radio-blackouts being associated with solar activity, since when, our editor, **Rob Mannion** experienced a big one while he was in Dayton, Ohio, USA on April 25/26. He tells me that the "h.f. broadcast bands were virtually dead" and that he could not find the BBC's World Service for a couple of days, and then only a weak signal. When you're used to active bands, it's hard to imagine a partial or total blackout until it is actually

experienced and then you 'hear' nature at work. **Fred Pallant G3RNM** (Storrington) noticed something similar on 28MHz, between 0900 and 1000 on May 17th when he reported, "not a peep from any beacon (except GB3RAL)" and by 1046 only the African beacon ZS5VHF had appeared. Also at 1647 on the 23rd he wrote, "have listened at various times throughout the day - have only heard GB3RAL." **Ern Warwick** (Plymouth) noted "fast-fading" on the signals from ZS6DN/B on 14.1MHz on the 23rd and 24th. He heard the German beacon DK0WCY on 10.144MHz giving weak auroral warnings at 1730 on the 25th, 0900 and 1400 on the 26th and 0800 on the 27th. In his general report on 28MHz for May, Ern said the band was "dead" around 0850 on the 5th, 1900 on the 13th, 1100 on the 16th. In addition he noted a "high background noise" (no doubt solar) at 0850 on the 3rd, 1300 on the 16th and 1010 on the 25th and a "fade-out" at 1240 on the 17th. **Gordon Foote** (Abingdon) found 28MHz conditions good on the 20th and 21st, when he logged 12 international beacon signals, "but", says Gordon, "in contrast there followed "terrible Thursday" 23rd May and "frightful Friday" 24th May!" when all he heard was ZS6PW on the 24th. "Two days with no sigs!" remarked **Ted Owen** (Maldon) about the sparse activity on those days.

Solar radio noise is something often discussed in this column because an outburst can mean that a stream of charged particles, ejected by the sun, are heading towards the

earth's orbital path. One of the simple ways of finding out if radio-waves are being emitted when sunspots are present, is to point a 144MHz Yagi (usually mounted horizontally) toward the rising or setting sun, **Fig. 5**. Next, set your receiver in the a.m. position, which should be tuned off station and listen for definite fluctuations in the background noise. Of course, if your beam can be elevated then the sun can be checked at anytime during the day.

## Sporadic-E

I'm preparing this column at the beginning of the 1991 Sporadic-E season. Between now and early September, an event, big or small, can happen at any time during the daylight hours. Such events can produce some interesting conditions, mainly between 28 and 80MHz. So far, **Bob Brooks** (South Wirral) has received television pictures in Band I (approximately 40-70MHz) from Iceland and Norway around 1440 on May 25, the USSR during the early evening of the 26th, Denmark and Sweden early on the 28th, Spain at 1010 on the 29th and Norway again at 1400 on the 30th. Around 1430 on the 25th, I logged test-cards from the Norwegian regionals Bagn and Melhus and at times their signals were so strong that the built-in telescopic rod on my JVC 3060 receiver was sufficient antenna for good results.

## Reflections



## Satellite Preferences

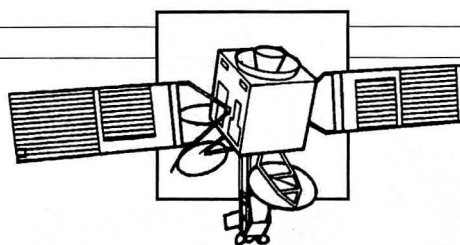
There are many conflicting opinions regarding the set of six microsats launched last year. Some satellite users state they would have preferred Mode B analogue transponders. Others prefer Mode L and S, even more Mode A, some an ATV transponder, and some others digital transponders. Many would like to see a fixed geostationary OSCAR and others a slowly drifting 'geosat'. Even more would like a Molniya orbiter, and more prefer the DX semi low earth orbits such as used by RS-1 to RS-8.

Some amateurs foresee the need to utilise the much higher frequency bands on a 'use or lose' basis. Meanwhile others wish to continue to use the lower frequencies, as these are readily available to most amateurs in most countries, at low station outlay costs.

The designers and engineers in AMSAT have further considerations, with little apparent interest in 'old-hat' ideas already well tried and tested. They like to do something new and novel, which is what many would say amateur radio progress is all about. This is most certainly one way of maintaining the amateur hold on coveted frequencies. The results of the considerations were the new breed of microsats called 'PACSAT's, i.e. Packet Radio Satellites, using high speed digital data transfer, with downlinks mainly in the amateur space allocation in the 430MHz band.

## The PACSATs

With the PacSats, amateurs now have a highly reliable way to communicate internationally, and a full-time Bulletin Board Service (BBS). They are also a means to receive both the Amsat News Service bulletins and the most topical sets of satellite orbital elements as soon as they are available. The amateurs no longer depend on propagation variables, net availability, an h.f. packet link, or even worry about busy signals from a v.h.f. packet or landline BBS. Because of the orbit of the PACSATs, global coverage of the world makes it possible for all of the world amateurs to see a PACSAT pass at least six times each day. Norberto LU8DYF reports from Argentina that he managed to receive 680k of data from UoSAT-3 in a single pass, which to quote Dave G4WFO "is phenomenal". When one considers the multipath space-to-earth possibilities at 435MHz, it's even more amazing that such a fast solid copy is possible.



# SATELLITE SCENE

by Pat Gowen G3IOR

*This month Pat Gowen G3IOR looks exclusively at the new packet radio microsats and their users, the reasons for the long wait for the satellites and their capabilities and problems.*

## Waiting Nearly Over

Satellite enthusiasts complain that it is now 16 months since the launch of the microsats, and that not all of them are, as yet fully operational or reliable. In response, Harold Price NK6K of AMSAT states:

"The wait for the microsat BBS seems to be just about over. The AMSAT Engineering Team has loaded the BBS software onto UO-14, AO-16 and LU-19 which are now running at 9600 bauds, and AMSAT News Service Bulletins are now available". In respect of the long wait, he adds:

"As you may know, the microsat development effort was Herculean in scope, in that the time span from initial concept to delivery of flight hardware was less than 18 months. Normally, a project of the magnitude and technical complexity of the microsats would take upwards of 48 months to complete. The accelerated launch date constraints prevented simultaneous development on hardware and software systems. This left the AMSAT engineering team to split the development efforts into two phases as:

1. Hardware development to be completed prior to launch
2. Software development which would occur for the most part following launch

For the first few months after launch, efforts were focused on fully characterising the spacecraft in their new environment. Once the AMSAT engineering team felt comfortable that they had stable birds, energy was then shifted towards development of the store and forward (BBS) or 'file server' software and associated ground station software".

Each time the uploaded program crashed, Harold Price NK6K and Jeff

Ward G0/K8KA, had to perform download memory dumps to determine the cause of the crash. They then attempted to recreate it on ground-based microsat and UoSAT simulators, finally writing code to address the series of events which caused the crash.

John Branegan GM4IHJ, points out that the microsats operate in a relatively harsh radiation environment. This is because the earth's magnetic field is not centred on the earth's geographic centre, but is centred 600km nearer Singapore than the geocentre. The radiation environment is harshest over Brazil and the South Atlantic (e.g. antipodeal to Singapore). This is because the Van Allen Radiation Belts come closer to earth in that region. Radiation causes Single Event Upsets (SEUs), and 'bit flips' in the microsats memory which then changes data thereby corrupting files. To avoid accumulation of SEUs in memory, the memory needs to be read and corrected regularly or 'washed'. Pre-launch data suggested SEUs at a rate of one per ten million bits-per-day. In fact, the microsats seem to be registering ten times more SEUs than this, meaning that the files will, in future, need to be washed regularly.

Although exhaustive testing was done prior to upload of the BBS code, the use of the spacecraft by real users was difficult to simulate. In some instances, the crashes are caused by users who have written their own code to download and upload files. This was shown by the improperly formatted upload frame which earlier crashed UO-14. Despite the problems created, the AMSAT engineering team want to emphasise that rolling your own software IS encouraged. However, AMSAT does not anticipate issuing an award for the person who crashes the satellite the most.

If you are writing your own code, AMSAT encourages you to take additional time to desk-check your commands, prior to testing them out on the Microsats. Use your code to prepare a frame, print it out, and look at it 'by hand'. If you have any questions at all about the protocol specifications, please ask the experts, such as Jeff Ward G/K8KA, at the University of Surrey, who is only too pleased to help.

Harold concludes, "Remember, you are actually witnessing the development effort of the satellites. Although it may appear that the satellites are not functioning to their full potential, they are close. Each time someone crashes the birds, in actuality, we are moving towards a more stable BBS code. This sort of testing cycle is nominal in software development. Meanwhile, try it out, and have some fun, just remember, we are not quite finished with it yet!"

## DOVE DO-17

Perhaps the biggest complaint regarding the microsats, is coming from educators and enthusiasts who were planning to use the DOVE satellite in their work, and have been disappointed. The mass opinion, is that DOVE, with its wide-ranging interest, relative user simplicity, ease of access and low cost user outlay, should have been completed first, and not left until last as appears to be the case.

Professor Martin Sweeting G3YJO, head of the UoSAT project, points out that it was vital to first prove reliable established software effectiveness of over 250 KBytes on the other satellites such as UoSAT-3, before venturing onto DOVE, as it has some mission critical hardware deficiencies. He writes, "It is essential that this process be carried through in a level headed and cautious manner, testing each step and in front of the other, without permitting external pressure to precipitate possibly fatal action". He is convinced that the AMSAT Software team have followed the correct path by first developing and proving the software on UO-14 and AO-16, and concludes, "The disappointment of waiting fifteen months for DOVE to 'speak' is understandable, but surely that wait is better than risking total loss of the mission?"

## WO-18

The WEBERSAT has a camera, and its controllers began shooting pictures in the dark, with wide iris settings to establish controls for the

upcoming full moon imaging experiments. In doing so, they managed to achieve a good picture of the upper right-hand corner of the moon. The phase was crescent, i.e., little of the moon was lit. Despite this, the brightness of the bytes of the object were well above 170, suggesting a full moon may adequately illuminate the Earth for imaging. The specifications for the camera didn't promise good results. Although the device was not selected to be able to image relatively dim astronomical objects, it apparently can. A following picture of Indonesia was also of excellent quality.

## LU-SAT

**Marcelino LU7DSU**, of the AMSAT Argentina Engineering Group, reports that all the tests have been completed on LU-SAT, and that the BBS is now available for use by radio amateurs on a worldwide basis. The first message to appear was from **Dr. Carlos Saul Menem LU1SM**, President of the Argentine Republic, which read, "To all Radio Amateurs: As the President of the Argentine Republic, I am very pleased to give my regards to all Radio Amateurs, students, scientists and technicians, all around the world, that access this, the First Argentine Communications Satellite. As a ham radio operator I know very closely the activities of this community that fraternise the world through their communications, that gives an important support on different emergencies, that actively participate in the technological advances, as it is evidenced with this, and other satellites that have preceded it. We Argentines feel very proud of integrating the small group of countries that share their communications satellites with amateurs all over the world".

## Microsat Users Directory

From Japan **JA6FTL** tells us that fifty five stations in 12 countries are active on UO-14, listed as the following:

CT1DIA, DB2OS, DD1EG, DF5DP, DL1YDD, DL8NCI, DF3LZ, DD1EG, G3YJO, G4WFQ, G8NOB, G0/K8KA, G0MJW, G3RUH, G4AXC, I2KBD, JA6FTL, JR1EDE, JR1ING, JA1OGZ, JA1QHQ, KF4WQ, K8YAH, K7PYK, K8IRC, WC8J, WA2LQ, W3QNS, WB6YMH, WD0E, W7KRC, W9FMW, WB0KSL, WA9FMQ, WD3Q, N4HY, NK6K,

N6HBB, N5AHD, N5BF, N3FKV, LU8DYF, ON6UG, PE1CHL, PA3DVG, SM5BVF, SM0TER, SV1IT, SV3KH, VK2BKQ, VK3DIO, VK5AGR, VK7ZBX, VK6BMD and VK6VV.

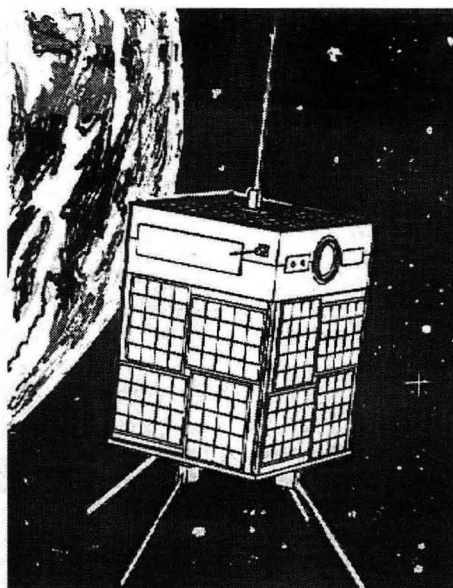
On AO-16, JA6FIL shows that 84 stations in 18 countries had become active on AO-16. They are:

DF5DP, DL8NCI, DU1POL, EA2CLS, EA8RT, FD9QB, FO5LQ, G0/N6IYT, G4WFQ, G3RUH, HB9AQZ, HB9CQK, I2KBD, I3RUF, JA6FTL, JR1EDE, JA1OGZ, KZ1B, KD9QB, KC4EBR, KA9LNV, KC4SA, K6OYY, KD2CQ, K8RSP, KB9CML, K6OYY, KD8SI, KE0VZ, KZ1B, KC8WF, KI6QE, N4HY, NK6K, N8DNX, N8AM, N8ITP, N5BF, NU6X, NJ1H, WH6AMX, WJ9F, WA5NOM, WC8J, WB9ANQ, WB0MPQ, WD0ETZ, WA3PSD, W9FMW, W0SL, WB6LLO, WB1HBU, AL7LD, LU1EXC, LU2BDT, LU4AEY, LU4ENQ, LU7ABF, LU7DSU, LU7XAC, LU8EBH, LU3XAL, LU6DWA, LU7AA, OH2SN, ON5PV, ON6UG, SM5BVF, SM0TER, PY2BJOS, V3KH, VE3CDY, VE8DX, VK2BKQ, VK2AIT, VK3DIO, VK5ZTY, VK5AGR, VK5HI, VK5ZK, VK6BMD, VK6VV, VK7ZBX and VS6VU.

Whilst this is a tiny minority compared to the many on OSCAR-13, and even more on RS-10 and 12, users are growing.

## MICROSAT Ground Station Software

The Store and Forward software loaded on UO-14, AO-16 and LU-19 requires ground station software in order to interpret the data which is in



binary rather than ASCII format. A description of the protocol used was presented at the proceedings of the 9th ARRL Networking Conference.

This software is available as shareware on Compuserve in USA, and is now being developed for PCs other than the IBM and IBM clones. For ATARI and MAC users, there is now some software with a PG 'lookalike'. There's also a TLM Decoder by PE1CHL which has successfully implemented the Broadcast and FTL0 Protocol. The ATARI file called NET.PE1CHL ATARI BROADCAST FTL0 TCP/IP NET/ROM MBOX is currently being carried on UoSAT-3 and is some 150k long in an Arc file. The MAC programs are called BCAST2.SIT (PG equivalent) and KISSTIL.SIT (for telemetry). BCAST2 is about 90k and KISSTIL is about 31k long.

## AMSAT-UK

The AMSAT-UK organisation hold the latest proven and updated versions of much software, and a request and s.a.s.e. sent to the Secretary, Ron Broadbent G3AAJ, AMSAT-UK, 94 Herongate Road, London E12 5EQ, will provide the availability. Current users, G3WFQ and G3CDK can provide helpful advice on the AMSAT Nets.

Harold Price NK6K, describes the software to be used by ground stations. "The software is broken into five distinct packages, PFHADD is a program which adds a header to a file, and prepares it for uploading. The header contains information on the source, destination, and contents of the file. It also contains the file name, which is used when the file is later downloaded. A file must have the

header added before it can be uploaded. Basically, you create a file using your favourite editor, or get a file from any other source, including '.exe' or '.zip' files; run it through PFHADD; and get a '.out' file. This file is then sent via PG.

The PG program is used to upload and download files in the connected mode. It can get a directory of all files on the spacecraft, a later version will be able to select files based on the contents of their headers. The PG program has an upload command which will send all files with a tag of '.out' in the current directory. It will also automatically continue files which were partially transmitted on a previous pass. It has a download command which will download selected files, and it will automatically continue files which were partially downloaded on a previous pass.

The PHS program removes the header from a file, which has been downloaded or received as a broadcast. It will use the embedded file name to build a file on your disk (if a file with that name does not already exist).

## Program Broadcast

Another program is PB (broadcast), and this is a program which is used to capture files which are being broadcast. It can capture up to 10 concurrent broadcast files. Lists of missing segments of files are kept, and files can be gradually accumulated over several passes. It can also request that a file be added to the broadcast queue. A requested file is broadcast for five minutes. A special version of PB is available to 'official bulletin stations' to have messages broadcast for longer periods. These will be things like orbit element files and AMSAT news.

These five programs are preliminary versions, and require some human intervention to direct their activities, such as selecting files to capture and download. Future versions will be totally automated. In addition you'll be able to send and receive ASCII or binary files of arbitrary length (up to 2MByte for the first version), and will be able to passively receive bulletin and other broadcast files".

*Naturally, there's lots more to tell you about the new packet microsats, but this, plus the other news, will have to wait until next month.*



# LOWE-FLYING AT CUMBERNAULD

## All day - every day!

We are very pleased to announce that we have now moved our Glasgow shop from Queen Margaret Road to a new centre at Cumbernauld Airport. It is a sparkling new showroom inside the main airport terminal building in which there is also a restaurant and bar on the first floor where the family can enjoy some refreshment whilst watching the aeroplanes; an excellent way of allowing you to browse around and try out the rigs at your leisure in a superb noise-free environment.

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## Microwave Bands

On the 'top' coast of North Wales (on the map) **John Lawrence GW3JGA** and **John Cronk GW3MEO** are busy on 1.2GHz, sending P5 f.m. ATV pictures to one another. At present, this is over a cluttered 1.6km path in Prestatyn, but they are working on extending their coverage along the coast.

If you follow the coastline around Britain you eventually come to the north Kent coast, and there you'll find **Ron G6GHP** and **Chris G4AYT** playing microwaves at X Band (10GHz). By trying reception at various portable locations of a signal from Chris's Whitstable location, they have discovered that 10GHz TV signals travel an amazing distance. Using just a barefoot Solfan head (without a dish) they have exchanged P5 pictures between Whitstable and a high spot on the Isle of Grain, making a path length of some 34km. This is not quite line-of-sight, and I think it's remarkable! The 10GHz allocation is definitely a band with potential, too bad so many people don't try it. Of all the ATV bands, it has got to be the cheapest to get going on, and perhaps someone will knock up an 'Airfix' type kit of parts for the diffident.

Our picture this time, **Fig. 1**, was taken at Ron's QTH in Margate. It shows a signal sent by him, on 10.3GHz, over a 25km obstructed path to G4AYT at Whitstable, then sent back by Chris on 1.2GHz. The picture is P5, with colour still visible - just like closed circuit, so Ron says! Microwaves appeal to Ron. He started working with microwaves in 1987 and is still using the same Solfan equipment as then. The only difference is that he has improved the modulator circuitry. Of course, the price of Solfan heads has tumbled in four years, and you can now pick them up for a fiver or less. Dirt cheap! Ron is also pleased to acknowledge the help and encouragement he has had from his QSO-partner Chris.

As the winner of BATC Diamond award number 6, and having done 10GHz to death, Ron is now looking for new challenges. He is experimenting with something new (to him), 2.3GHz, and is building a station for the band. He has nothing on the air yet but might be spurred on if there were someone else fairly local in Kent or Essex who was also interested. He is QTHR and would also like to find someone in Essex or the Netherlands who would be interested in conducting trans-oceanic TV tests on 10GHz.

## Borrowed Bands

I think it's no secret that the various law enforcement agencies 'borrow' the amateur bands for surveillance television from time to time. They used to use 430MHz but now prefer the very bottom and top ends of 1.2GHz. This of course is a great boon for the manufacturers of ATV equipment, who are now

# FOCAL The World of ATV POINT

*Andy Emmerson G8PTH takes his bi-monthly look at ATV and reports on some remarkable happenings on 10GHz in Kent.*

finding a ready and expanding market for their wares. On looking at one UK manufacturer's catalogue, **Tom O'Hara W6ORG** told me that:

"The catalogue and data sheets makes one think everyone is spying on everyone else in England! The bugging business is obviously a much bigger and more lucrative market than cheap old hams".

I'm sorry if that rattled anyone's cage! However, even if that news didn't, perhaps the following will. It really made my blood boil!

Normally you'd say that any video signals on 1.2GHz must be a good thing. But there's a not-so-welcome TV transmission on the 1.2GHz (shared) band in the form of a private (non-amateur) station on the Kent side of the Thames estuary. This transmission provides local amateurs with a rather boring, and unchanging view of a caravan site. The signal can be picked up in Margate, so it isn't exactly running flea power. However, what's more annoying is that it's bang on 1.310GHz, which is a repeater output channel.

The use of 'amateur' television for this kind of surveillance is totally illegal and what is even more tragic is that the transmitters are allegedly being sold by a local G3 'amateur', who really ought to know better.

One of his installations is allegedly in operation in north-east Kent and has even been allegedly received in the Netherlands! This would be amazing if it was not so pathetic. Perhaps the local amateurs could conduct some legitimate high power tests on 1.310GHz. This might induce the caravan site owner to close his QRM machine down or at least change the frequency!

## Oxford On The Air

A communication from **Jeff G8PX** (who says two-letter calls are just as 'real' as three-letter ones!) advises that G6NB and G3UMF have reported improvements in signal strength, since the GB3TV repeater at Dunstable has been overhauled. Jeff can now see GB3TV drawing out the Union Jack, and when he gets his masthead pre-amp finished he hopes to get a viewable picture. Jeff has also added a p.i.l. to his Solent transmitter.

## Repeater News

In addition, Jeff remarks that he had heard the Aylesbury Vale Repeater Group are considering a 2.4GHz ATV repeater if there is sufficient support. If you are interested in having a TV repeater

covering the Oxford-Aylesbury area please let Jeff know (QTHR), as he is making up a list of supporters to send to the repeater group.

Hey, things are happening at Crawley! I understand that the Crawley Radio Club are taking over the running and housekeeping of the repeater and that permission has been given for a better located (higher) site. This should increase the transmission range, which is reportedly rather localised at present.

## Celtic Connection

**Derek GW3FDZ** writes from Dyffryn Ardudwy - "I am pleased to report that I still have regular QSOs with Craig EI3FW, normally on a Thursday and Sunday evening at 2100 hours. A novel QSO that you should know about, is that he let the New Year in for me at midnight this last New Year's Eve, and then vice versa! Joyful celebrations were going out on 430MHz in both directions!

## SSTV News

**S. Bunin UB5UN, J. Jakonon UA3ALA, J. Czubaczensko UW6LC, E. Suchowierchow UA3AJT and A. Blasienko UP3BD** were the first constructors of SSTV reception equipment in the Soviet Union. They took their equipment to a radio exhibition in 1973 but the organisers were not interested in SSTV and had UB5UN's apparatus removed. The SSTV's fortunes changed 13 years later in 1986, when the club station U3VRW received temporary permission to use the SSTV mode at the radio-amateur exhibition. They made about 20 contacts with European stations including DF2YT, DJ8LE, ON5NM, SP9AMN, SP9PAC, SP9GND, LZ1KNP, HB9ANT and Y21UO. Since 1 March 1990 amateur stations of the first category in the USSR have been allowed to use SSTV on the frequencies 7.035-7.045MHz, 14.225-14.235, 21.335-21.345, 28.675-28.685 and all u.h.f. bands.

The U3QC station uses the photo-mechanical type of transmission. Thanks go to BATC member **Stan Pazur** in Warsaw for this information, and it was the only SSTV news received, apart from **Thomas GM4CAU** in Aberdeen, who is having good results with the G3WCY/G4ENA system. At the moment, Thomas is QRV only on 144MHz as far as SSTV is concerned. However, he is hoping to have an antenna erected for 7MHz soon, and he's already seen some good pictures on 7.040MHz. On the 14MHz band he has received pictures from most of Europe and Canada, USA and Japan. He just missed South Africa due to QRM. All using the eight second frame method. He intends to send us some off-screen photographs (good!) to let others see what can be done with a home-brew SSTV system.



**Fig. 1: There are a few G6 stations left and I don't mean G6/T ones either! This is Ron G6GHP from Margate as received at Whitstable and re-transmitted back.**



# PACKET PANORAMA

*This month Roger Cooke G3LDI brings news of a special rally, takes a quick look at the Japanese packet system and ends up with an invitation to packet groups.*

I mentioned in my last column that Costis 5B4TX, is responsible for the distribution of the SV9AIZ BBS program. (PW May 1991) I only got the callsign wrong! It should have been SV7AIZ. Apologies to Spiros, and I offer my wrist for slapping!

The 1991 BARTG rally takes place this year on Sunday September 15 at Sandown Exhibition Centre, Esher, Surrey. Located close to London, it's a 10 minute drive from the M25 (junction 10) and is not far from the M3, M4 and the M40 (now open all the way to Birmingham). Obviously this rally has the emphasis on data communications, but is also of general interest to most amateurs. However, with over 250 tables in a large hall you will be able to see the latest in computers, peripherals for computers, radios, t.n.c.s, software, books and all the rest of the usual expected bits and pieces.

There's free parking, on-site catering, talk-in on S22 and SU22. Admission is £1 for adults, under 14s are free if

accompanied by an adult. The event is open from 10.30am until 5pm. Further details are available from **Peter Nicol on 021-453 2676.**

Rallies always provide a good meeting place, and this one is particularly useful for amateurs with a similar interest. The influence of packet has even persuaded the name to be changed from British Amateur Radio Teleprinter Group, to the British Amateur Radio Teledata Group. The group publish a quarterly magazine which caters for most data modes. If you want more information, write to the secretary, Ian Brothwell G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ.

The Japan Amateur Radio League (JARL) publishes a monthly newsletter. The March 1991 issue of the newsletter published some guidelines for packet radio users and BBS sysops. The guidelines make interesting reading. I've extracted the main points, but please bear in mind that these are verbatim translations and they reflect the Japanese culture.

## JARL Guidelines

"Guidelines for packet radio users.

1. Packet radio operators must observe the frequency segments stipulated in the JARL 'Amateur Bandplan'.

2. Packet radio operators must take the responsibility to see that the contents of information dispatched by their stations do not conflict with 'Amateur Radio Operation Standard'. Such information must not deviate from the definition of Amateur Service stipulated in the Radio Law of Japan. Including the possibility of such information spreading widely even if intended for specific station (it may well be transmitted to others through store-and-forward system).

3. Packet radio operators must not only be interested in technical matters, but likewise utilise packet radio for its technical development.

4. Those who use BBS's must avoid transmitting (writing) redundant messages (documents) in order to enhance transmission efficiency. The

callsign of the dispatching station (including the name of the person responsible in the case of a club station) must be clearly shown on every document so that the dispatcher can be identified."

## "Guidelines for BBS's Sysops

1. Those who have set up a BBS must take good care of its system and documents (messages?) so that the recording and forwarding functions of the BBS work properly.

2. Those who keep a BBS must at all times bear in mind that any message deviating from the 'Amateur Radio Operation Standard' or Amateur Service should not be accepted. When encountered they must endeavour to avoid transmitting such messages to other stations.

The Amateur Radio Operation Standard formulated by JARL is as follows:

"1. Not to diminish the reputation of any individual or organisation by openly disclosing facts against others wishes.

2. Not to infringe human rights of other people by the use of

**Fig. 1: The Sysops of the East Anglia Data Group (EADG) meeting. They're putting on brave faces despite the bar being closed.**



# PACKET PANORAMA

libellous or insulting words.

3. Not to invade the privacy of others.

4. Not to express assertions or opinions in connection with politics, religions, elections, or any other issue in dispute.

5. Not to disturb social order or obstruct good customs.

6. Not to use indecent or obscene expressions which may offend others.

"JARL intends to review the contents of the current Amateur Bandplan this year and in this regard have already received various options as outlined below. The JARL Board of Directors has asked its Frequency Committee to study them.

1. Formulation of frequency segments for RTTY and packet communication in the 'data' classification on the h.f. bands.

2. Study of appropriate segments of the f.m. classification on the 144MHz band.

3. Extension of period of use, and formulation of frequency for audio contact, with regard to ATV communications in the 430MHz band.

4. Separation of the 'c.w./DATA' classification in the 50, 144 and 430MHz bands".

It looks as though the JARL are experiencing similar problems to ourselves, with regard to the actual use or misuse of the BBS system. They are at least trying to discipline their network, by

curtailing or limiting the content of bulletins in this way, at least their sysops can't then be accused of being 'censors'.

The h.f. side is also suffering the same lack of band-planning and space, that the rest of the world is having to combat. Let's hope that by 1992 we can get some international agreement on the need for a specific segment of each band, instead of each country adopting their own 'solution' to the problem.

## Meeting

The photograph, Fig. 1, shows a recent meeting of the East Anglian Data Group. This group is holding regular sysop meetings in Thetford. It usually has an attendance of 15 to 22, which is not bad for just one area. The main discussion topics are normally routing of private mail, bulletins, the local network problems, nodes and qualities plus topics of BBS interest, etc. I wouldn't really know what magazine is being displayed, perhaps you can make it out?

Do you have a packet group in your area? Would you like a mention in 'Packet Panorama'? If your answer is yes, then let me have names, addresses and your views please, to G3LDI @ GB7LDI or QTHR. For those still using voice communications, you can phone me on (0508) 70278 (there's an answering machine if I'm not available).

**73 and happy packeting de  
Roger G3LDI.**

**DO YOU HAVE A PACKET GROUP IN YOUR AREA?  
WOULD YOU LIKE A MENTION IN PACKET  
PANORAMA?  
IF YOU DO, CALL G3LDI AT QTHR OR VIA GB7LDI.**

## Starting Frame

**CARRIAGE RETURN. (<CR>):** A DTE (Data Terminal Equipment) key or a control character that is used to indicate the end of a line of typed information; it causes the DTE display to begin printing at the left-hand margin.

**CCITT:** International Telegraph and Telephone Consultative Committee, a part of the International Telecommunication Union.

**CHARACTER BITS:** The bits that represent an alphanumeric or control character. See ANSI and ASCII in PW April '91.

**CHECKSUM:** A short form of Check Summation usually an 8-bit value. The Byte values of all the characters in a program, message or in memory added together. There is no account taken of the overflow. Also the sum (in hexadecimal) of the bits in the t.n.c. software in ROM. It should be equal to the check sum published in the t.n.c. manual. This is a very simple check of integrity, see CRC below.

**CLONE:** A device that is an identical copy of, or that duplicates another device. Nowadays this is usually taken to mean a computer that is functionally identical to an IBM PC.

**COLLISION:** A condition when two or more transmissions occur at the same time and cause interference to the intended receiver(s).

**COMMAND MODE:** The t.n.c. operating mode where the t.n.c. is waiting for command input from the user.

**COMMAND MODE CHARACTER:** A control character that causes the t.n.c. to enter the command mode. Many t.n.c.s start with the default of '\$03' (pressing Control+C together)

**CONFIGURATION COMMAND:** A t.n.c. command that selects a parameter that is used by the t.n.c. when it performs a task.

**CONNECT:** To establish a communications link (a connection) between two packet-radio stations. At the t.n.c. level this is normally shortened to 'C'.

**CONNECTION:** At the link-layer, logical coupling of two packet-radio stations for information transfer and control purposes.

**CONNECTION PROTOCOL:** A network layer protocol that sets up and maintains a clearly defined path for the transfer of packets between the source and destination during a single data communications session; also called virtual circuit protocol.

**CONNECTIONLESS PROTOCOL:** A network layer protocol that transfers each packet independently along the best available route; also called datagram protocol.

**CONTROL FIELD:** An 8-bit pattern in an HDLC frame containing commands or responses, and sequence numbers, indicating the frame type.

**COSI-SWITCH:** An implementation of the CCITT X.25 virtual circuit networking protocol for the t.n.c.-2 written by Howard Goldstein N2WX.

**CRC:** Cyclic Redundancy Check, normally a 16-bit value calculated from the contents of a file or message. A mathematical operation in which the results are sent with a transmission block to enable receiving stations to check the integrity of the data.

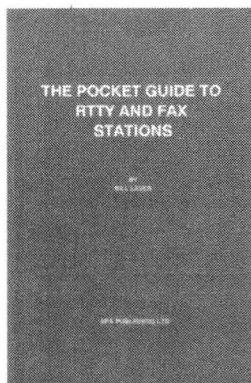
**CSMA:** Carrier Sense Multiple Access. A channel access arbitration scheme in which packet-radio stations listen on a channel for the presence of a carrier before transmitting.

**CTS (Clear to Send):** An RS232-C/EIA232-D serial interface signal. CTS informs the DTE that the DCE (data communications equipment) is able to transmit data. This is in effect the 'go ahead' signal. This is the machine equivalent of good operating practice.



# Book Reviews

**The Pocket Guide To RTTY and FAX Stations.**  
**Bill Laver.**  
 SPA Publishing Ltd.  
 ISBN 0-9512729-5-057.  
 57 pages, price £3.95.  
 Available from *PW* book services, 85p post and packing.



A slim volume, but nonetheless jam-packed with information for those whose interests lie with this reception mode. It assumes a little knowledge of the modes, containing only an aide-memoir to the RTTY and FAX methods. This memory-jogger is contained in the first few pages. Then there begins a comprehensive list of frequencies, stations and modes used. These lists are a little cryptic, but along with the times of transmissions, which even a beginner should begin to receive something within a very short time. The range of frequencies covered, begins with the Tallinn (Russian) station on 518kHz, and ends with the French military use of 26.8177MHz.

If you buy this book you will have a pocket (216x138mm) full of up-to-date information on FAX and RTTY.

**Air Band Radio Handbook 3rd Edition.**

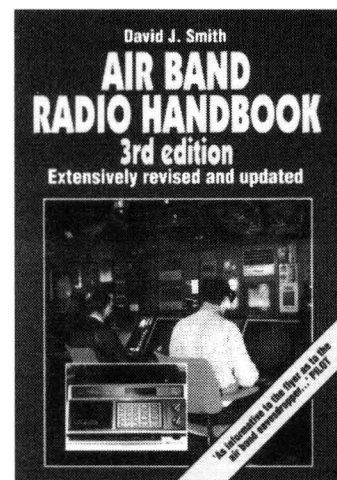
**David J. Smith.**

**Patrick Stephens Limited ISBN 1-85260-339-9.**

173 pages, price £6.99. Available from *PW* book services, 85p post and packing.

This almost pocket-size (211x156mm) book manages to pack a wealth of information about aircraft and control into 19 chapters and six indices. Not only does it deal with the radio side of the hobby, but it also expands into areas such as navigation, airspace and control, both over land and ocean. It discusses weather and its effect on the control and flight routings. One small snippet found, was that Concorde takes fixed flight paths over the oceans. As flying at that height puts them above most of the weather. There is one section covering a range of radios which may be used to listen to this fascinating area of radio communications. When you've chosen your radio, there are lists of frequencies and callsigns to listen out for.

Super value-for-money, for either novice or 'old-hand'.



**Space Radio Handbook.**

**John Branegan GM4IHH.**

**Radio Society of Great Britain, Seven Stars Publishing, Marlow.**

**ISBN 1 872309 05 4.**

**242 Pages, 244 x 183mm, softback. £12.00 (£13.34 incl p&p).**

Whether you are a mere beginner, a keen space enthusiast or an experienced satellite user with increasing interest, this new book is for you. It covers every aspect of space radio, from the basic solar physics to both manned and unmanned spacecraft and their various communications systems. Adequate coverage is given to all forms of space related contacts, be it the many types of amateur spacecraft, commercial, navigational or weather satellites. The subjects of aurora, meteor scatter and moonbounce, and even amateur radio astronomy are covered. The many fascinating propagational aspects are fully covered without using the complex jargon so often used among experts.

Whilst such a book could have been very complex, John Branegan has written it so that all of the many related subjects are comprehensive and fully understandable to all, with lots of assistive diagrams, charts and tables to help the reader understand the principles and practices. The use of computers and programs are covered, as are tracking methods and antennas, plus a fascinating series of practical experiments that may be performed without the need of complex and expensive equipment. John looks ahead also, covering the future of amateur radio in space.

This book is a regular 'bible' for the space radio enthusiast, and a great boon to those who wish to teach or learn of space physics and the practice, and is thoroughly recommended to readers of all ages, who will find it invaluable in explaining the many mysteries that otherwise abound in this topic.

**Pat Gowen G3IOR**

**Flight Routings 1991.**

**Compiled by T. T. Williams and S. J. Williams.**

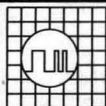
**T.T & S.J. Williams Haverford West ISBN 0-9514431-2-7.**

114 pages, price £5.25. Available from *PW* book services, 85p post and packing.

If you have an interest in listening into the world of airband radio, then this book is a must as the reference for 1991. Little or no space is wasted in this pocket-sized book. It is filled almost to bursting point with the callsigns and short flight details of almost all aircraft passing over, or within UK airspace. The guide aim is "assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign". There's a list of 112 airlines from Aberdeen Air to Z.A.S. Airlines. Each airline and flight has its own callsign.

Checking this callsign out against the listings will give you the airline, flight times, destination and aircraft type. With one page for your own notes, even the inside back cover has information printed on it. Find out what 'Watchdog', 'Clansman', 'Leopard' or 'Cygnets' refer to. This book is an absolute 'must' if you listen to the airbands.





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73 John G3TLU.

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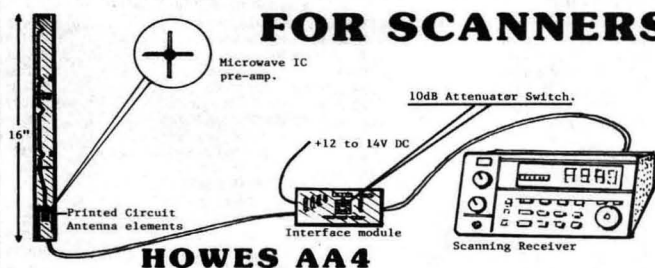
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73 from Dave G4KQH, Technical Manager.



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# Back-Scatter

## HF Bands

Reports to  
Paul Essery GW3KFE

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

So much for Global Warming - I have the heating on in June....brrrrr! Please note also the changed deadline dates below.

### Conditions

Conditions have been somewhat "like the curate's egg", difficult at times, brilliant at others.

### The 1.8MHz Band

I have the May issue of the G3XTT/G3RBP *Top Band Newsletter* to hand, and the first thing I see is that VE3KQS is also now in the field. All I can say is I doubt there is enough support for two such specialist publications. I hope they can, between them, ensure continuity of regular 1.8MHz news to keep activity rolling on this band.

The general consensus of opinion, seems to be that the season since January on this band has been below par - although the Newsletter Editor himself remarks that he has a feeling this is more down to activity than conditions.

Ted G2HKU (Isle of Sheppey) found the band too noisy, although he did - just - manage to keep his sked with ON7BW going despite the daylight path.

Angie G0HGA (Stevenage) has been having a listen on the band, although as yet she doesn't have a suitable antenna for the band. However, at 0305Z on May 21, she heard K2SG having a QSO with someone this side; he was giving and getting 579, and was noted as 559 to G0HGA.

As far as I'm concerned, 1.8MHz operation is by courtesy of a switch-mode p.s.u., sold for professional use, which generates an S9+10 signal every 15kHz or so up the band. If one happens to be between raspberries, as it were, all is o.k. - but the snag is that the raspberries slide up and down the band like the soap in the bath!

### The 3.5MHz Band

The 3.5MHz band is the home of the mythical race of sideband pundits, who can lay the law down on any subject under the sun so long as actual knowledge is not regarded as relevant!

Eric G3LPS (Blackburn) spent a little keying time on the band, and raised N4ZC, W1MK, N2NT, P34A, K1ZM and K5MA in the wee small hours of the WPX contest, plus R6L at around 2330Z. On this band, G0HGA has about 28m of wire, and a key with which she managed G3ATH, G3ZWH, G4BJM, G4OEC, G4ZMH, G0NTT, G0EFH, MORSE, OH6MQE, IK3HXB, YU3XY, YT2EZ, DL/Y2LNL and OK1RR.

Turning to Pat ON7PQ (Kortrijk) we find that he keyed with 1A0KM, U19ACQ, RA9AK and C30EUA. At the end of this list, I found the terse comment "Summer Time!"

On this band G0KRT (Welling) uses 2W c.w. out from a Lake rig, and receives with a Howes. They are coupled to 25m of wire and a counterpoise. The aim is mainly to make QRP-QRP contacts, which this month were completed with G0COG, G0FGW, G0FYP, G0JBQ, G0LDJ, G0MOU, G0NEZ, G0NXX, G0OGN, G3GCG, G3SES, G3TWG, G4AL, G4EHT, G4JRE, G4YEP, GB2LOW and GU4YBW. A few QRO stations were worked, notably DK8PD, DL6LX, F6EQC, ON7MO and nine Gs.

### The 7MHz Band

Another band requiring a good attenuator in the receive system! GM3JDR (Aukengill) is a mainly c.w. operator, and on 7MHz he found 1A0KM, VK3YD, 5I3SM and H44XF.

Next we turn to G3LPS (Blackburn) who notes the band has been fairly lively at times in late evening/early morning sessions, and as usual at this time of year mainly in a N-S direction. Eric notes 4J1FS on Maljy-Vysotskiy Islands doing out contacts in the WPX contest. Eric was number 068, but towards the end 4J1FS was dishing out serial numbers in the 3500 mark! Among the QSOs noted on the key, we can see YL200SM, PY7ZZ7, Z21HS, PY7XC, LU5EHV, MORSE, GB200SIG, SZ4SM (from SM-land), RZ10A/A (IOTA EU66), UJ8JI, CE4IDY, LU1ICX, 4K20IL (Franz Josef Land), UL7CA, PY4PJ, LU6EF, 4K1A (Antarctica), U18IZ who had 8W to a vertical, CP6UH 6W1QB (QSL via DK3NP), CX3AW, U18BDU, PJ1A R18BD, VP2ZE who only sent his call once, lost under QRM, KB5KO/AE, C02VG, various rare Russians in the CQ-M contest, ZD8Z, LW1EXU, IB0/I01A (Santo Stefano Is), VP2MDH (QSL via KJ4VH), RZ4W/UB4JKA (Oblast 095), OY/N6HR, and a selection from the WPX contest by way of H18A, UQ0A, UF6QR, U19ACP, 4J1FS for a New One, P34A, FQ2M, VP5W, ZD8Z, UA9SA, ZP50Y, IS0/DL6RAI, YM2KC (Turkey?), ZB2X, VO1MP, UW9TM, R6L, SV8AA, 4M2BYT, RW9WA, UD6DKW, YM7A (Turkey again?), 4K1AFM (Antarctica), LU6DBJ/H and PY4MS.

Ted G2HKU tried the band just once for a c.w. contact with 4U6ITU. Angie G0HGA tried putting her c.w. into a best bent wire, which produced W2VT, W1HMD, W4XJ, K1JKS, PY7XC, PJ1A, 1A0KM, C30EUA (QSL via HB9MM), J49CW, GB200SIG, MORSE, GB2JUNO, GB0RN on *HMS Fearless*, G4FOC, GB200SM, OY/DK9FE, 7S30WG, SI3SM both SM in disguise, and SV0MW/8 at 0910Z.

Turning to ON7PQ, Pat keyed with 1A0KM, FS/JH4ADK, FS/JG1TCB,

4U6ITU, H18AX/QRP, C30EUA, LU4KV, SV0MW/SV8, J49CW, Z21HQ, ZD8Z, FH5EJ, FY5EW, 9V10K and PZ1DV.

### The 10, 18 and 24MHz Bands

This time it's GM3JDR first. On 10MHz c.w. VK3CKL, VK5FE, JJ1VKL/4S7, on 18MHz c.w. VP2EXX, D68KN, 9Y4KB, H44VU, VA3NXX, AH6JF, 4L0DXC, FW0BX, T77C, ZL2ALJ, VU2TS, UA0ZC, 4K1A, VK7AAQ, ZS6QU and VA6UX. On 24MHz c.w. VK6ASO, ZL2ALG, ZL4HB, ZL1AIZ, ZL2UW, VP2EXX, UW0LT, KH2D, 3C1EA, SV9ADH, SV5AEL, 4K1A, OY1CT, PA0GAM/ST2, 3A/DK6AS, 9M2FS, 9Y4KB, UL7RO, YB5QZ, 3B8CF, FY5FA, VU2NBT, CE3BGP and A41JV. A switch to 24MHz s.s.b. yielded A92BE, VU2DPD, ZS1ACY, EL2CX, SV1UM/8, SV5AZR, EL2SM and 5NHBK.

Don G3NOF (Yeovil) is all s.s.b. and skipped 10 and 18MHz this time. However on 24MHz, Don managed FH8CB, FR5DX, KE0DR (Colorado), PY0SK, PY0SR, RW9FW, UJ8KA, TL8CK, TL8MB, V29A, VP2EHF, VP2EXX, VP8CFV and 9K2SH.

On to G2HKU who stuck to the key throughout the month, to find on 10MHz H18A, 6W6JX, G4MVA/5B4, EA9KD, T77C, FS/JA6ILT and WA5BGD.

Pat ON7PQ brings up the rear with, on 10MHz, FS/JA1IFP, 9Y4KB, IS0/DL6RAI, C30EUA, SV5/DJ2GM/P, H18A, PA0GAM/ST2. On 18MHz we find TA2/F6AUS, FS/JA1IFP, EA/DF3FJ/P, G4MVA/5B4, F00VU, H44XF, KF6B/KH2, ZD8LI, KH3AE, H44SX, Z21AA, 9Y4KB, ET2A, PJ2/PA0VDV, IS0/DL6RAI/F05DV AG9A/WHO and 3C1EA. That leaves 24MHz for FS/JL1RUC, 8N6ARL, YB5QZ, H44SX, 4X4MU, FH5EJ/P, AG9A/WHO, IS0/DL6RAI, ET2A, 3B8FE, PJ7/VP2EXX, VP2MDH, BV2FA, 9M2FS, C06DD, 9Y4KB, PAGAM/ST2 and FG5FF.

### Comments

Noting that he still needs Heard Is, St. Peter/St. Paul, ZA and CEOZ, GM3JDR notes that both Heard Island and the LA1EE/P were audible for days upon end but operating with so wide a split - 50kHz - that he couldn't possibly 'get at them' with his FT101ZD. I suppose the answer is probably to have a separate receiver. I used to have a switch in the coaxial line between transceiver and linear with which to divert the antenna to a receiver. In fact, this seems probably a better solution than the modern arrangement.

There seems to be a problem over the YA0RR and 3W3RR QSLs at the time of writing. They were supposed to have been out a month ago, but to date I haven't heard of anyone receiving a card. Furthermore I hear W4FRU has

been returning cards with a note saying he has not received any logs. Letters to Romeo Stepanenko and Ed Kritzy NT2X remain unanswered. What goes on?

### People

ZD8DX had a severe fall while in Ascension, but is now back in the USA and under intensive care. Please send all getwell cards to Dave Porter K2PBB, Holmes Regional Hospital, 1350 S Hickory St, Melbourne, Florida 32901, USA.

### Things

We heard this morning that the DXAC have agreed unanimously to add Penguin Is to the DXCC list. That makes the current list of possibles up to 323. QSLs may be submitted, but **NOT** before September 1. I've also heard that the SV2ASP/A and DJ6SI/SY operations from Mt Athos have been accepted and cards may be submitted forthwith.

### Silent Key

I'm sorry to report that 'Brad' Bradbury BRS 1066, has died at the age of 79. A long-time s.w.l. as his BRS number indicates, and sub-manager of the RSGB QSL Bureau. As a result, G4IEY has taken over the latter chore, for the G3A, G3B, G3C, and G3D series callsigns.

### The 14MHz Band

Mary G0NZA (Kirkby-in-Ashfield), seems to have stuck to s.s.b. this time, by way of PT7SY, X33JP (Madeira Is), YL30WW, UR0UCH, 9K2IC, C30EUA, UH3W/UA4FEG, UO50Y, V29A, N6TIB, MYV5KBA, 4U1UN, I100NU (a UNICEF call), IK3PQH/P/LI3 in San Giorgio in Alga Lagoon, Venice, and KA2HTV.

Angie G0HGA, got out to some fifty Ws, plus ZL3GQ, VK4XA, VK6RU, VP2VA, VP2EOH, VK4DID, ZD8VJ, EA6ZY, YV1NX, PJ1A, PY7PO, PY4UM, HK3RQ, C30EUE (QSL via HB9MM), KP4L, MORSE, JW0GB, VE2ZAN and OY3QN.

In Belgium, ON7PQ has F00VU, 1A0KM, 5R8AL, 4K4/UA0KW, 4K4/UA0KBZ, FS/JH4ADK, 9J2SZ, 9V1YR, A43DX/A, V47EA, 9Y4KB, H44VG, H44SX, H44XF and AG9A/AH2.

Now to GM3JDR, who keyed with LU3XPM, 3C1EA, ZL1HY, ZL1BZT, ZL2AWK, XE2EFC, FY5FP, PJ1A, XE2FFY, UA00FC, UA0BFU, BV2DM, FU50, 4K4/UA0KW, 4K2FJL, RC2CQ/UA01, 9J2SZ, JW5E, F00VU and H44VG.

The s.s.b. from G3NOF was used on HB0/DA1WA, HK0EFU, UJ9SWE, V29A, Y11BGD, 3Z0J and 4J1FS.

'Just to show he doesn't spend all his time on 7MHz' G3LPS keyed with SV9BAI, UW90/UW9A0, UA9YC/UA0Y, EK9SYC (QSL via UA9TX), 4K20IL (QSL via UA9MA), UD850AI (Box 73 Baku

# Back-Scatter

370092), VK5GZ, HK3LT, VK2PP, RJ4X, VK5AL, ZL1VV, G3RUG/EA6, VK2RAS/1, VK1KT (both the same operator in RSARS activity month), VK6AJ, VK6WT, IQ9ITU, PJ1A, ZD8LII, LU4KV, CE40CZ, YN/SM00IG, JU1SU(QLS via UA4WA), 4J1FS and HS1AAM.

On this band, G2HKU found his way over to VK4XA, VK2ALG, ZC4RF, VK5AL, SI1MI, JL1ZCG, LU4FC, VK7CW, VK2PP, J49CW, WB2YQH, VK6CGB, OG9M, VK7EQ, VP8GAV, 4K1ADQ, RW8/UA4FDS, 4K4/UA0KBZ (Wrangel Is), and SI3IM. Down at the QRP, 4W level, Ted was able to make another QSO with 4K4/UA0KBZ.

## The 21MHz Band

Angie G0HGA leads off here, and she starts with some 21W signals, VK3MJ at midnight UTC, JA3PEX, H44VG, H44XF, H44SX, UI8A/G3SWH,

TA5/N5NLL, PJ2/PA0VDN, VE1ABB, VE3HX, RT7U, and the usual crop of Europeans, Russians and Gotaways, all c.w.

Now to Mary G0NZA who found VQ9CQ, UJ8XCZ, LU4DWE, C30EUA, UH5W/UA4FEG, UO5Y, V29A, AJ1L/KP4, JA1RJK, N1CNC and W2QCV, all on s.s.b.

It was c.w. all the way for Pat ON7PQ. For this band he notes 9K2/HB9CVM, 1A0KM, FS/JA1IFP, SI3SM, A43DX/A, FK/JA1WPX, H44SX, H44VG, F00VU, PY0SR, H44XF, AG9A/AH2, Z71AB, ET2A, ZD8Z, AG9A/WH00 ZD8SE, 3C1EA and FR5AI/T.

From over the border, GM3JDR offers c.w. with 4K1ADQ, 4K20IL, 4K2/UA3DJG, CM2VS, Z71AB, VP5P, BZ10K, H44VG, H44XF, H44VU, MORSE, A41JV, VU2BK, VP2EXX, HL1EIZ, UD850DWZ, 7X2CR, 9N1MM, UA9YC/UA0Y, EX0FFW, YB2FEA, VU2TTC, RJ0J,

UA0CAC, VK6BFW, 3A200SM, 7M1GAG, ZV8WAS, BV2DA, DX1HB, PZ1DY, CO2VG, SY/DJ6SI and 6W6JX.

Yeovil-based G3NOF is a s.s.b. buff. Don raised A22A, BY5RA, C9RTC, C58T, CU2YA, D44BS, F00KAW, HK0TCN, IF9/DJ8QP, I100NU, JAs, JX3EX, NS6D, RA0AL, TU2XP, TJ1FN, UH5W/UA4FEG, UW0ME/A, UW0LAP, V29A, VE7BAS, VU2TTC, W51JU (IOTA NA 56), W6YMR/UB5W, W7YD, WB7CHS, YB/YCs, ZD8Z, ZS1KS, 4U6ITU, 5B4ZI and 9M6HS.

## The 28MHz Band

On 28MHz, G2HKU notes PY2KXI, WA4SNI, JY9SR, ZD8VJ and H44XF.

For G3NOF the pickings included A22AK, A41KV, AP2JZB, FG5FC, FT4WC, FH4EH, PY0SR, V2/VE3QDC, VP2EOH, VP5JM, VQ9JC, VU2MPS, XW8KPL, XQ0X, YC4GDS, ZC4KS, ZD8DX, Z8SW, 3X1AU, 3X1SG, 6C1RJ

(=YK) and 9X5NH.

Just a couple of c.w. contacts for GM3JDR. Don worked H44VU and RD850DM.

Pat ON7PQ is another c.w. operator, he keyed with TR8GL, Y88POL (Antarctica), Z21HQ, V47EA, H44XF, H44VG, ZD8Z, TL8FD, ZD8VJ, 7Q7JA and FH5EJ.

For her effort, G0NZA offers TF0CHA in Jakarta, CE3FSB and UD850SF all s.s.b.

Finally G0HGA who had a long c.w. QSO with JA1NUT, AA8AO, PZ1DY, EA8UH, UA9CR, 4X6VU, H44SX, ZD8LII, ZD8VJ, and a sporadic-E contact with FD1PGP, mostly at 599.

## Deadline Change!

The deadlines for the October, November and December issues are August 1, 29th and October 3 to arrive, addressed as above. Sorry!

# Back-Scatter

## VHF Up

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

At the time of writing this column, June 9, there had not been any 144MHz Sp-Openings in the UK. This was possibly due to the very high geomagnetic activity prevailing during the early part of June, which tends to disrupt the formation of the requisite ionised layer. Apart from one or two good days on the 50MHz band, there has been very little so far to jump up and down about. However, by the time you read this there should have already been a number of 144MHz Sp-Openings, with the likelihood of this continuing until the first week of August.

Openings on 50MHz via Sp-E were recorded on virtually every day during May, allowing contacts to be made with operators in CN, CT, DL, EA, F, I, IS0, IT9, LA, LX, OE, ON, OH, OY, OZ, PA, SM, SV, Y0, ZB, 5B4 and 9H. Star turn of the month was the joint Finnish/Russian expedition to Malaj Vysotskij Island. Using the callsign 4J1FS, this DXCC country was worked from the UK on four consecutive days between May 24-27.

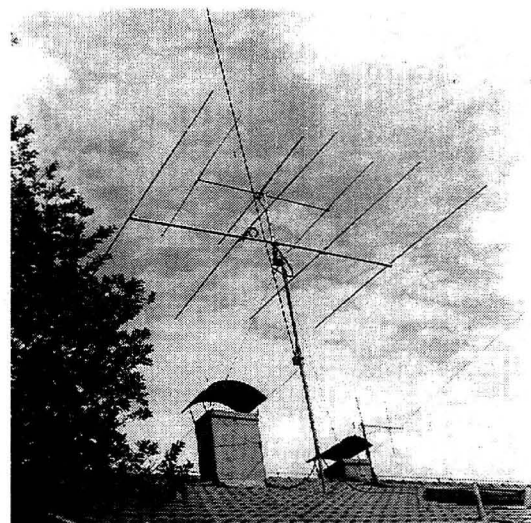
Many stations have probably worked **Wolfgang IN3TWX**, during Sp-E openings on both 50 and 144MHz. The picture, **Fig. 1**, shows his 28/50MHz antenna system and although the boom of the 50MHz Yagi is only 2.7m long, many UK contacts have been made with it despite a very poor take-off to the north-west. In fact, sometimes he finds that signals are stronger via backscatter than on the direct path.

The first 70MHz QSO this year, between the UK and Gibraltar, occurred on June 2 at 1230UTC when **Martin Vincent G3UKV** (I082) worked ZBOW (IM76) on 70.200MHz. Paul ZBOW then went on to work a number of stations on s.s.b., and later in the opening changed to f.m. to work the crystal controlled p.m.r. brigade.

Among the surprised operators to work ZBOW was **Ken Easty G3LVP**. He normally uses his modified p.m.r. box and indoor vertical antenna, to chat to the locals in Cheltenham and was very surprised when Paul opened up the squelch!

To find out the chances of an opening, you can telephone the RSGB Sp-E hotline on (0426) 952211. **Jim Bacon G3YLA**, the IARU Region 1 Sp-E

co-ordinator, records a daily message giving details of possible Sp-E reflection points within Europe, and although it is not a forecast, it can give some useful pointers as to when conditions look favourable. Jim would welcome logs of Sp-E openings, especially from the 144MHz band. These can be sent to me for forwarding to the RSGB Propagation Studies Committee.



**Fig. 1:**  
**Wolfgang**  
**IN3TWX's**  
**28 and**  
**50MHz**  
**antenna**  
**system.**

## Aurora!

A number of small scale auroras occurred during May. In central England they were reported on May 13, 14, 26 and 31. I have no doubt that there were many more than this and, if you live in Scotland, you probably experienced them nearly every day!

I first heard the opening on May 14 at 1610UTC, working **GM0JKF** (I087) on 50MHz, **GM6VXB** (I097) at 1632UTC on 70.200MHz s.s.b. and five other GMs on 144MHz. The opening faded out at my QTH around 1710UTC. During the event on May 31, I stayed exclusively on 144MHz, working at 1607UTC, **SM5DCX** (J089) followed by a handful of contacts with stations in I063, I075, I076, I086, I093, I095 and J001. My final contact was made at 1744UTC after which I could hear no more auroral signals.

**Vince Shirley G0ORC**, (I093) last reported to this column as **G7ENF** and has obviously since passed his Morse test. Congratulations! Vince mentions that he doesn't particularly want to operate on h.f. but wanted to be able to use c.w. on the v.h.f. bands. An excellent decision if I may say so! He is very pleased with the results so far, especially as he participated in the aurora on May 31, working **GI40PH** on 50MHz for a new country and **GM4DJS** on 144MHz for a new square. Vince reports that the aurora faded out with him at 1745UTC, exactly the same time as observed by myself.

A number of minor auroral events were recorded during the first week of June, all leading up to a large scale opening on June 5. All the warnings signs were there, massive bursts of sun noise, short wave fade-outs, magnetometers reacting violently, bulletins on the packet network, WWW



# Back-Scatter

reports, announcements on the DX Clusters, alerts on DK0WCY, messages on the telephone warning chain, you simply couldn't fail to know that something big was going to happen. The clincher for me was hearing the 144MHz band fully auroral at 0630UTC on June 5. For the next hour I made c.w. contacts with LA1T/P (JO37), OZ, SM and GM. This is very rare and as I had not heard anything the previous night, I guessed it was the precursor to a good opening rather than the aftermath of a previous event.

At the time of writing this, I have received no 50MHz reports and only one report, from **Jerry Russell G4SEU** (IO92), concerning the 70MHz band. Between 1652-1830UTC he worked, on s.s.b. G1RKF (IO80), G18AYZ (IO64), GM4CXP (IO85), GM4DIJ (IO85) and GW4HBK (IO81).

As soon as Vince G00RC turned on his 144MHz receiver and checked the beacons, he knew that he was in for a good event, especially as the 5W e.r.p. beacon DL0UB (JO62) was quite audible. Using an Icom IC251E, 180W amplifier and a 16-element Yagi, he worked 10 countries between 1526-1820UTC, the pick of the bunch being HB9DK (JN37), HG3GR (JN86), I1KTC (JN45), OK3TNZ (JN97), SP5EFO (KO02) and YU2EZA (JN86). Vince reports that beam headings of 40° were required for HB9 and F, whereas he had to beam at 60° for HG, I and YU. He also found the concept of being called by five SPs at once quite 'mind blowing' but very frustrating as he couldn't work all of them!

## Packet Warning

**Ian McCabe G0FYD**, (IO83) was forewarned of the event by packet radio bulletins and the Jim Bacon Sp-E hot-line. During the morning, the recorded message gave details of the three hourly K index, reporting an 0600UTC K index of seven and an 0900UTC K index of eight. Normally, a K index of five or over, in the afternoon, should set the alarm bells ringing, let alone in the early morning! With a Trio TS780, 100W and a 15-element Cushcraft Yagi, he worked 10 countries between 1345-1845UTC, the notables being HG0HO (KN07) at 1836km, I1KTC, OE3JPC (JN88) for a new country, OK1FFD (JO60), OK1HA (JN79), OL7VYT (JN99), YU2CCY (JN85), YU3ES (JN65), YU3ZV (JN76) and YU3ZW (JN86). Gotaways included HA2RD, HA4XT, RB5PA and UB5WBG.

**John Regnault G4SWX**, (JO02) resisted the temptation of swinging the beams around to the east to work the stations in southern Europe, and concentrated on a northerly beam heading to work the elusive Finnish and Russian operators. He was rewarded with a number of quality contacts including UA1AFA (KO59) at 2070km, UV1AS also in KO59, UC2CBZ (KO34), ES5RE (KO38), OH2AV,

OH2BAP, OH2TI and OH5LK.

I commenced operation at 1330UTC, the 50MHz beacon GB3RMK being 55A at this time. Moving up to 144MHz, I worked a handful of GM stations but found very little else at this time. At 1440UTC, the SK6SIX beacon on 50.080MHz suddenly became audible at 55A, and within minutes the 144MHz band opened up into central Europe. For the next five hours, from 1445-1945UTC, it was bedlam, but fortunately I was able to hold my c.w. frequency for the entire session. In total, I made 150 QSOs in 73 locator squares and 18 countries, DL, F, G, GI, GM, HB9, HG, I, LA, OE, OK, OZ, PA, SM, SP, UB, Y and YU. The chart, **Fig. 2**, shows the extent of the opening from my QTH in IO81. I won't bother detailing all the DX but some of the highlights were 14 YUs, the best being YU1LA (KN04) at 1900km, 10 HG's, 14 OK's, 4 SP's, 2 OE, 7 Is and UB5WBG (KN19) at 1875km. The strength of some of the YU, HG and I stations were unbelievable. Beam headings during this event, found Poland at 40°, Czechoslovakia at 50°, Hungary at 60°, Yugoslavia at 70° and Italy at 80°. In the last 25 minutes of the opening, from 1920-1945UTC, I was working stations in southern France on a beam heading of 90°.

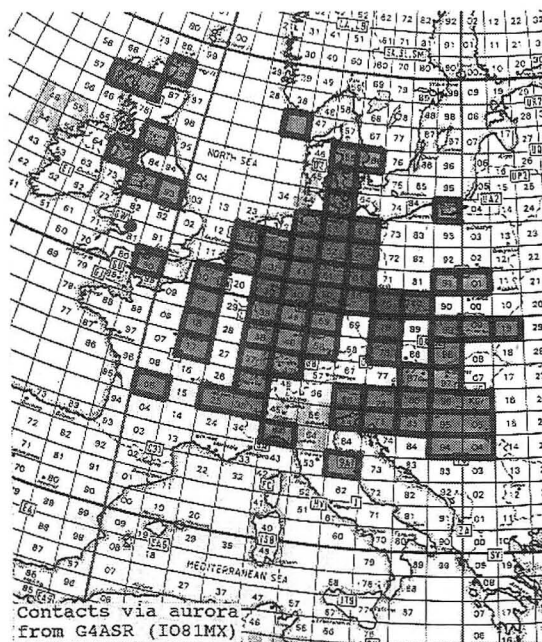
Another operator to catch the early morning opening was Andy Cook G4PIQ, (JO01) who found GM3POI (IO88) on 144MHz at 0715UTC. During the previous evening, at 2030UTC, he worked OZ9EDR/P in the Scandinavian Activity Contest. Suitably forewarned, Andy was able to prepare for the afternoon session. From 1500-2030UTC he made 190 QSOs including 16 YUs and 15 HGs. Other DX included ES5RE (KO38) on a beam heading of 25° and UB5WBG at 70°. At 1917UTC, Andy was called by YO2IS (KN05) but the QSO was incomplete. By 1930UTC, activity had started to die down, with

only a few stations being worked on a restricted beam heading of 75-80°, moving slowly back to around 50-60° by 2015UTC. Andy stayed up for the later phase, around 2240UTC, but didn't hear very much. It started off with GM, LA, OZ and SM, then moved south to encompass PA and DL, fading out around 0015UTC.

## Exciting Reports

Reports from continental Europe were equally exciting. Johan PE1NMP, (JO32) running only 10W into a 10-element Yagi first heard signals at 1400UTC, working GW4VEQ, SM5MIX and SM7BYB. By 1530UTC, the opening had spread to southern Europe with stations in HB9, HG, I, UA, UB and YU being heard but Johan found it very difficult to break the pile ups with his low power. However he did manage to work HB9QQ, HB9RDE, HB9SNR, HE7STY, I1HWWG and FC10PA.

**Marcel FD1DQK**, (JN18) first noticed the aurora at 1550UTC, on arriving home from work. He worked DD1BR, EI5FK (IO51), GOGTM (IO94)



**Fig. 2.**

and G8GXP (IO93) and heard many other stations including EI4DQ, OK2SBL, OL7VYT, RB5PA and SP5EFO. The event faded out with him around 1945UTC.

Further to the south, **Didier FC1MXE** (JN05) was also fortunate to catch the event. From his QTH, auroras are quite rare, so he was very pleased to work a number of stations between 1629-1845UTC. Running an IC271, 80W and a 17-element Yagi he made s.s.b. QSOs with GW4VVX, GW4ZQV, GW6TEO, GW8ELR, G0CRT, G0NNF, G0PCF, G1AAR, G1AWF, G1EMJ, G1GYI, G1SSL, G1TWS, G2CZS, G4FCD, G6CJW, G6HKM, ON1KNP, ON1KVL, OT4KHG, ON4VT and ON5NY.

**Joachim Kraft DL8HCZ**, was another station to notice the early morning opening, hearing the 144MHz beacons SK4MPI and GB3LER 59A at 0700UTC. He reports that from northern Germany it was possible for many operators to work about 100 stations and 40 squares on 50MHz, and about 150-200 stations and 100 squares on 144MHz.

**Raimund DG9MAQ**, (JN58) running with an IC251, 75W and a 9-element crossed Yagi contacted a number of stations, between 1545-1800UTC, in DL, F, G, ON and PA. He heard, on s.s.b. G6IJM, G8FEO, G8XVJ, GW4ZQV and worked G8LHT. Between 1820-1940UTC, he could only hear c.w. stations.

**Robert HB9BZA**, (JN36) located in Geneva made most of his contacts between 1600-1700UTC, although he continued to hear signals through to 1940UTC. He made nine contacts with the UK, the stations being located in IO72, IO82, IO83, JO01 and JO02. Robert reports that he does not detect many auroras, normally only one every two years or so.

## Tropo

Conditions via the tropo propagation mode were quite good during May. Many contacts were made from the UK into central Europe on both the 144 and 430MHz bands.



**Fig. 3.**

# Back-Scatter

On May 5, Vince G0ORC worked DF0RW/P (JO31) on 144MHz and PE0MAR/P (JO22) on 430MHz but found very little else. He had a good s.s.b. contact with GM0NTW (IO85) on May 14, but the best period for long distance working appeared to be during the evening of May 31 when s.s.b. QSOs were made with DL0WAE (JO42), DL2NY (JO32), DL3YB (JO32) and Y23SB (JO53). The European field day, on June 1, gave many contacts with portable stations in France and Belgium, a contact with FF1PBI/P (IN87) providing a new square. Later on in the day, LX/F4YAT was heard at good strength but language difficulties meant that the contact could not be completed. Vince reports that he is going to brush up on his French!

**Gary Nicholas GW7EVG**, (IO83) found that conditions during the RSGB 144MHz contest, on May 18-19, were quite good. With 3W into an 8-element Yagi he worked EI3GE/P, G14KSO/P, GM00GC/P, GM80RG and GM4ZUK/P. Gary mentions that his father, GW30IN, has just bought him a 25W amplifier and GaAs f.e.t. low noise amplifier, so he is hopeful of some better results and maybe some DX in the log soon.

At my QTH there were a number of days during May, when the tropo conditions were enhanced into central Europe. The best of these was during the period May 31 to June 1. During the evening of May 31, I worked OZ1KYM, OZ2ST, Y23SB and a number of German stations, the best being DC7MH (JO62) in Berlin. The next morning was even better and between 0730-0900UTC I worked OK1KYY/P (JN69), OL7BVJ/P (JO60) and many German stations as far as JN59, JO50 and JO51.

## Meteor Scatter

The SM7 Six Metre Group have organised a six hour meteor scatter contest which is to run between 2200UTC on August 11 to 0400UTC on August 12. The frequency band to be used must be between 50.150-50.300MHz and contacts can only be made on c.w. or s.s.b. The contest exchange will consist of callsigns and the standard IARU Region 1 m.s. report. No locators need to be given. Only contacts made via m.s. over a distance of greater than 500km will count. The score is calculated by multiplying the number of QSOs by the number of prefixes worked. Members of the SM7 Six Metre Group count as extra multipliers. The SMs will be found on the following frequencies: SM7AED 50.170, SM7CMV 50.180, SM7FJE 50.190, SM7JUQ 50.210, SM7FMX 50.220, SM7LXV 50.230 and SM7SCJ on 50.240MHz. There will also be activity on 50.152, 50.157 and 50.162MHz. Log entries, postmarked no later than August 31, should be sent to Bo Nilsson SM7FJE, V Grevie 22, 235 94 Vellinge, Sweden. The log must contain your callsign, name and

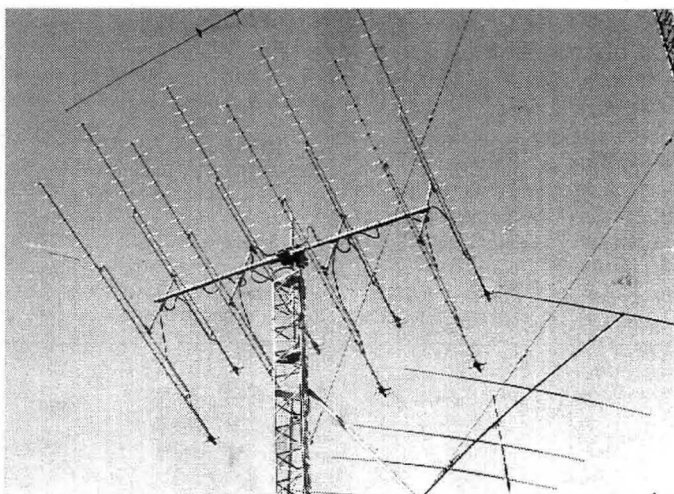


Fig. 4: The e.m.e. antenna at JL1ZCG.

address, locator, date, time, station worked, reports, points, total score and a declaration of fair play. The results will be published in the countries participating, with the three top entries in each country receiving an award.

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

The Delta Aquarids occur between July 12 to August 18, with the best activity being on Sunday July 28. Unfortunately it is below the horizon from 0600 to 2300UTC, but does produce very good results on the east-west path between 0100 to 0400UTC.

The biggest event of the year, but not necessarily the best, is the Perseids shower encountered between July 20 to August 23. Most activity will occur during the period August 8-13, the theoretical peak being on Monday 12th. The shower is circumpolar, which means that it does not set and is therefore usable, in particular directions, throughout the 24 hours. Between 1000 to 1400UTC beam north-east or south-west, 1400 to 2200UTC beam east or west, 2200 to 0200UTC beam south-east or north-west. There is no well defined peak for the north-south path, it generally being good at all times except between 0500-0900UTC and 1700-2100UTC.

## Moonbounce

The recent changes in licence conditions, bringing c.w. powers into line with p.e.p. levels, has enabled a number of stations to experiment with e.m.e. communications without the necessity of applying for a special research permit. **Mark Holloway G4YRY**, (IO90) has recently completed a number of c.w. contacts using only 200W into a pair of 14-element Parabeams. Admittedly, all QSOs have been with stations with large antenna systems, but nevertheless the results are very encouraging and show what can be worked with a good tropo

system. As Mark has no elevation facility, all contacts have been made either at moonrise or moonset, with recent QSOs including I2FAK, N1BUG, K2GAL, W5UN and KB8RQ. The contact with W5UN was completed in one minute and was also Mark's third random QSO with that station. The strength of some of the 'mega' e.m.e. stations can be quite enormous, and at times it can be easier to work W stations than working G's around the UK!

Ian McCabe G0FYD reports that thanks to the tracking information given in a recent issue of *PW*, he was able to copy, on May 18, 144MHz signals from SM5FRH and W5UN.

**M. Yokoyama J01BMV**, has written from Tokyo, giving details of his 430MHz activities. He recently participated in the REF e.m.e. contest from JL1ZCG, his local club station, making over 30 QSOs during the event. He also mentions that many DXers in Japan are now using a new antenna, the Create 2x727, shown in Fig. 3. The antenna assembly consists of two 27-element long Yagis and associated power splitter. The 430MHz e.m.e. system at JL1ZCG consists of four such antenna assemblies combined to create (!) the 216-element array shown in Fig. 4.

## DXpedition Update

Further information regarding the scientific expedition to Greenland has been obtained from REF, the French amateur radio society. A member of the scientific team, Laurent Beugnet F6G0X will operate as OX/F6G0X, during July and August, on the 50, 144 and 430MHz bands from HQ83. Preferred frequencies will be 50.210MHz for c.w. and 51.150MHz for s.s.b. operation. That's what the press release said anyway! A beacon OX3BCN will be in operation on 50.025MHz, 144.850 and 432.850MHz. The RSGB *DX News Sheet* however gives conflicting details. It states that Laurent FJ5BL will operate as OX91REF on the h.f. bands and that he will run a

beacon signing OX91BCN on 50.100MHz. You pay your money and take your choice!

Reg Woolley GW8VHI, plans to operate from JO71 between July 13-14. He will use the callsign DA4RG/P and may be found on 144MHz and 432.185MHz.

There is still time to work Johannes LA6HL during his annual trip to Iceland. He will be staying in a camp site near Reykjavik (HP93) until July 19, during which time he will be using a twin Yagi system, working e.m.e. on 144.039MHz. Between July 20-25, Johannes will operate from IP03 and IP13, concentrating on meteor scatter operation. He will operate on 144.183MHz, transmitting during the first 2.5 minute period. As has been the practice in past years, he will spend more time listening than transmitting, the best time to make random calls being from 2000UTC. He will also be active on 50MHz, but his permit only allows transmissions between 2300-1800UTC. After leaving Iceland, Johannes will be QRV from the Faroe Islands, operating on both 50MHz and 144MHz. His equipment consists of an FT726 into a 5-element Yagi on 50MHz, and the same transceiver on 144MHz into a 160W amplifier into a 15-element Cue Dee antenna.

## Active Squares

Bo OZ1DJJ, will be active on 50MHz from various squares in Greenland during 1991. Using the callsign OX3LX, he will operate from GQ12 between July 8-20, HP15 between August 21-September 3 and GP52 from September 17-26. He will be running 50W into a 5-element Yagi whilst in HP15 but only a dipole from the other locations.

Monitor 50.150MHz, 144.260MHz and 432.220MHz, if you want to catch the Island Hoppers DX Group activating the Great Blasket Island between July 20-27. The island, located off the coast of Ireland, will be of great interest to IOTA hunters, as it has not been activated for a number of years.

Lasse SM5DCX/3 will be active from JP81 between July 22-28. He is especially looking for 144MHz auroral and meteor scatter contacts.

ES2WX, formerly UR1RWX, will be active on 144MHz from Saaremaa Island (KO08) from August 8-18. The possible callsigns will be ES2WX/0, ES2W/0 and ES0/SM0KAK. Skeds will be taken via the v.h.f. net when on site. QSL cards should be sent via ES2WX, Box 13, Viimsi, 203 006 USSR.

Every August, Clive O'Hennessey GW4VX is active from Lairg (IO78) and this year is no exception. Between 10-25th he will be using the callsign GB2XS, primarily on the 144MHz band. I've also heard that GOISW will be in Cyprus during August and expects authorisation to allow 50MHz operation. Further details in next month's column.



# Back-Scatter

## QRZ Contest!

According to CQ's contest editor, K1AR, the annual CQ World-Wide v.h.f. WPX contest, scheduled for July, has been cancelled. The magazine was unable to find a volunteer administrator for this event.

Low power contests, no more than 25W p.e.p. output from the transmitter, are being run during the weekend of

July 27-28. The 144MHz section will be held between 1500-2300UTC on the 27th and the 430MHz section will be held between 0900-1500UTC on the 28th.

Cumulative contests, for all bands between 3.4GHz and 24GHz, will be held between 0900-2100UTC on July 14, August 18, September 15 and October 20.

Scandinavian activity contests will be held on the following dates. The

50MHz activity on July 23, 144MHz on August 6, 430MHz on August 13 and microwaves on July 16. All sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

## Deadlines

Please send your letters to reach me by the end of the month. I always

write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. These can all be returned if necessary.

## World Administrative Radio Conference

Of interest to listeners and broadcasters is that the International Telecommunication Union's Administrative Council, meeting during June, decided to postpone the World Administrative Radio Conference 1993.

This WARC was to have discussed the Improved HFBC Planning System which, in theory, is designed to ensure equitable access to the short wave broadcast bands by all countries. In practice the system is a shambles, failing to offer any guarantee of decent reception in a target area or continuity of frequency from quarter-hour to quarter-hour. Whilst it would have affected large broadcasters such as BBC World Service and Deutsche Welle extremely badly, countries such as Brazil and Senegal, which use short wave for domestic transmissions, would have been unable to maintain their operations successfully. The WARC to examine the planning system will now take place no earlier than 1995.

The WARC 92, which will cover frequency reallocation across the radio spectrum, will be held in Spain during February. There will be some expansion of the short wave broadcast bands and a decision on an allocation for radio direct broadcasting satellite operations will be taken. More details will appear both in Back-Scatter and in the 'Band Scan' sections of *Short Wave Magazine* in the run up to the Conference.

## Interesting Changes

Moscow came up with some interesting changes to its output on June 1, with the closure of Radio Station Peace and Progress. This station opened in 1964, claimed to be the voice of Soviet public opinion, although there was little to distinguish it from Radio Moscow. As a result there has been some tinkering with Radio Moscow's programme line-up. Arabic, for example, is now continuous from 1200 until 2100GMT, having taken over the hour-long Arabic from Peace and Progress. Other services have been trimmed, Turkish output reduces from seventeen and a half hours to fourteen hours weekly and some Indian language services have been slightly reduced, with some minority languages such as

Marathi disappearing altogether. The Soviets have begun to realise that international broadcasting is an expensive business, particularly when transmitting such an extensive range of languages.

In last month's column, I reported that Israel Radio was to be cut back on June 1. This date came and went, but the cuts did not occur. It seems that the level of protest from listeners across the world, was sufficient to alter the minds of the hierarchy in Jerusalem, and programmes continue as before. The Voice of America started a daily 30-minute European German service on US Independence Day, July 4. At the time of writing, mid-June, no times and frequencies are available. The VoA is to relinquish some of its use of the BBC Woofferton transmitting site in 1992 when the BBC restarts full-time operations from the station on four 300kW transmitters. At the same time, the Daventry site will close, with the relatively new transmitters re-deployed to other sites in the UK or overseas. Presumably the Radio

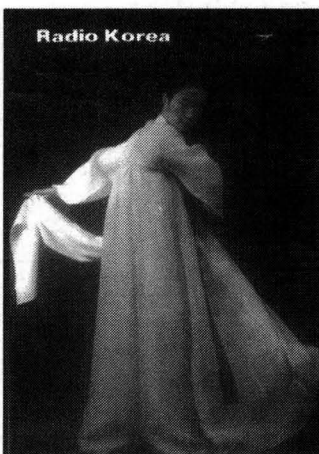


Fig. 1.

# Back-Scatter

## Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

Canada International relays at present via Daventry will be allocated to other BBC sites in the UK.

Radio RSA has plans to start an Arabic service to supplement its present coverage of Africa. No firm details have been decided yet. Meanwhile the station has spare capacity on its transmitters following the cessation of transmissions outside the African continent last year, and is inviting other international broadcasters to bid for time to serve Africa and neighbouring regions.

The AWR-Latin America operation plans to re-locate to improve and expand its service to Central and South America. The station has purchased a new transmitting site, from the now defunct Radio Impacto near Cahuita in Costa Rica. The site is 48 hectares with a transmitter building, four senders and two quad antennas. At present, AWR-Latin America transmits from the Central American Adventist University near San Jose, the capital of Costa Rica. One 50kW and one 5kW transmitter are used for transmitting programmes in Spanish and English to Central America, Mexico, the northern Caribbean, Colombia and Venezuela, with special programmes on Saturday in Dutch and Papiamentu to the southern Caribbean. The new site will allow the installation of new log periodic antennas to cover Central and northern South America. Two medium wave transmitters on the new site are being re-built to operate with 50kW on the h.f. bands. Full operations from the new site will begin during 1992. This year is the twentieth anniversary of Adventist World Radio, which began operations on 1 October 1971. There will be special programmes and QSL cards to mark the anniversary.

## Publications Of Interest

Some publications of interest have

arrived in my post bag recently. The 19th edition of the *Tropical Bands Survey*, published by the Danish Shortwave Clubs International, is a complete survey of all stations operating between 2.0 and 5.90MHz from all parts of the world. Each station has full details of times of operation, how often it has been noted and parallel frequencies. This comprehensive and very useful guide is available for 7 IRCs or DKr 30 for surface mail delivery or 9 IRCs or DKr 35 for airmail postage from DSWCI, c/o Bent Nielsen, Betty Nansens Alle 49, I tv., DK-2000 Fredriksberg, Denmark.

Meanwhile Radio Sweden has released the latest edition of *Communications in Space - The DXers Guide to the Galaxy*. Released in May, it offers a complete guide of what is on which satellite, together with frequencies and how to monitor such things as the Space Shuttle and MIR. This useful booklet is available for £1.00 from 'Sweden Calling DXers', Radio Sweden, S-105 10 Stockholm, Sweden.

I'm indebted to regular correspondent Roy Merrill in Dunstable and to newcomer Cari Jensen in Delft, The Netherlands, for some of the information in this month's tour around the airwaves.

## Europe All times GMT(=UTC)

Radio Budapest's DX programme has been noted on Sunday at 0900 for fifteen minutes on 9.835MHz. Radio Prague's *Interprogramme* continues with English noted at 0948 on 9.48 and 7.345MHz. Deutschlandfunk is to launch a new German language course in the autumn. Called *Deutsch - Warum nicht? or German - Why Not?*, it is set in a small hotel called 'Hotel Europa'. The course deals with all important aspects of the language you would need when visiting Germany, or meeting Germans in your own country. The dialogues are written in simple, practical German. There is a new course book to accompany the radio lessons which is available free-of-charge from DLF - English Service, PO Box 51 06 40, W-5000 Cologne 50, Germany. Mark your order 'German - Why Not?'.

The Voice of Greece has English news 0840 on 15.65MHz.

Radio Romania International's summer English schedule has European broadcasts:

# Back-Scatter



Fig. 2.

INTERNATIONAL SHORTWAVE STATION  
**KFBs-Saipan**

1300-1400 on 17.85, 17.72, 15.365 and 11.94MHz  
1930-2030 on 11.94, 9.75, 9.69 and 7.145MHz  
2100-2130 on 11.94, 11.81, 9.75, 9.69 and 7.145MHz  
to North America:  
0200-0300, 0400-0430 on 11.94, 11.83, 9.57, 9.51, 6.155 and 5.99MHz  
to Asia and the Pacific:  
0645-0715 on 21.665, 17.805, 17.72, 15.325 and 11.94MHz  
1200-1230 on 17.72, 15.39 and 15.365MHz  
1500-1530 on 17.775, 17.745, 17.72, 15.325, 15.25 and 11.94MHz  
to Africa:  
0530-0600 on 21.665, 17.79, 17.745, 17.72, 15.38 and 15.34MHz  
1730-1800 on 17.845, 17.745, 15.365, 15.34 and 11.94MHz

Radio Exterior de Espana's English to Europe service is at 1900-2000 on 15.395, 15.375, 11.79 and 9.875MHz with a further placing at 2100 on 9.875MHz only. The service for North America runs from 0000-0200 on 11.88 and 9.63 and at 0455-0552 on 9.63MHz.

Radio Yugoslavia has English at 1830-1900 on 5.96 and 15.14MHz, although both tend to be rather cluttered, with the 15MHz channel most variable, suffering co-channel QRM from Moscow on 15.135. At 2100 the English service on 5.96MHz is badly affected by Radio Kiev in English, running for the full hour on the same channel. However the parallel channel of 11.735 is well received at 2100.

Radio Kiev has English at 0000-0100 to North America on 17.645, 15.525, 15.485 and 15.18MHz.

Radio Alma Ata's English service at 2130 daily has been noted on 17.73, 17.715, 17.605, 15.385, 15.315, 15.215, 9.505, 5.97, 5.96, 5.26, 5.035, 4.40 and 3.955MHz. This seems to be the frequency usage of the second programme from Kazakh Radio, which precedes and follows the English broadcast.

Radio Vilnius in English is on the air to Europe at 2130 on 666kHz, 1.557, 9.675 and 9.71MHz all from Lithuanian-based transmitters. At 2300 the frequencies used are 15.485, 15.455, 15.18, 13.645, 11.79 and 9.71MHz. According to the station's *DX Programme*, some of these transmitters for the European service may be in Bulgaria, whilst others for Australasia are in the Soviet Far East. The *DX Programme* can be heard on alternate Mondays and the *Listeners' Club* programme is on the last Sunday in the month.

Vatican Radio's current schedule was passed on to me by Francis Rose and Paul Essery. It lists English transmissions to Europe:

0500 on 7.25, 6.248 and 1.53MHz  
1345 on 11.74, 9.645, 6.248 and 1.53MHz  
1950 on 7.25, 6.248 and 1.53MHz

There is a half-hour Concert transmitted daily except Friday and Sunday at 1430 on 9.645, 7.25, 6.248 and 1.53MHz.

## Africa and the Middle East

Could Radio Mogadishu be about to return to the air? Rumours abound with Radio Havana Cuba's *DXers Unlimited* programme suggesting 9.62MHz as the likely frequency.

A schedule of Radio Jordan's English programmes has been passed on by Roy Merrall who observes that one page indicates one set of frequencies, whilst another shows different usage! Actual usage confirms the listing of 1100-1200 and 1400-1600 on 9.56.

Radio Zanzibar has been unheard by Roy since Thursday May 9, although he is uncertain whether this is as a result of a frequency change from variable 11.7342MHz or transmitter problems. Has anyone traced the station which is usually audible from around 1700?

## Asia and the Pacific

The AWR Asia service is due to introduce Swahili language broadcasts during the summer. These will be heard on 13.72 at 1800 on Saturday and Sunday only. This slot is used by English transmissions at present. Russian programmes began at the end of March heard at 1000 and 1900 on 13.72 at weekends only.

All India Radio did not say a great deal after the assassination of Rajiv Gandhi during an election rally near Madras in June, but at least it was possible to hear the news from the horse's mouth. The present schedule for English from Delhi is:

0000-0115 on 17.83, 15.135, 15.11, 11.745 and 11.715MHz  
1000-1100 on 21.735, 17.895, 17.387, 15.335 and 15.05MHz  
1330-1500 on 15.42, 11.76 and 9.565MHz  
1800-1845 on 15.36 and 11.935MHz  
1830-1845 on 11.86 and 9.95MHz  
1845-1945 on 11.935, 11.86, 11.62, 9.95, 9.665 and 7.412MHz  
1945-2000 on 15.36 and 11.935MHz  
2045-2230 on 15.265, 11.715, 11.62, 9.95, 9.91 and 7.412MHz  
2315-0000 on 17.83, 15.135, 15.11, 11.865 and 11.715MHz

Hindi programmes are beamed to Europe daily at 1945 on 11.62, 9.95, 9.665 and 7.412MHz.

Russian to Europe puts in good signals on 15.14 at 1615 although there is some QRM from Moscow and Lisbon but the AIR signal, rating up to 433, has frequent identifications "Govorit Delhi". Content includes songs and interviews in Hindi and Russian with male and female announcers.

Trying to untangle a schedule from Radio Korea proves difficult because of its confusing layout, but I hope that this is a true reflection of current times and frequencies:

0000-0100 on 15.575MHz  
0600-0700 on 15.17, 11.81 and 7.275MHz  
0800-0900 on 13.67\* and 7.55MHz\*  
1030-1100 on 11.715MHz#  
1100-1200 on 15.575MHz  
1215-1315 on 9.75MHz  
1600-1700 on 9.87 and 5.975MHz  
1800-1900 on 15.575MHz  
1930-2000 on 6.135MHz  
2030-2130 on 15.575\*, 7.55 and 6.48MHz\*

Frequencies marked # are from RCI's Sackville relay and those marked \* are European beams.

Radio New Zealand can now be heard on 13.785MHz from 1800 until 2200 except Saturday with a fairly strong but watery signal. However it does suffer from sideband splatter from Deutsche Welle on 13.78 and 13.79 which reduces SIO to around 322.

Radio Veritas Asia was noted on 15.14MHz although rarely identifiable before 1500. Short English newscasts noted at 1505, 1524 or 1537. The station has been logged as late as 1600 in English on Sunday.

KFBs Saipan's recent tests on 9.475 have now been followed by regular programming to East Africa at 1900-2000 in Shona and Yoruba languages. It can be heard clearly, if weakly, on most nights. Roy Merrall's recent QSL from the original tests is pictured here.

Last month I mentioned that Radio Canada's Ian MacFarland was now working at Radio Japan, presenting the *News Round* programme on Thursday and Friday at 0700 and 1100. I failed however, to include frequencies for these transmissions, so to make amends:

0700-0800 on 21.575#, 17.89, 17.81, 17.765 and 15.325MHz

1100-1200 on 11.84, 11.815 and 6.12MHzs  
1600-1700 on 21.70#, 15.23, 11.865, 11.815, 9.58, 7.21 and 7.14MHz  
1700-1800 on 15.345c, 11.865, 11.815 and 7.14MHz  
1900-1930 on 11.865, 11.85, 9.64 and 7.14MHz#  
2100-2200 on 17.89, 17.81, 15.34, 11.84 and 11.815MHz  
2300-2400 on 17.81, 15.34, 15.195, 11.815 and 11.735MHz#  
Frequencies marked # are relayed from Gabon, c from Sri Lanka and s from Canada

## The Americas

Radio Havana Cuba now uses 17.815 for French and English between 1900 and 2100. This channel replaces 17.835 and offers reasonable reception. The *DXers Unlimited* programme can be heard on Saturday at 2015.

Radio For Peace International now has a variable channel of 21.465 and appears to be experimenting with u.s.b./l.s.b./d.s.b. with partial carrier insertion. The schedule is 1900 at weekends and 2000-0300 but interference from co-channel Radio Moscow until 2200, coupled with very variable propagation means only infrequent reception. Roy reports *World of Radio* edition 594 on May 11 at 1940, but says this is the exception rather than the rule. The other outlets on 7.375, 13.6306 and 15.03 have all been noted at various times throughout the night and early morning. None have rated above SIO232 at best.

Kim Elliot, the VoA's Audience Research expert, faxed through the latest VoA schedule which includes English for Europe, North Africa and the Middle East:

0300-0330 on 17.865, 17.81, 15.195, 15.16 and 6.095MHz  
0400-0430 on 15.205, 11.825, 7.20, 7.17, 6.14, 6.04 and 5.995MHz  
0430-0530 on 15.205, 11.825, 7.20, 7.17, 6.14, 6.04, 5.995 and 3.98MHz  
0530-0600 on 15.205, 11.825, 7.20, 7.17, 6.14, 6.06, 6.04, 5.995 and 3.98MHz  
0600-0700 on 11.825, 11.805, 7.325, 7.17, 6.14, 6.095, 6.06, 6.04, 5.995 and 3.989MHz  
1000-1100 on 21.615, 21.57, 15.195, 15.16 and 11.74MHz  
1500-1600 on 15.26, 15.205 and 9.70MHz  
1600-1630 on 15.26, 15.205, 9.70 and 3.98MHz  
1630-1700 on 15.26, 15.245, 15.205, 11.74, 9.70, 6.04 and 3.98MHz  
1700-2200 on 15.26, 15.245, 15.205, 11.76, 9.76, 9.70, 6.04 and 3.98MHz  
2200-2400 on 17.885, 17.81, 15.255, 15.215 and 6.095MHz

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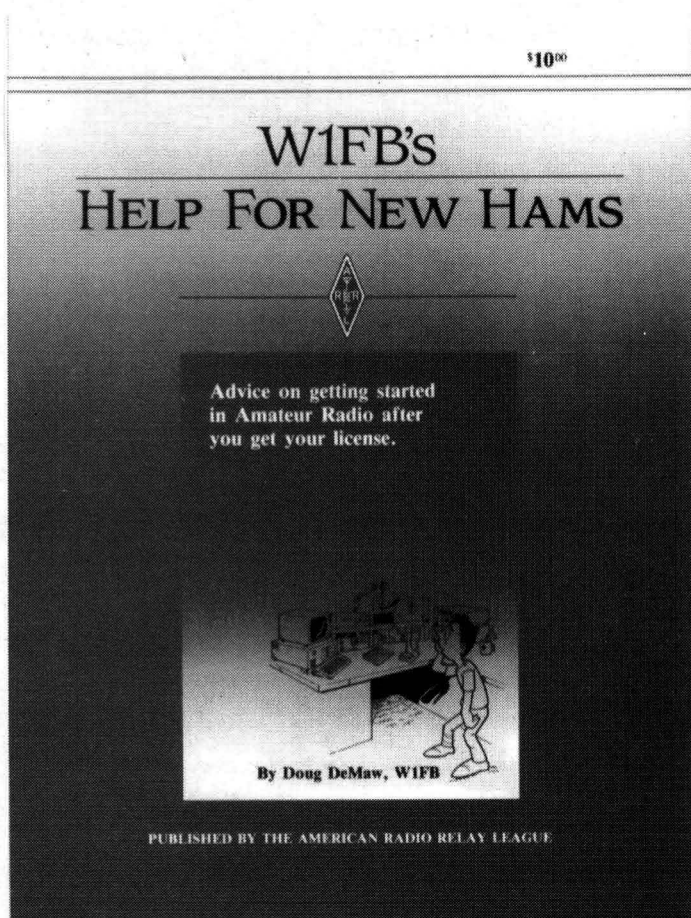
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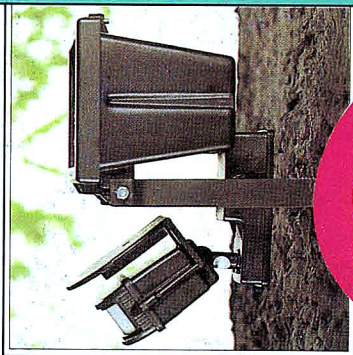
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The Detector Security Floodlight has the latest infra-red technology that detects movement over your chosen area and illuminates it with a 500 Watt Halogen lamp for up to approx 12 minutes which gives you time to park your car, unload the shopping, find your keys, greet your guests or avoid obstructions.

With 500 watts of halogen lighting beaming down on them, any potential burglar becomes clearly visible – so visible it could well be daylight!

Feel safer, more confident with the Maplin security floodlight. Economical – the system automatically switches off in the daytime to save power.

For your enjoyment the Detector can be permanently switched on, for EVENING BARBEQUES etc, by turning the main light switch on, off and on again within 2 seconds.

The range of the Detector is such that it is ideal for both residential and commercial use.

## YOUR TOP TEN FEATURES

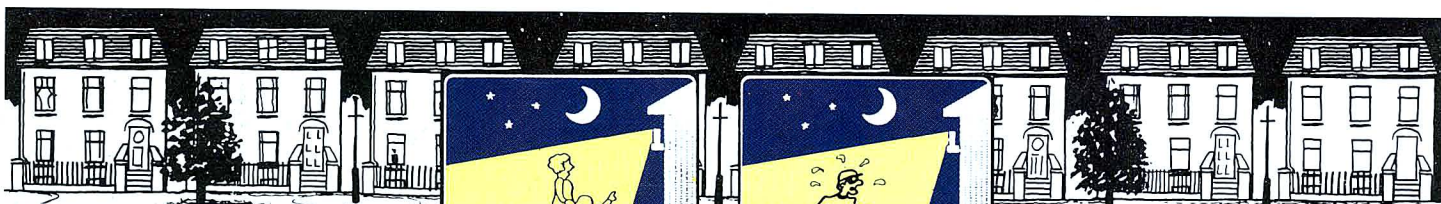
- ★ Automatic infra-red sensor, lights up
- ★ \*500 watt tube, when people approach your property
- ★ Adjustable 'on time' ★ Easy installation
- ★ Full 15m detection range
- ★ Fireproof ultraviolet material
- ★ Water resistant and weatherproof
- ★ Approved to international standards
- ★ Automatic on/off and manual override
- ★ Heavy duty zinc alloy body
- ★ 110 degree detection angle

**HELPS YOU  
PROTECT YOUR  
HOME AND  
YOUR FAMILY!**

## COMPARISON WITH SIMILAR SECURITY SYSTEMS

SE Essex Branch	Heavy Duty	500 Watt Power	Weather-proof	Automatic Infra-red	Adjustable Timer	Complete with Halogen Tube	Cost of 500W Halogen Tube	Cost of Security System
<b>DO-IT-ALL</b>	•	•	•	•	•	•	£4.15	£69.99
<b>HOMEBASE</b>	•	•	•	•	•	•	£7.99	£69.95
<b>TEXAS</b>	•	•	•	•	•	•	£5.99	£59.99
<b>ARGOS</b>	•	•	•	•	•	•	Not supplied	£46.99
<b>PAYLESS</b>	•	•	•	•	•	•	£7.59	£74.99
<b>B&amp;Q</b>	•	•	•	•	•	•	£3.95	£79.99
<b>MAPLIN</b>	•	•	•	•	•	•	£3.75	£29.95

(Survey conducted on 21st February 1991)



**WELCOME?** **WARNING?**  
**AVAILABLE AT MAPLIN SHOPS NATIONWIDE**

**Maplin** ELECTRONICS  
CREDIT CARD HOTLINE

Access PHONE BEFORE 5pm FOR SAME DAY DESPATCH

**24 HOUR SERVICE - PHONE NOW!**  
**0702 554161**

All items are subject to availability, all prices include VAT

Access ☐ Amex ☐ Visa ☐ Delete as required

If ordering by Credit Card please sign

Expiry date of Credit Card

Order Coupon Send this coupon to P.O. Box 3, Rayleigh, Essex SS6 8LR

Quantity	Description	Code	Price	Total
	Infra-red detector	YMS01	£29.95	
	500 watt halogen tube	YMS02	£3.75	
			Carriage for 1	£3.75
			Add further	
			£1.25 if more	
			than 1 YMS01	
			Handling	£1.00
			<b>Total</b>	

Name.....

Address.....

Post Code.....

PW7 Total

I authorise you to debit my Credit Card account for the cost of goods despatched.

Credit Card No.

Although this unit may deter intruders, no warranty is given or implied that the unit will provide security or prevent illegal entry.

**HURRY...**  
**THE FLOODLIGHT**  
**SECURITY SYSTEM**  
**IS A**  
**LIMITED OFFER**  
**SEND YOUR ORDER**  
**TODAY!**