

# PW

**Reviewed This Month**

**A New British Product**

The AKD 2001 144MHz Mobile FM Transceiver

**Constructional**

Build The PW Robin Frequency Counter

**Plus**

Dayton HamVention Report

Packet Panorama

Antenna Construction

Backscatter

Competition

And Lots More!



**PW Special Offer**

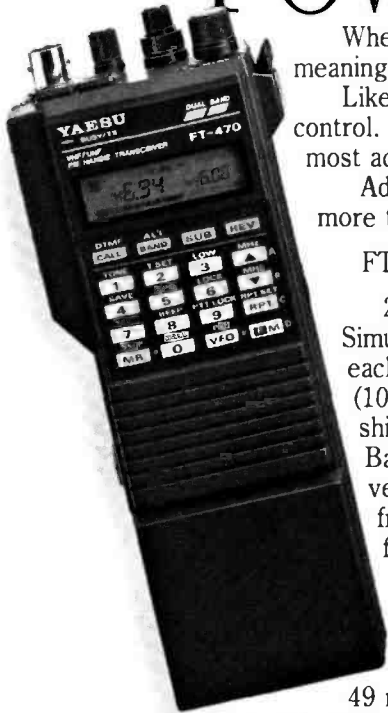
Move Into The Fast Lane With An Alinco DR-112 144MHz Mobile Transceiver Plus Mounting Kit & Antenna For £249!

ISSN 0141-0857



JULY 1991  
£1.60

# OUR COMPLETE LINE OF PORTABLE POWER TOOLS.



When you're talking Yaesu handhelds, power takes on many meanings.

Like maximum RF output. Sophisticated microprocessor control. Deceptively simple operation. Even cost savings—as most accessories are interchangeable throughout the line.

Added up, it's no wonder amateurs choose Yaesu HTs more than any others.

## FT-470. DUAL-BAND OPERATION PERFECTED.

2 metre and 430-440 MHz 42 memories. Simultaneous receive of both bands. Dual VFOs each band. Paging feature. DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Audible command verification. Keypad and rotary-dial frequency entry. Battery packs available from 2.3 to 5 watts. More.

## FT-411 SERIES. MAXIMUM SINGLEBAND PERFORMANCE.

2 metre FT-411 and 430 MHz FT-811. 49 memories. Dual VFOs DTMF autodialer (10 memories, 15 digits each). Auto repeater shift. Scanning features. Auto power-off. Battery saver. Audible command verification. Key-pad and rotary-dial frequency entry. Many battery packs available, from 2.3 to 5 watts. More.

## FT-23R SERIES. SMALL, SMART, RUGGED.

2 metre FT-23R, and 430 MHz FT-73R. 10 memories (7 store odd splits). Memory scan at 2 frequencies per second. High/low power switch. LCD power output and "S"-meter display. Auto-battery saver. Aluminium-alloy case. Water-resistant seals. Many battery packs available, from 2 to 5 watts. More.

Want more information? Call **(0703) 255111**

Or call into your local authorised Yaesu dealer and ask about the FT-470, FT-411 and FT-23R Series handhelds. The power in handheld performance.

**South Midlands Communications Ltd**, S M House,  
School Close, Chandlers Ford Industrial Estate,  
Eastleigh, Hampshire, SO5 3BY. Telephone (0703)  
255111, Fax (0703) 263507, Telex 477351  
SMCOMM.



# YAESU

Prices and specifications subject to change without notice.

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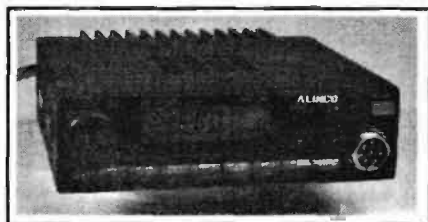
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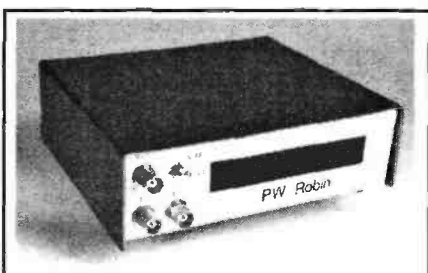
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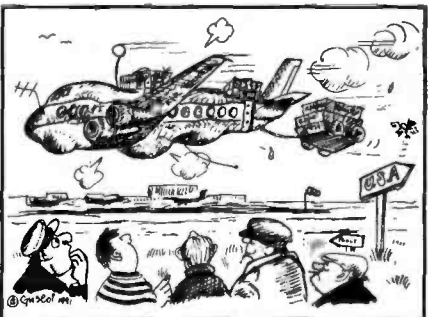
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month.*

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# ICOM

## NEW MULTIBAND IC-970E Base Station



Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

The IC-970E is supplied as an all mode dual-bander for 144 and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS system make this one of the most comprehensive multi-band transceivers available.

For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

**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!

# NEW MOBILES



**IC-229E/449E**  
2M, FM Mobiles



**IC-3220E**  
Dual-Band  
Mobile

Icom have built a range of ultra compact FM mobile transceivers. Similar in style, easy to operate and perfect for driving safety. Advanced features include a variety of tuning steps, memories, scan functions, adjustable R.F. power, optional pager and tone squelch units for selective calling. All these models include the HM-59 hand microphone with up/down and 1750Hz tone call for repeater operation. The unique simple operation enables each function to be operated with one switch. Illuminated switches and controls give complete night time operation.

**IC-229E VHF Mobile.** This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

**IC-449E UHF Mobile.** High sensitivity with GaAs FETs and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

**IC-3220E Dual Band Mobile.** Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Icom (UK) Ltd.

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

# South Midlands Co

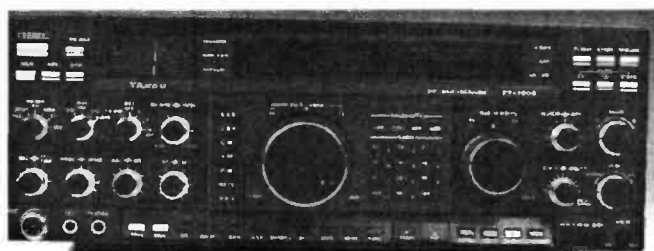
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★ PLEASE NOTE WE SHALL BE CLOSED ON

## HF EXCELLENCE

Have you always wanted to stand out from the crowd? Well now's the time to stand head and shoulders above the crowd with the FT1000 and FT990 HF transceivers, from Yaesu, arguably the crown king and prince of all HF transceivers.

Designed with no expense spared, these transceivers offer exceptional performance combined with the ease of operation, a truly marvellous step forward in HF communications. The FT1000 and FT990 feature the very latest in electronics and microprocessor technology to ensure a highly reliable and exciting-to-use transceiver for all modes of operation on the HF bands.



### FT-1000

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Dual Independent Rx capability.
- ★ Power output up to 200W PEP.
- ★ Auto ATU and internal P.S.U.

### FT-990

- ★ Amateur Bands Tx 160-10m.
- ★ General Coverage Rx.
- ★ Power output up to 100W PEP.
- ★ Auto ATU and internal P.S.U.
- ★ 50 Memories.



**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.  
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9am - 5pm. Mon-Fri  
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# Communications Ltd.

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ON FRIDAY 28th JUNE FOR STOCKTAKING ★

**NEW**

## TELEREADER TNC TERMINALS

INTRODUCING THE NEW TNC24MKII AND TNC MICRO

Two new TNC units, the TNC24MkII and TNC Micro, are both compact full featured designs, built to exacting standards for the discerning packet operator. The TNC Micro being totally portable and the size of a cigarette packet.



**TNC  
24MkII  
£325**



**TNC Micro  
£209**

- ★ PACKET, CW, RTTY & FAX modes.
- ★ PSK & JAS-1 B modes for satellite packet.
- ★ Auto doppler shift tuning.
- ★ Message storage facility.
- ★ Neat compact design.

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

**WHY NOT DROP US A LINE FOR MORE INFO!**

## SMC FOR ALL YOUR ACCESSORIES

### BASE STATION ANTENNAS

HF			
OSTD-HP	10-80m Trapped Dipole	£55.75	C
OSGSRV	10-40m Half size GSRV	£19.95	B
OSGSRVF	10-80m Full size GSRVF	£26.25	B
HF3VNB	12-17-30m Vertical	£69.00	C
28HS-2HB	10m HB9CV 2 Element	£66.00	C

### VHF/UHF

DSC770	Discone 70-700MHz	£26.50	C
TW435D	Discone 400-1200MHz	£47.00	B
D130	Discone 25-1300MHz	£76.65	C
ZHB6	6m HB9CV 2 element	£36.75	C
HS-GP62	6m 3x5/8 collinear	£56.36	D
ABC23	2m 3x5/8 collinear	£45.00	C
GP23	2m 3x5/8 collinear	£45.00	C
GPV5S	2m 2x5/8 collinear	£46.49	C
SG144	2m Swis Quad (Vert. Pol)	£69.45	C
GP714	70cm 14 step collinear	£76.00	C
WX1/N	2m/70cm 4.5/7.2dB collinear	£40.26	C
WX2/N	2m/70cm 6.0/8.0dB collinear	£80.78	C
WX4/N	2m/70cm 7.8/10.8dB collinear	£106.26	C
CA2X4WX	2m/70cm 6.5/9.0dB collinear	£80.72	C
CA2X4MAX	2m/70cm 8.5/11.9dB collinear	£102.12	C
LT606	Log Periodic 50-500MHz	£189.00	C

### MOBILE ANTENNAS

HF			
SMC12SE	12m Fold-over	£16.85	B
SMC15SE	15m Fold-over	£16.85	B
SMC17SE	17m Fold-over	£18.78	B
RSL28B	10m Fold-over	£14.25	B
PL20M	20m Fixed	£22.90	B
PL40M	40m Fixed	£22.90	B
PL80M	80m Fixed	£24.00	B
PL160M	160m Fixed	£24.50	B
FLEX110	160-10m	£82.00	C

### VHF/UHF

2GW	2m 1/4 wave	£4.00	B
2NE	2m 5/8 wave foldover	£13.50	B
VM-144HP	2m 7/8 wave foldover	£32.65	B
78B	2m 7/8 wave ball	£15.35	B
88F	2m 8/8 wave	£18.40	B
268E	70cm 2 sect collinear	£33.50	B
358	70cm 3x5/8 wave	£34.50	B
VM-727RS	2m/70cm 1/2+2x5/8 wave HI Pwr.	£28.35	B
VM-727SKR	2m/70cm 1/2+2x5/8 wave	£25.50	B
HS-727VMS	2/70 1/2+2x5/8 wave shortened	£26.50	B

CA2X4MB	2m/70cm 4.5/7.4dB	£38.50	C
CA2X4KG	2m/70cm 2x5/8+4x5/8 wave	£40.75	C

### MOUNTS

SMCGCCA	Gutter Clip c/w 4m cable	£14.25	B
SMCSOCA	Cable Ass. 6m SO239/PL259	£7.05	B
SMCSOCAL	Cable Ass. 6m SO239/PL259	£7.36	B
HS-TMK	Trunk Mount H.Duty c/w cable	£18.91	B
SOMM	Mag Mount c/w 4m cable	£13.02	B
SMCGCD	Gutter Clip only	£6.59	B
BSD	Bumper Strap	£11.75	B
RSM4M	Mag Mount c/w Cable Ass.	£26.44	B
TBR	Hatchback Mount	£11.50	B

### MINI VHF/UHF

CHL21J	2m/70cm 0/2.15dB	£14.75	B
CHL23J	2m/70cm 2.15/3.8dB	£17.35	B
HS-727SS	2m/70cm 0/2.8dB	£17.35	B

### MOUNTS MINI

RS17	Mini Trunk mount only	£12.75	A
RS16	Mini Gutter Clip only	£12.75	A
CK-3LX	Mini Cable Ass. RS16/RS17	£16.25	B
SSB1	Mini Hatch Mount c/w 6m cable	£27.00	B
SS-BM	Mini Multipurpose Mount only	£10.25	B

### DUPLEXERS

CF416MN	144/430 Duplexer UHF/N conn.	£26.00	B
HS790DN	144/430 Duplexer UHF/N skts	£26.00	B
CFX4310	144/430/1200 Triplexer	£36.75	B

### BALUNS

CEL-30	1:1 1.7-30MHz SO239	1kWPEP	£18.95	A
CEL-2000	1:1 0.5-60MHz SO239	2kWPEP	£25.50	A
CB2F/2k	1:1 2-30MHz SO239	2kWPEP	£30.50	B
CB2F/4k	1:1 2-30MHz SO239	4kWPEP	£56.00	B
CB2F/6k	1:1 2-30MHz 'HN' type	6kWPEP	£179.00	D
CB2F/10k	1:1 2-30MHz 'HN' type	10kWPEP	£460.00	D
CB2F/Sk	4:1 50MHz 'N' type	~3kWPEP	£105.75	D

PRICES FOR POSTAGE ON ALL THE ABOVE ITEMS ARE CODED AS FOLLOWS:

- A = £1.75
- B = £4.00
- C = £6.00
- D = £10.00
- E = £13.00

### 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	£780.25
16M20FB80	80FT FIXED BASE MOUNT	£1245.50
16M20BP40	40FT BASE PLATE MOUNT	£849.50
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
PB30	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

*The Serious Alternative*

**First in Europe!**

**2 Metre Handheld  
+ AM Airband Rx!**

Range: AM 108-138MHz  
FM 138-180MHz

**DJ-160EA**

**£239**



The DJ-160EA is the natural progression from the DJ-160E. Exactly the same package but with a much wider coverage and the addition of AM airband, a first in handhelds. The wide frequency range coupled with all the standard features of the DJ-160E give the new DJ-160EA an unrivalled specification. Standard features include 3 or 0.5 Watts output, LCD display, keypad selection, rotary frequency control, 21 memories, scan and priority, reverse repeater, 5-25kHz steps, DTMF decoder, auto power off, DC-DC 12V converter, 700mAh pack, rapid AC charger. Add to this AM airband coverage and you will see why the DJ-160EA is destined to become the best selling handheld for 1991!

**DJ-460E...£239**  
(70cms)

## 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**

**INCLUDES  
TONE  
SQUELCH**

**DJ-560E**

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 2x 3/8th 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
X-500	2m/70cm 8.3/11.7dB	119.00
X-700	2m/70cm 9.3/13dB	199.00
Others:		
D-707	Active base 1.5-1300MHz	99.00
D-505	Active mobile as above	69.00
CP5	80-10m HF vertical complete!	189.00
SAE for 26 page Diamond Catalogue. Fabulous!		



**DR-590E  
2M & 70CMS  
£499**

2m & 70cms • 45 Watts • 10 or 5 Watts low power • Dual watch • Full Duplex • Automatic Repeater Memory • 38 Memories • Auto Band Change • Reverse Repeater • 6 channel steps 5-25kHz • Brightness control • Priority • Bell Function • Detachable front panel option • Built-in speaker • Fist mic and full mounting kit • 150 x 50 x 178mm.

**SPECIAL THIS MONTH  
20% DISCOUNT OFF JAYBEAM**

## KENWOOD SPECIALIST DEALER



**TS 850!  
£1325 +  
FREE PSU!**

**COMING SOON!**  
New TS 450 & TS 690  
Phone for information and delivery

Full 12 month warranty  
Phone for latest  
DEALS!

TS-140S	Compact HF rig + FREE PSU!	£880
TS-450S	Classic HF rig + FREE PSU!	TBA
TS-690S	HF with 6 metres + FREE PSU!	TBA
TL-922	Hunky 2kW Linear in stock!	£1495
TS-790E	2m/70cms (Part Ex welcome!)	£1525
TH-77E	Dualband handy + Free High Gain Ant.	£395
TR-751E	2m All Mode + FREE PSU!	£610

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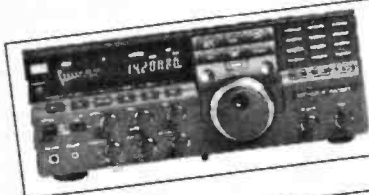
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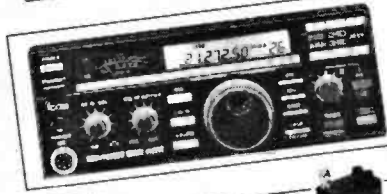
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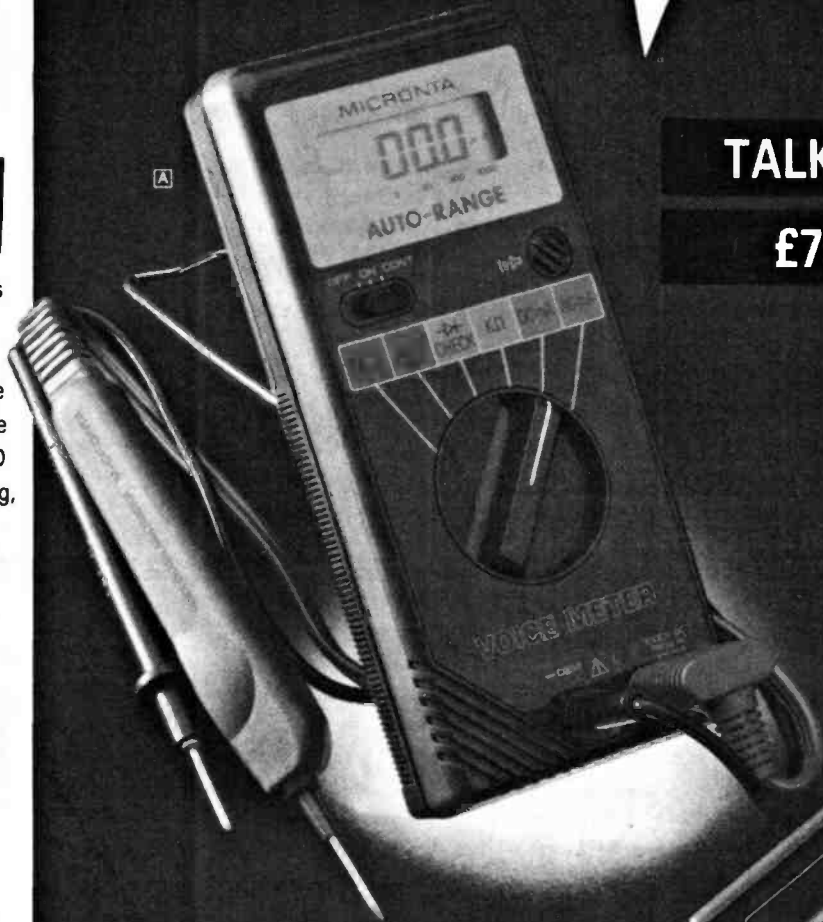
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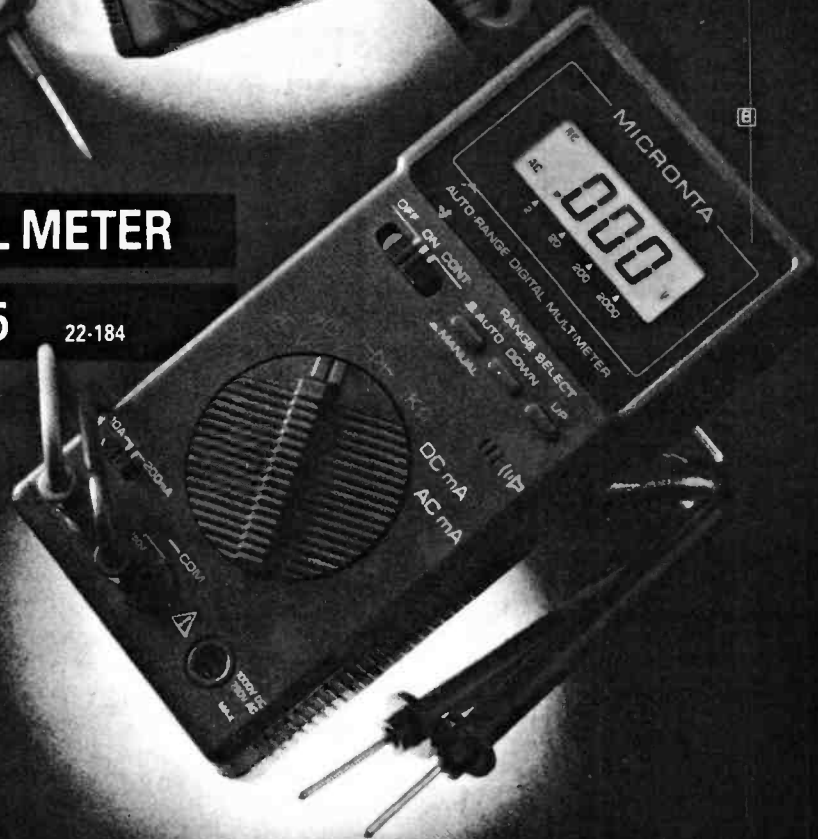
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# Keylines

Amateur radio has a valuable part to play in times of emergency. The fact that there are amateur radio-related emergency organisations and systems in countries throughout the world, proves my point.

Radio amateurs, whether it be in Manchester or Minnesota, Canada or Kalgoori, are ready to drop what they're doing so that they can help provide emergency communications. Despite, and perhaps because of, the modern extremely sophisticated official communications systems, we can still help by providing lightweight, reliable and user-friendly equipment for times of emergency.

In the UK we have RAYNET. They carry out many tasks for the various official services and played an important part in the fairly recent Boeing 747 aircraft sabotage disaster in Lockerbie, Scotland. The RAYNET groups are very well organised, and they go to great lengths to equip themselves and their vehicles with the best equipment they can afford.

So, it's obvious that there are a great number of people willing, able and waiting to be asked to help. Disasters, accidents and other events occur

regularly, and all over the world radio amateurs are ready to spring into action. However, there are some tragic events where we could play a part but aren't able to because those who may need us, don't know we're ready and waiting!

## Bashed Bangladesh

It's a terrible thing to suggest, but I think that many people may have become used to hearing the news that "A cyclone has struck Bangladesh, killing and injuring many thousands". They may be so used to the regular disasters, that they are shutting off the terrible truth. If you add the statement of fact that this low-lying country is one of the poorest nations on earth, to my suggestion, we've certainly a lot to worry over.

Please don't misinterpret my words. I'm profoundly concerned that this country is so badly affected and so regularly, by such bad storms. I've no doubt also that I'm not alone with my innermost thoughts, which suggest that Bangladesh should be abandoned and the people rehoused somewhere else.

However, such thoughts are tempered by reality, especially as there's literally nowhere else for them to go. In any case, if our European neighbours can keep The Netherlands 'afloat' and mostly watertight, surely the United Nations (with Dutch expertise) could help?

The people of Bangladesh need help, and when the disasters strike, the world turns to assist in any way possible. However, one of the biggest problems in this densely-populated country is the lack of communications. The problems become far worse when the cyclones strike, leaving the country with the minimum of civil and military communications.

## Call For Help

The Bangladeshi authorities (many of you may remember the country as East Pakistan) could call upon radio amateurs to help - if there were enough in the country to help! It appears, although I can't confirm it as 'official policy', that the authorities don't encourage amateur radio, apart from granting the occasional permit to visiting radio amateurs.

Before I wrote 'Keylines', I made several attempts to extract some comment from the Bangladesh High Commission in London. I FAXed two letters, and one was duplicate to 'chase them up', and I also wrote direct to the High Commissioner. Eventually, in desperation I managed to obtain some information over the 'phone, although it's not good news for intending RAE candidates in Chittagong!

## Transmitters Banned

It appears that in Bangladesh, ANY form of privately owned transmitter is illegal. Even CB radio in its most basic form is not allowed. After a great deal of chasing around by 'phone, I found a source 'close to the High Commission' who was willing to tell me that amateur radio in Bangladesh is neither allowed or encouraged. In fact, I was told by my source that he'd tried to become an amateur himself a few years ago, but had to give up in the end.

Another information source passed on a story which really told me how paranoid the Bangladesh authorities must be. They confiscated his TV

infra-red remote control, acquired with the set, as he arrived home from abroad!

I hope, eventually, to have a full statement on the Bangladesh Government's attitude to amateur radio. However, I've got to be fair, as much of the delay in getting a reply to my questions is obviously because communications to and from Bangladesh are strictly limited due to the storm damage.

Just think how much better their communications could be, if radio amateurs were allowed to help! Even if the country allowed the import of very cheap, low power short-range CB radio equipment, stranded villagers would have some emergency communications.

In the meantime, why can't radio amateurs around the world, the 'United Nations In Amateur Radio', put pressure on the Bangladeshi authorities to allow amateur radio into the country. Once in operation, a radio network could have countless technical spin-offs, apart from the much needed emergency communications system!

73s DE Rob Mannion  
G3XFD

# Receiving You...

## ★★★★★STAR LETTER★★★★★

Dear Sir

I like the new format of your magazine very much and the way it addresses some of the issues affecting the viability of amateur radio now and in the future. Your 'Quaynotes' column is long overdue in this respect. This is because many of the thousands of licensed amateurs who came into amateur radio over the past 10 years, have 'graduated' from Citizens Band radio.

However I feel that today's CB'er (perhaps tomorrow's amateur) demands more than a photo of someone else's QSL card. I for one would like to see some technical articles dedicated to antenna theory/propagation for these bands. I believe it is time to ditch the image of CBers as 'radio simpletons' unable or unlikely to progress beyond speaking into the microphone.

Thanks for a much improved and less stuffy read.

**Ellis Evans G1PDA, New Eltham, London**

**Editor's reply:** It would be interesting to hear what other readers of the 'CB High & Low' page think of this suggestion. Get those pens out, and let's be hearing from you all.

Dear Sir

Despite the April fool article (by Gerald Stancy G3MCK) published in *Practical Wireless* April 1991 issue, it is possible to use logic circuits in radio circuit applications.

My book *50 Circuits using 7400 Series ICs*, Babani book number BP58, describes circuits for a phase sensitive detector using 7400 i.c.s, an r.f. attenuator

using a 7400, a voltage controlled oscillator using 7401 type, a signal injector using 7413 i.c.s and others.

If anyone is interested in buying the book, it is still available at £2.50 (retail) from Babani.

**R. N. Soar  
Doncaster**

**Editor's comment:** It's nice to hear that our little joke has practical possibilities Mr Soar!

# Receiving You..

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

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

**Dear Sir**

I'm a Chartered Engineer. In order for me to call myself such, and to earn my living as a professional engineer, I must be a member of an Engineering Institution, in my case the I. Mech. E. In addition, I must pay an annual fee to the Engineering Council. I have no choice. Nevertheless, I am more than happy to pay the subscription of £75, because I belong to a professional body which represents my interests both nationally and internationally.

Moreover, it provides me with a number of membership services, including access to professional advice outside my expertise. It also provides me with a high quality monthly magazine, as well as organising regular conferences, exhibitions, etc., which allow me to keep up-to-date within my chosen field.

I ensure that the Institution reflects my views by voting each year in the Council elections, for candidates I believe will represent me fairly. Professionals take an interest in their professional body.

Since 1969 I have also held an amateur radio licence. When the prized ticket first dropped through the letterbox, separate licences were required for mobile operation and for television. There were less bands than now, the regulations were far more restrictive, and many lived in fear of a knock on the door from the local Post Office Inspector.

There is absolutely no doubt in my mind that the very significant improvements to the conditions under which we operate, have been achieved over the past 22 years through the tireless efforts of our much maligned national society, the RSGB. We expect the RSGB to represent our views, yet the majority of us fail to take any interest in the affairs of the society, and half of all licence holders are not even members. This cannot escape the attention of those in authority.

If amateur radio is to survive in the modern world, we must be completely professional in our approach to the hobby. We must put personal vendettas aside and remember that the spirit of amateur radio is greater than one individual licensee. We must be represented at the highest levels and make the RSGB our 'professional body' and not a club. Only then will the bickering stop and the future begin. That's why we must all be members of the RSGB like it or not. The I. Mech. E. collects my annual Engineering Council registration fee; why shouldn't the RSGB issue my licence, collect my fee and be paid by the DTI for doing so?

**M. E. Costello G3YPP**  
**Shefford**  
**Bedfordshire**

**Dear Sir**

Having purchased a standard C528 twin band hand-held from Amateur Radio Communications at Newton-le-Willows approximately seven months ago, a fault developed with the 144MHz side of the radio.

A quick trip over to the shop found me chatting and having free coffee with the resident engineer Frank. While being supplied with the cups of free coffee, the fault on the rig was found and the replacement part ordered.

I left the radio at the shop following their promise that it would be repaired as soon as possible. I expected at least a week's delay, as it was a Thursday (allowing postal time, the weekend and their Monday closing day).

To my utter surprise and delight, I received a call the following day, Friday, saying the part had come. The radio was repaired and ready for collection, less than 24 hours later at no charge!

My heartfelt thanks go to Peter (G4KKN), Frank the engineer and the rest of the staff, Elaine and Richard for the coffee and help.

I'm a very satisfied customer. I suggest that for choice, service, facilities and courteous helpful advice that you go to ARC, Newton-le-Willows.

**Graham Blomley**  
**GWOHUS**  
**Nr Mold**  
**Clwyd**

**Dear Sir**

I settled down this evening to read my May copy of *PW*, a magazine I have received and enjoyed for many years, and found the free 144MHz repeater card enclosed. My enjoyment of the magazine ceased temporarily at that point as I found yet again that my country (Scotland) had been 'chopped off' at the top.

I would hate to be classed as 'one of these wingers from north of the border', but although I am Scottish, I am also British, and not a regular complainer. In fact this is the first time that I have been compelled to put pen to paper on such a matter. This kind of treatment of my homeland incenses me and I hope that some cognisance of my views is accepted by you.

It would be interesting to see what kind of a reaction you would get from 'G' land if your next issue of a repeater card 'cut-off' in the South of England on a line roughly through the Isle of Wight, with a few dots and arrows indicating the approximate positions of repeaters placed to the south of the line. I am sure that the reaction from the south of the border would far exceed any mild nationalistic reaction from us Scots, and that your magazine would be left in no doubt as to what side your bread was buttered on!

The United Kingdom starts at the Shetland Isles in the north and finishes at the Scilly Isles in the south (maybe even at the Channel Islands) and, while it has been generally accepted by map makers that it is not practical to include the Northern Isles in their usual place in

relation to the mainland, at least they are illustrated on the UK maps.

Your magazine purports to represent amateurs in the UK. Please do us all the courtesy of treating us as a nation, and as equals, and your popularity will do nothing but flourish. If you don't include some of us in the illustrations of the United Kingdom, it will encourage the separatists among us. This could foster the sometimes over jealous nationalistic response from some quarters.

I would just like to repeat again that I do enjoy your excellent magazine.

**R. C. Young GM0GRW**  
**Nr Mauchline**  
**Ayrshire**

**Editor's comment:** To show what he meant, GM0GRW sent back his data card with the Isle of Wight and part of the south coast missing! I'm sorry that our efforts offended him but when the card was designed, I had the choice of including the UK as a whole in very small scale, thus placing the marked repeater locations very close together, (including those in the Central Belt in Scotland) or by the method eventually adopted. I took the decision to present the card in a way so it would be useful to as many people as possible, placing (graphically speaking) as few repeaters away from their correct positions as we could. Sorry for any offence caused, but the design by Rob Mackie our graphics artist (he's from Scotland!) and editorial content prepared by myself (formerly GM3XFD and although I'm English-born, I'm very pro-Scottish) was unintentional! However, before we offer the next free Data Card (for 430MHz) perhaps readers would let us know their feelings on the subject?

# Receiving You...

## 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.

### Dear Sir

I can't tell you how pleased I was to read the item in the March *PW* reporting the meeting held by the DTI between the Radiocommunications Agency, the RSGB, *PW*, *Short Wave Magazine* and others.

I am tremendously encouraged by this demonstration from the ultimate authorities of Amateur Radio in this country that they realise that the RSGB is not the sole voice of our hobby. It is of paramount importance that the authorities, the policemen and the representatives of the end users develop a substantial understanding and trustworthy relationship.

Considering that the DTI have thrust this responsibility on yourself and other amateur radio journalists, it is necessary to proceed with some caution due to the undemocratic nature of your selection. However, I would like to offer my support for your remaining in this position. I'm sure that any item worthy of report, and open forum would find space in *PW*. Additionally, I'm sure that you would not make an observation on any point without acknowledging the feelings of *PW*'s readers.

I used to be an RSGB member, but after eight years became disillusioned with their management style. I now buy *PW* to keep me up-to-date. It seems to me that the 50% of licensed operators who are not RSGB members must be, like me, either reading *PW*, *SWM* or other magazines. If this is so then it's vital that the opportunity is recognised and grasped.

Please remember that there are many of us out here in the wilderness who do not agree with all that the RSGB does.

**Bob Ralph G8LJG**  
Solihull, West Midlands

### Dear Sir

Now that the Government has hammered the final nail in the telephone monopoly coffin, isn't it time that British amateurs were allowed to handle third party traffic? After all, they would no longer be depriving a public body of revenue, but would only be competing in a very minuscule way with private enterprise. Since the demise of the telegram (I wonder if other countries have withdrawn this service?) such a facility could provide a useful and free service, albeit in a very small way.

I am not suggesting that the traffic system should be organised on the almost professional lines of the USA - merely that it should no longer be an offence for any amateur to contact

another amateur with the request to pass on a message on behalf of a third party purely as a favour. A useful spin-off would be to show amateur radio in a more favourable light to the public at large, and indeed, thus help to recruit more into the ranks.

**Alec Foxhall G6NPK**  
Bitterne  
Southampton

### Editor's comment:

Alec Foxhall has an interesting suggestion, especially when the recent disasters, and loss of communications facilities following storms in various parts of the world are considered. Where under-developed countries don't have organisations like RAYNET, I can see a real need. What do you think readers?

### Dear Sir

Reference the City & Guilds Radio Amateur's Examination, Subject 765.

I'm concerned at the difficulty experienced by potential candidates for the above examination, in finding an institution within the Poole/Bournemouth areas which is providing a course and an examination centre. The following comments based on my experience may be of some help to them: In order to run the course, an educational institution must have sufficient students enrolled to make it a viable course (12 or more people).

Although your local college may be an examination centre, it will only run the exam if it has been running the course. It follows that you may sit the exam without attending a course only if the College has been running a course.

I am constantly having queries passed to me in relation to these matters and have noted that in spite of being informed of the procedures that:

1. Potential students do not turn up to enrol on the course.
2. The course therefore doesn't run.
3. They arrive with further queries in October/November and then find they're too late.
4. The external candidates then cannot find anywhere to sit the examination because the course isn't being run at that centre.

To avoid these problems potential RAE candidates should: Keep their eyes open for college enrolment dates

and times. They should then enrol on time. If there are sufficient students the course will run and if the course does run, external candidates will also be able to sit the exam at the same centre.

Local institutions in Dorset likely to run the course are:

Bournemouth and Poole college of Further Education, North Road, Parkstone, Poole. Tel: (0202) 747600.

Adult Education Centre, Purbeck School, Wareham. Tel: (0929) 556809.

There are clubs in: Bournemouth - Bournemouth Radio Society.

Wimborne - Flight Refuelling ARS.

Poole - Poole Radio Amateurs Society.

Finally, may I wish anyone taking the RAE this year, the very best of luck and success.

**Dave Mason G3ZPR**  
Head of Educational Services  
The Bournemouth and Poole College.

### Editor's Comment:

Although the information regarding the Dorset Colleges will only be of use to candidates in this area, I felt that the general advice offered by Dave G3ZPR, on what to do, would prove useful in any area of the UK. The *PW* office now has the most-up-to-date list of centres (kindly provided by the C&G) on the most recent venues for the RAE. If you want to know of your nearest centres, please send an s.a.e. to Donna Vincent (marking it: RAE List) and we'll provide as much information as we can on examination centres near you.

## Let's Hear Your Opinion!

Write and tell us of any points of view you may have.





## Club News

**Coulsdon ATS** meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. On July 8, they have a 144MHz Fox Hunt, assemble at Grovelands Road. Further details from **Andy Briers GOKZT** on 081-668 7004.

**RAF Halton ARS** meet every Thursday, 7.30pm, to RAFARS members only. For further details, contact **Terry Owen G4PSH** on (0296) 85760, or write direct, QTHR.

**Derby & District ARS** meet Wednesdays, 7.30pm at 119 Green Lane, Derby. June 19 is The History of British Naval Aviation, an illustrated talk by Mr L. H. Owen, the 26th is a Night on the Air, July 3 is a Junk Sale and the 10th is The Novice Licence - illustrated talk by Roy Dakton. Details from **Richard Buckley G3VGW** on (0773) 852475.

**Oxford & District ARS** meet 2nd & 4th Thursdays, 7.30pm at the British Legion Club, Marston, Oxford. June 22 is Chairman's BBQ, held at Fromley Hall Farm, Nr Worminghall and July 6/7 is VHF/UHF NFD. Details from **G8PX** on Oxford 58785.

**Wakefield & District RS** meet Tuesdays, 8pm in First floor rooms, Ossett Community Centre, Prospect Road, Ossett. June 18 is On the Air (c.w.), the 29th is the Rothwell Gala, July 2 is On the Air and the 9th is HF Operating Procedures G4JMT. For more details, contact **John-Lloyd Bailes G0MYA** on Wakefield 260048.

**Loughton & District ARS** meet in Room 14, Loughton Hall, 7.45pm. June 14 is a Quiz night (radio related and trivial pursuit questions) and the 28th is a Calibration and Alignment evening. More details from **Mike Pilsbury G4KCK** on 081-504 4581.

**Coventry ARS** meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. June 14 is a Canal Trip - see **George G3TFA** for details, the 21st is Outdoor Operation evening - Burton Dassett Country Park and the 26th is a Night /n the Air - Gliding Trip. Details from **Neil** on (0203) 523629.

**Mid-Sussex ARS** meet Thursdays, 7.45pm at Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. June 13 is Windmills evening; Jack and Jill car park, the 20th is an informal, the 27th is a talk on Astronomy by Eric Zucker, July 4 is an informal, prep for VHF Field Day, July 6/7 is VHF Field Day and the 11th is an informal, prep for Brighton rally. **John Fuller G00IO**, 13 Lucastes Lane, Haywards Heath, West Sussex. Tel: (0444) 450957.

**Grafton RS** meet Fridays, 8pm at Holy Trinity Church Hall, Stapleton Hall Road, London N4. July 5 is Detection Equipment and the 19th is WWII Radio Interception. For further details, contact **Rodney Harrigan G0JUZ** on 081-368 6154.

**Mansfield ARS** have an HF Activity evening on July 4. They meet at The Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. More details from **Mary GONZA** on (0623) 755268.

**Bromsgrove ARS** meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. June 23 is Lower Wick Fair & Boot sale, the 25th is Night on the Air and July 9 is Antenna Construction Tests & Prize. **Mr D. Edwards G4ZWR**, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.

**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. July 3 is a demonstration and talk by **Derek Pearson G3ZDM** on products & kits available from **JANDEK** Kits. Further details from **Martyn Baker G0GMB** on (0908) 560026.

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. July 4 is System X Telephone Exchanges by **Alan G1DNP** and the 6/7th is VHF Field Day at John Hampden School, High Wycombe. For more information, contact **Neil G8XYN** on (0628) 25952.

**Nottingham ARC** meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. On July 11 they have a talk on Ambulance Communications by **Alan G8SSL**. Further details from **Rex Beastall** on (0602) 733740.

**Verulam ARC** meet on the 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Road, (off Malborough Road). June 25 is a talk on Amateur Radio in the USSR by **A. Slater G3FXB**. Details from **Rosemary Evans G0NOB**, The Old Dairy, Chipperfield Road, Hemel Hempstead, Herts HP3 0JR.

**Braintree & District ARS** meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street. June 17 is Six Club Speakers and July 1 is a Quiz evening. More info from **M. Andrews**, 22 Arnhem Grove, Braintree, Essex CM7 5UQ.

**Sutton & Cheam RS** meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, with natter nights on 1st Mondays in the Downs Bar. On June 20 they have an Inter-Club Quiz S&C v CATS, the 25th is a Committee meeting at G3WHK, the 30th is the Longleat Mobile rally (coach trip), July 1 is a natter night and the 6/7th is VHF National Field day at Leek, Staffs. **John Puttock G0BVV**, 53 Alexandra Avenue, Sutton SM1 2PA.

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Tennis Club, Midgeland Road, Blackpool. June 27 is a talk on Construction by **George Dobbs G3RJV** and July 11 is an RSGB Video Screening. **Eric Fielding G4HF**, 6 Thornton Avenue, Lytham St. Annes, Lancashire FY8 3RL. Tel: (0253) 726685.

**Dorking & District RS** meet 2nd & 4th Tuesdays, 7.45pm at the Friends Meeting House, South Street, Dorking (opposite the Spotted Dog). June 15 is a VHF NFD Planning meeting, July 6/7 is VHF NFD and July 9 is an Informal. Further details from **John Greenwell G3AEZ** on (0306) 77236.

**Norfolk ARC** meet Wednesdays, 7.30pm at The Norfolk Dumping, The Livestock Market, Harford, Norwich. June 19 is Experiments with Dp-Amps by **Mike Harris G3YIA**, the 26th is a Debate - 'Does Packet Radio Have A Future?', July 3 is an evening at Happisburgh (Eastern Communications & Sea side) and the 10th is a Mobile DF Hunt. More details from **Jack Simpson G3NJQ** on (0603) 747992.

**Llanelli (Coleshill) ARS** meet Mondays, 7.30pm at the Coleshill Day Centre for the Handicapped, Coleshill Terr Llanelli. RAE class, c.w. class, nights on the air and various talks. Special event station in July at Pembrey Country Park. Further information from **Roy Jones GW0KJZ** on (0554) 820207/759844.

**Plymouth RC** meet Tuesdays, 7pm at the Fredrick Street Centre, Plymouth. Details from **Sandy Pimlott G8IDE** on (0752) 363607.

**Sevenoaks & District ARS** have Weather Satellites, **Mike Senior G4EFO** on June 17 and Worked All Britain/Heard All Britain, **John Fitzgerald G8XTJ** on July 5. Please send all correspondence to the Secretary, **Ted Denman G7HKE**, c/o Sevenoaks District Council, Council Offices, Argyll Road, Sevenoaks, Kent TN13 1HG.

**Salisbury Radio & Electronics Society** meet 7.30pm, at the Grosvenor House Centre, Churchfields Road, Salisbury. June 25 is Preparations for VHF national field day, July 2 is a talk about Weather Satellites and the 9th is a committee meeting. Details from **David Kennedy, 'Coleborn'**, 11 Silverwood Drive, Laverstock, Salisbury, Wilts SP1 1SH. Tel: (0256) 342289 day or (0722) 330971 eves and weekends.

**Northampton RC** have moved to 2 Harvey Street, Northampton. They meet Thursdays, 8pm and for more details contact **Paul G0HWC** on (0327) 41267 evenings.

# Newsdesk '91



## NEC News Extra

What a happy crew! As most of you appeared to have visited the *PW & Short Wave Magazine* stand at the RSGB's NEC show, literally buying nearly everything on sale, we thought you ought to see them during a brief moment when they stopped work for a photograph.

The team were: (left to right) **Marcia Brogan**, **Sandie Hunt**, **Peggy 'Brown Owl' Ganderton** and the Editor of *Short Wave Magazine*, **Dick Ganderton**. Unseen, but

busily composing and designing the picture from behind the camera, was **Steve Hunt**, Art Editor for both *PW* and *Short Wave*.

Our NEC team were close enough to see the delight on **Bob Harrison G4UJS's** face when he won the RSGB's main lottery prize - a new red Ford Fiesta car. **Jim Bacon G3YLA**, drawing the tickets, also drew **Bob's** number for a combined TV-Video set, but generous **G4UJS** handed the prize to be drawn again, when he knew he'd won the car!

## SMC Annual Stocktake

As usual SMC will be having its annual stocktake at the end of June. This will take place this year on Friday June 28 and will mean that all their showrooms will be closed on this day.

Normal trading will resume on Saturday June 29 and SMC would like to apologise for any inconvenience this may cause.

## MIR Handbook

An excellent written work on the Soviet space station entitled *Space Station MIR*, already adopted by the JUNO Project, is now generally available. **GM4IHJ** has written a 37-page treatise which includes many diagrams, tables, tracking methods and experiments.

The content, presentation and informative reading this book provides brings a highly complex subject

into fully understandable and exciting reading. It is highly recommended to all of those who wish to follow, learn of, communicate with or use *MIR* as a stimulating educational project. It is produced at low cost and no profit, for the benefit of all users and potential users at £5.50, which includes post and packaging from:

**John Branegan GM4IHJ**, 8 Whitehills, Saline, Fife, Scotland KY12 9UJ.

## New American Kit Dealership For Raycom

Following his successful visit to the Dayton Hamvention, with the *Practical Wireless* organised group, Ray Withers of Raycom Communications Systems Ltd. has now been appointed the UK dealer for the exciting range of amateur radio kits from Ramsey Electronics Inc.

Ramsey Electronics have been supplying top-quality constructional kits in the USA for over ten years. All the kits come with professionally produced handbooks and instructions. Their recently-introduced fully synthesised 144MHz 3W f.m. transceiver kit, expected to cost around £129 in the UK, is already proving immensely popular in the USA. A 430MHz version of this kit, suitable for UK Novice use, is to be introduced soon.

These kits will certainly be very popular in the UK. You can get the full details on the wide range of Ramsey products, including h.f. transmitter and receiving kits, plus 50 and 144MHz projects, by calling Raycom on their Hotline 021-552 0073.

**SEND ALL  
YOUR NEWS  
AND NEW  
PRODUCT  
DETAILS TO  
SHARON  
GEORGE AT  
THE EDITORIAL  
OFFICE IN  
POOLE.**

# Newsdesk '91

## Pembrokeshire RS

Pembrokeshire RS will be running a special event station for the Cutty Sark Tall Ships Race, to be held for the first time on the Milford Haven waterway, Pembrokeshire, Wales.

The Cutty Sark Tall Ships race runs from the 9th to the 14th of July 1991, with a proposed sail past of all the entrants on the Haven on July 14, before heading out to the sea for the start. The ships should start arriving from the 7th or 8th, maybe even before. They are hoping for about 60 ships to be in the Haven, from some 18 countries, and the Cutty Sark Committee are expecting almost a million visitors over the period, it will be a big thing down there.

Their station will be run from July 1 for 28 days, under the callsign GB2TSR and should be great fun to run and take part in. The station will be from a caravan in the lower park of the British Legion, Hamilton Terrace, Milford Haven.

They would like as many contacts as possible on all bands and modes. So, give them a call on the air, or if you are in the area, please call in. They are hoping for a good QSL card, sponsored by the Preseli District Tourist Council and Dowty Precision Seals, which is being negotiated.

For any more information, but please not about reservations, etc., write to:  
**Paul Delaney  
GW0HPQ  
67 Haven Drive  
Milford Haven  
Pembrokeshire  
Wales SA73 3HW.**



## World Record on NTL Tower

The world abseiling record was broken on May 8 at the National Transcommunications Emley Moor television tower in West Yorkshire, Britain's tallest self-supporting structure. After months of preparations by two outdoor pursuits professionals, Phil Barber (31) and David Griffiths (28), took less than five minutes to abseil 267m in front of Yorkshire TV's live cameras, courtesy of NTL's transmissions going out above their heads. The previous record was for a descent of 259m at the Drax power station in November 1989. They will now take their place, along with the tower itself, in the *Guinness Book of Records*.

An attempt the previous week was abandoned at the last minute due to the wind speed rising above safe limits, but during the successful attempt conditions were perfect, with only a light breeze in the evening sunshine. Afterwards, Phil Barber admitted feeling 'almost suicidal going over the edge of the balcony into the unknown'. But the stringent safety arrangements left no doubts that the pair would live to tell the tale.

The abseilers celebrated their achievement with champagne, courtesy of the tower owner, National Transcommunications, and the transmission company also presented a cheque for £500 to the local representative of the NSPCC charity.

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

## Battle of the Somme

The 75th anniversary of the Battle of the Somme occurs on June 30 to July 2. The Bedford & District ARC are planning to operate a special event station during this period from Kempston Barracks, Bedford, with the callsign GB75SOM.

Visiting operators will be especially welcome during this time. Depending on conditions they hope to operate mainly on the h.f. band in c.w., s.s.b., AMTOR and PACKET radio.

## 50th Anniversary

RAF Cardington in Bedfordshire will be the setting for the 50th anniversary celebrations by the 134 Bedford Squadron Air Training Corps on 14 July 1991. Bedford & District ARC are planning to operate a special event station for this anniversary.

The callsign GB50ATC will be used on the 3.5 and 7MHz bands.

## Amateur Radio Motorcycling Association

Martin Lynch of the Amateur Radio Exchange Centre in Ealing, is trying to form a register on Motorcycling enthusiasts also involved in amateur radio, either as an operator or a listener.

Days out are planned, with events spread throughout the year. It is hoped that not only will this attract interest from the UK, but due to *PW's* world-wide distribution, overseas visitors may also participate.

A joining fee of £2 would be appreciated, just to cover administration, etc.

**Martin Lynch G4HKS  
The Amateur Radio  
Exchange Centre  
286 Northfield  
Avenue, Ealing  
London W5 4UB.**

## Twinning Link With Appeal

Trowbridge & District ARC are staging a special event station for three days in July and hope to make 1991 contacts, using the callsign GX2BQY.

As part of the West Wiltshire '91 Trade & Commerce Exhibition, at Court Mills Centre, Polebarn Road, Trowbridge, members of the public are more than welcome to see the radio station in action on July 11, 12 and 13, both on h.f. and v.h.f.

As well as complementing the exhibition, the club hope that contacts will be sponsored with the money going towards the £50 000 needed to provide a £250 000 dedicated music centre in West Wiltshire for young musicians.

A special QSL card will be available via G2BQY, also the event will promote the aims of the Novice Licence and project YEAR.

More information, if required, from **Ian Carter on (0380) 830383.**

## WAB News

The Worked All Britain Awards Group have suggested that readers of PW would like to recommend to their committee a worthy charity related to our hobby which WAB could make a donation.

The WAB Awards Group will be celebrating 25 years in amateur radio in 1993 and aim to organise fund raising activities both on and off the air, and they will be running a lottery which proved very successful during their Guide Dog Appeal. **Steve Bryan G1SGB 99 Greystones Road Whiston Rotherham South Yorkshire S60 4BH. Tel: (0709) 543747.**

# Newsdesk '91

## Stolen Equipment

The following equipment has been stolen from Bury Radio Club:

Yaesu 980 - No. 3E010513

Yaesu 225RD - No. 9H060023

The equipment was purchased by the extremely hard fund raising efforts of the members, and any information regarding this would be greatly appreciated. Contact:

**Harry Hargreaves G4ZSI, Bury Radio Club's Secretary, 7 Harwood Walk, Tottington, Bury BL8 3NT. Tel: (0204) 886506.**

## Junk Sale

The Huntingdonshire ARS 1991 Junk Sale will be held at The Medway Centre, Coneygear road, Huntingdon, Cambs, on 26 August 1991. Doors open 10am to 4pm. Food and drink available all day. Talk-in on v.h.f.-S22, u.h.f.-GB30V repeater on 433.125 RB5.

There will be a selection of trade stands, with junk, components, antenna bits and NiCads, together with a Bring & Buy.

Tables and boot pitches will be available on the day subject to space at a cost of £6, and in advance £5.

Contacts or queries to: G1YVS on (0860) 433891 or (0733) 241109 evenings, G8LRS on (0480) 456772 evenings, G7DIU on (0480) 431333, G0JLQ on (0480) 454858.

## Radio & Computer Fair

Sussex Amateur Radio & Computer Fair will be held on Sunday July 14, 10.30am to 4pm, at Brighton Racecourse. Trade stands, Bring & Buy, picnic area, refreshments, car park, free shuttle to Brighton sea front. Details from **Barry Parkes on (0273) 501100.**

## Special Event Station

Mrs Gail Stevens is organising a special event station to demonstrate the fascinating hobby of amateur radio, to the girls (ages 11 to 18 years), parents and visitors at a Grand Fete at Helenswood School, in Hastings, on 14 July 1991. The station will be QRV on Saturday 13 July 1991.

They shall be using the Hastings Electronics and Radio Club's callsign GX6HH/P so that the girls may pass greeting messages across the world.

Gail would be interested to hear from any amateurs worldwide with a view to arranging skeds, maybe with other schools or perhaps with the various towns named 'Hastings' around the world, although anyone is welcome to join in the fun.

The girls will be designing their own unique QSL card which will be sent for each contact. All QSLs to be sent via G0GRK.

Any contact with GX6HH/P will count as 2 points towards the 1066 Award. Gail may also be able to arrange for other local stations to be 'on air' to enable the award to be completed.

All enquiries should be addressed to: **Mrs Gail Stevens G0GRK 33 Langham Road Hastings East Sussex TN34 2JE.**

## New 144MHz AKD Mobile Transceiver

AKD are proud to announce the launch of their very own 144MHz f.m. mobile transceiver. Manufactured in their factory in Stevenage, this competitively priced, no fuss, British designed unit, is supported by the usual AKD two year warranty.

Ideal for the beginner and enthusiast alike, the rig costs £193.75 inc VAT.

The company are also launching their new h.f. wavemeter, the WA3, following successful field trials undertaken by a friendly, local amateur club.

**Unit 5 Parsons Green Estate Boulton Road Stevenage Herts SG1 4QG.**

## Auction of Surplus Equipment

On June 22, The University of Surrey Electronics & Amateur Radio Society will be holding an auction of surplus and second-hand test equipment, computer equipment, etc. To be held at the Lecture Theatre L, University of Surrey, Guildford, starting at 12 to 4pm.

Information can also be obtained over packet network from G7GIJ @ GB3UPZ.

**James Barnett, Chairman Univ. of Surrey E&ARS, Electronic Eng Dept. University of Surrey, Guildford, Surrey GU2 5XH.**

## Fastnet Rock Lighthouse

Final arrangements have been completed for the first expedition to Fastnet Rock Lighthouse off the South coast of Ireland in July 1991.

The callsign EJ7FRL is to be used for this expedition.

The IOTA reference number is EU-121 which results from revisions to the IOTA directory and which applies for the new group, Irish Coastal Islands. The QSL address is via EI2BB call book address or bureau.

Preferred frequencies are: s.s.b. 1.8, 3.775, 7.075, 14.140, 14.240, 21.275, 28.450MHz and WARC bands and 144.260.

The c.w. frequencies are: 10kHz up on 3.5 and 7MHz; 10kHz and 30kHz up on 14, 21 and 28MHz and 144.040MHz.

Weather permitting, the group will land on Fastnet by helicopter on July 9 and leave the Rock ten days later on July 19.

This is the first expedition to Fastnet and may be the only one for which permission will be granted, and they hope to provide as many people as possible with a chance to work ECHO JULIET SEVEN FASTNET ROCK LIGHTHOUSE.

For further information, contact: **EI3GU 31 Seaview Park Shankill Co. Dublin Ireland**

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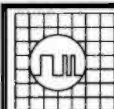
**CLARK SCAM HEAVY DUTY 70' TELESCOPIC PNEUMATIC MASTS** Retracted 13'5" Head load 90lbs with or without legs + erecting kit + handbook .....£500 - £800**TEXSCAN CATV SET TOP CONVERTOR** Tuner FX range 54MHz - 450MHz output on channel 48 UHF-PAL-Synthesiser controlled - keypad or IR remote controller **brand new & boxed** with circuits & information. Not tested. ....£20 or two for £30 IR Control £5**RACAL MA4204 ENCRYPTION UNIT** (Speech or data security scrambling) for use with HF-VHF or field telephone equipment. Solid state. Alloy air sealed case - 12V DC supply - each unit can send or receive - but two must be used one to receive the other for sending both switched to the same number selectable from rotary switches on the front panel 512 operating codes available - **Brand new with book** .....£150 or two for £275 or four for £500**RACAL MA4230 - MA4231 AUTOMATIC MORSE RECEIVING AND SENDING SYSTEM. MA4230 AUTOMATIC MORSE SENDER** - Small solid state unit incorporates a full alphanumeric keyboard for entering messages which can be sent immediately or stored for 30 days. Output is in Morse code 10 to 20 wpm or 8 to 16 times this speed. Internal storage of up to 1000 characters etc., contained in small alloy airtight case with book. **Brand new. MA4231 AUTOMATIC MORSE READER** Self contained - receives Morse code from above unit or radio audio output at up to 160 words per minute, by hand or automatic - stores up to 912 characters - readout on unit - letter by letter - -LED display or printer VDU etc., many adjustable speeds ASC11 or Baudot. Power 11-30V DC or AC mains by MA4232 power unit with book - MA4230 + MA4231 + battery charger + line adaptor & book. Not tested. Internal battery (NICAD) may need replacing due to storage. **Brand new** .....£100**AS ABOVE BUT ARABIC NOT ENGLISH** But supplied with kit to convert to English - new keyboard cover + proms + book. Line adaptor - **Brand new** .....£50**MARCONI TF2008 SIGNAL GENERATORS 10KC/S TO 510MC/S** AM/FM or sweep output. Complete with book. Not tested - as they come from the pile - will have small faults - as received MOD hence clearance price. £250 each. Front panel protected with metal cover therefore fair condition. Wooden kit box of leads etc. ....£25**ARMY TYPE MORSE KEYS** Large quantity available. ....£5 ea**ARMY WHIP AERIALS AND BASE** 12' or 16' - NEW .....£20 - £25

Small selection only listed. Export trade &amp; quantity discounts price is Ex-works. SAE all enquiries. Phone for appointment or for demonstration of any item, availability or price change. VAT and carriage extra.

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73 John G3TLU.

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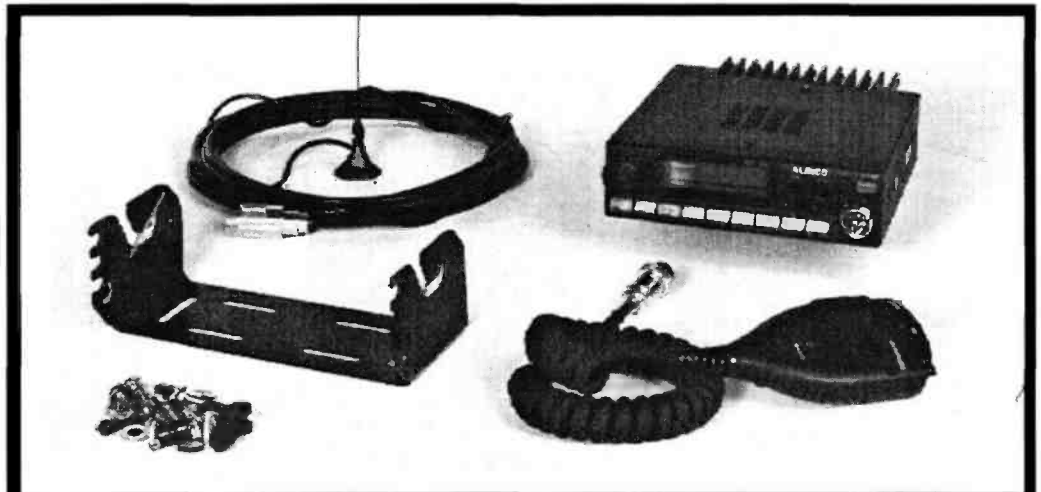
*A La Carte Menu**Main Course*The "MENU" at **MARTIN LYNCH** is always plentiful, (SEND FOR YOUR FREE USED EQUIPMENT LIST AND SEE HUNDREDS OF MOUTH-WATERING GUARANTEED ITEMS), the presentation is always excellent along with courteous, knowledgeable and **LICENSED STAFF**. Even the **COFFEE** is freshly percolated and we do not charge for the biscuits!You may also have noticed the latest addition to the "authorised" dealerships, listed above. I am proud to say that Lowe Electronics have authorised **MARTIN LYNCH** to sell the excellent **Kenwood** brand. This includes the **TS850S**, (more rare than a fillet steak in a vegetarian restaurant), along with all the rest of the product range. Call in today for your **KENWOOD** requirements.*Choose From Our Tempting Range of  
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# PW Special Offer

Here's a treat for readers - An Alinco 144MHz Mobile Transceiver For £249 including p&p!

Save £26 on normal price of package deal.

The mobile operating season's here! Why don't you treat yourself to a new rig and take advantage of our July special offer. Just look at what you get for your money:



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The Alinco DR112 144MHz transceiver + Microphone + Mounting Kit + Low Profile Magnetic Mount Antenna.

The rig features: Easy-to-use and simply laid-out front panel controls, clear, easy-read tuning and control display, small physical profile for easy fitting in the car, 25W r.f. (high) output 5W (low) output and a low power consumption, dual-conversion receiver providing 2W of audio output. On the transmitting side the rig comes complete with electret microphone and all the facilities required to get you 'up and running' on 144MHz, whether it be for simplex or repeater operation.

Come on, join the fun and don't be stuck in that hot shack - go mobile with the *PW* July special offer!

## HOW TO ORDER

Complete both coupons in ink, giving your name and address clearly in block capitals. Coupon 2 will be used as the address label to despatch your transceiver to you. Send the coupons with your cheque to: *Practical Wireless*, Transceiver Offer (July), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP. If you wish to pay by credit card (Access, Mastercard, Eurocard or Visa only), please fill in your card details and sign the coupon where indicated. Available to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands, the Isle of Man and BPO addresses. Orders are normally despatched within 28 days, but please allow time for carriage.  
**The closing date for this offer is 10 July 1991.**

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**PW JULY 1991  
TRANSCEIVER  
OFFER**

## The AKD 2001 144MHz Transceiver

*Richard Ayley G6AKG believes that the simple to operate and well made AKD 144MHz f.m. transceiver could become something of a standard. Read on and see what you think.*



I know that I certainly yearn for the simple life, so the hobby can return to the 'hands-on' experience it once was. That's why I was so keen to review this new transceiver from AKD. It looked easy to operate with its handsome and simple front panel, while still retaining its versatility for the minimum number of 'bells and whistles'.

After removing the four case-fixing screws, I looked in amazement at the beautifully laid out p.c.b., with its interesting array of components. I felt sure the p.c.b. must be made abroad and boxed in this country.

To confirm this I called AKD and spoke to their Technical adviser, John Armstrong G8MVH. John assured me that the 2001 was a 100% British product designed by AKD, and manufactured at their factory in Stevenage.

### Under The Bonnet

With the outer case removed, the first thing to catch my eye on the p.c.b. was the enormous outline of the 40-pin d.i.l. package of a 6802 microprocessor and its attendant 28-pin EPROM. I'm no expert, but I found this choice of chip a little strange knowing from personal experience how noisy, from an EMC (Electromagnetic Compatibility) point of view, this processor can be. There seemed to be no logical reason for putting this device into the circuitry of a sensitive radio transceiver. However, as I later discovered, my fears were unfounded.

As AKD pointed out, there are many advantages to using this microprocessor. For one thing it's cheap, and the other is, that with all its surplus processing power you can get it to do all sorts of other things, besides loading the divide data into the synthesiser chip.

The processor can generate the tone burst for example. To take this further, you can get it to generate all the tones for accessing private repeaters or selcall activated stations. It means in simple terms, that for a little extra cost lots of software add-ons can be put into the basic transceiver.

### The Synthesiser

The synthesiser chip is a Plessey device which is loaded serially with data from the microprocessor. The receiver is a fairly standard type dual-conversion superhet with the first i.f. being 10.7MHz and the second 455kHz.

The front-end device is a dual-gate m.o.s.f.e.t., as is the mixer. Most of the receiver gain, plus

demodulation and squelch circuitry is provided by the excellent Motorola MC3357 chip, which makes frequent appearances in a large number of transceivers these days.

### Preliminary Manual

Unfortunately, the rig was so new it only had a preliminary manual, without the circuit diagram. This prevents me from going into any detail about the transmitter. Despite this, I'm glad to say that the p.a. stage uses discreet components, unlike some which use the very expensive-to-replace modules. The review transceiver on my set-up at home produced a very healthy 25W into 50Ω at 3.75A input on a 13.8V supply.

### Physical Design.

On the clean and uncluttered front panel, next to the mylar-coned speaker, is the channel display which is configured with two green, seven segment l.e.d. displays. The channels are arranged in a logical manner so that '00' equals R0 up to '07' which equals, you guessed it, R7.

The simplex channels then follow on from '08' to '23', on 'switch-on' the rig powers up on channel '20', the calling frequency S20. If you need it, AKD can provide an alternative EPROM that powers the transceiver up on a preferred packet operating frequency for unattended operation.

The multi-mode section of the band is held on channels '24' to '43' consecutively. Channels '44' to '51' cover from 145.8 to 145.975, while in '60' to '67' and '70' to '77' give you the option of re-using those repeater input and output frequencies not used in your area, for simplex operation. Reverse repeater operation is catered for on channels '90' to '97', and all channel steps are in 25kHz.

### Channel Selection

Channels are selected by using one of three push-to-make buttons located below the display, with the left and right buttons activating the up and down channel selection. These are single-shot, or repetitive in operation when held down. The full channel compliment can be scanned through in approximately eight seconds. Listen on input, for repeater use, is covered with depression of the third, centre button, and this only functions when a standard repeater channel has been called up.

The only rotary controls on the front panel are the squelch and volume. The squelch is what I term as hard, as it's either open or closed. The control exhibits quite a large amount of hysteresis, and this takes some getting used to for its most sensitive setting.

Below the two rotary controls are the 'on-off' and 'high-low' power switches. These are miniature toggle switches and they're very easy to operate. The 2001 has two power settings of 25W and 5W, the low power setting being ideal for packet operation, while 25W is just right for local mobile working even with a modest antenna.

The microphone supplied is a fairly ordinary medium impedance dynamic type. One of the four microphone pins is fed with pre-volume control, low level audio. While this is OK for packet operation, it's not so good for driving a low impedance inserts as used in most headsets.

### Mobile Working

When I first tried the AKD 2001 mobile, I was struck by the transceiver's sensitivity. It seemed streets ahead of my hotted up ex-p.m.r. rig. I could hear our local repeater at almost twice the distance obtained on my own rig using just a 1/4λ antenna. The audio reproduction on receive was good, although the outer case resonated a little on some of the more processed signals.

Operation of the transceiver while mobile was easy. All the controls are well spaced and logically laid out. The only slight problem encountered, was a tendency to overshoot the channel I was trying to set. I'd prefer something more tactile, possibly a click-stop switch for channel selection.

When working simplex, the audio reports were good, although my local repeater kept telling me that the rig's deviation was a bit on the thin side. I had to 'talk up' enough audio to hold the repeater open. There is an internal preset deviation control to tweak if you run into this situation. However, to be fair, our local repeater is regarded as being too fussy with regards to audio quality.

### Base Station

As a base station transceiver the 2001 gave a good account of itself. However, in the quiet of my shack, one or two internally generated spurious emissions were detected. These were of such a low level that the only time I noticed them, was with the squelch set to its most sensitive point during a quick sift through the channels. No apparent degradation in signal-to-noise ratio was detected on the few channels effected.

If there's one improvement I'd make to the 2001, it would be to remove the low-level audio on the microphone socket. I'd re-route it to a 5-pin DIN socket on the rear panel, along with the p.t.t. and audio input lines. This modification, along with the EPROM for packet channel power-up would increase versatility.

If the fourth pin on the microphone socket was fed via a 100Ω resistor from the speaker, the output would drive a low impedance headset insert. With these modifications the transceiver would be attractive to packet and mobile devotees. Having said that, it doesn't mean I wouldn't buy a 2001 for my car. The rig is so simply laid out, that the modifications could be done by even a comparatively inexperienced amateur.

### The Package

The AKD 2001 transceiver comes with a microphone, manual and a two year warranty, for £193.75 including VAT. I spoke to AKD about modifications and they state that the warranty will be honoured as long as any modification has not contributed to the failure of the equipment. I think this is pretty amazing when compared to the hard-nosed approach to the honouring of warranty claims by many manufacturers. PW

### Summing Up

From the time I unpacked the 2001, I felt at home with the rig. The use of easy-to-obtain components, along with the high standard of construction, provide the feeling the rig will be around for many years to come. The uncluttered lay-out of the controls and their 'KISS' operation made the transceiver refreshingly simple to use. All in all, these features add up to a transceiver that should appeal to both enthusiasts and beginners alike.

The price and specification of the 2001 will make it a hard act to follow. It's quite likely that this rig could become something of a standard. The transceiver got my vote anyway, now all I need to do is convince the XYL I need one!

### Future Developments

Updated EPROMs with features like, customer selectable packet channel power-up will be available by the time you read this review. The other exciting piece of news to come from AKD is that they intend to market 70 and 50MHz versions of this transceiver very soon.

My thanks to AKD for the loan of the review transceiver and the co-operation of their Technical Adviser John Armstrong. Finally - I can tell you that I'm looking forward to reviewing the 70MHz version of this transceiver.

# REVIEW

### Provisional Manufacturer's Specifications

#### General

Modulation	F3E
Frequency Range	144-146MHz
Supply Voltage	13.2V ±10%
Channel Spacing	25kHz
Speaker	80mm internal
Operating Temp. Range	-10 to 50°C
Frequency Stability	10ppm over -10 to 50°C

#### Transmitter

RF Output (High)	25W (Supply Current 4A)
RF Output (Low)	5W (Supply Current 2A)
Conducted Harmonic Content	1mW
Audio Distortion	3%
Audio Response	6dB/Octave from 300Hz to 3kHz
Deviation	4kHz
Tone Burst	0.5s of 1750 ±2Hz

#### Receiver

Sensitivity	Better than 0.3µV for 12dB SINAD
Adjacent Channel Sensitivity	-60dB (Relative to wanted signal)
Image Response	-70dB (Relative to wanted signal)
Audio Response	6dB/Octave De-emphasis over 300Hz to 3kHz
Audio Output	2W

**Yaesu**

FT1000	HF Transceiver	2995.00 (10.00)
FT980	NEW HF Transceiver	P.O.A.
FT767	HF Transceiver	1699.00 (10.00)
FEK767(2)	2m Module (767)	182.89 (4.00)
FEK767(10)	70cm Module (767)	228.89 (4.00)
SP767	6m Module (767)	182.89 (4.00)
FT747GX	Speaker HF Transceiver	71.47 (4.00)
FT767GX	Mini HF Transceiver	999.00 (10.00)
FP700	20A P.S.U.	223.76 (8.00)
PC700	Manual ATU	181.24 (8.00)
FP767HD	Heavy Duty 2m P.S.U.	394.37 (8.00)
FA814R	Remote Aerial Switch	81.74 (4.00)
FT736	2/70cm 4B/39W Base Stn.	1368.00 (10.00)
FT5200	2m/70cm Dual Band FM Mobile	639.00 (10.00)
FT290MkII	MkII Super 280 2m Multimode 2.5W	428.00 (8.00)
FT690MkII	MkII 6m M/Mode 2.5W	428.00 (8.00)
FL202B	25W Linear	117.80 (3.00)
FL500	5m 10W Linear	111.37 (3.00)
FT212RH	NEW 2m 48W FM Mobile	Special 329.00 (8.00)
YHA15	2m Helical	8.68 (2.50)
YHA44D	70cm J wave	12.77 (2.50)
MMH15	Mobile ATU	14.95 (2.50)
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FT811	70cm H/H Keyboard	Special Price (4.00)
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FT23R	2m Mini Keyer	Special Price (4.00)
FT73R	70cm Mini H/H	Special Price (4.00)
FT28	NEW 2m H/Held	P.O.A.
FT78	NEW 70cm H/Held	P.O.A.
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FN810	Nicad Battery Pack (23/73)	35.20 (2.50)
FN811	Nicad Battery Pack (23/73)	39.33 (2.50)
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SMC28	Charger (23/73) 13A Plug	18.09 (2.50)
NC28	Charger (23/73)	18.09 (2.50)
NC29	Base Charger (23/73)	70.50 (4.00)
PA8	Car Adapt. Charger (23/73)	24.85 (2.50)
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FRG900M	Speaker Mic Miniature (23/73/72)	620.00 (10.00)
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PA3	Car Adapter/Charger	22.33 (2.50)
YM24A	Speaker Mike	36.19 (2.50)
FRG860	HF Receiver	646.00 (10.00)
FRV860	Converter 118-176 for above	102.18 (4.00)
FR7700	RX ATU	80.28 (3.00)
MM18B	Hand 600 Spin mic	21.46 (3.00)
MD12C	Desk 600 Spin mic	96.96 (3.00)
MF1A3B	Boom mobile mic	28.54 (3.00)
YH77	Lightweight phones	20.42 (3.00)
YH55	Padded phones	20.42 (3.00)
YH1	L/weight Mobile H/ant Boom mic	29.38 (3.00)
SB10	FTT Switch Box 270/2700	22.48 (2.50)

**Antennas**

D8C770	70-700MHz RX Discone	26.50 (8.00)
D130	2B-1300MHz Discone	79.84 (8.00)
Jaybeam	TB3 MkII 3m HF Tribander	403.10 (10.00)
Creative	CD31B J4 4e HF Tribander	308.00 (10.00)
Creative	CD31B 4e HF Tribander	367.00 (10.00)
CPV65	2m Coilover	46.45 (8.00)
WX1	2m/70cm Base Fibre Glass	80.28 (3.00)
WX2	2/70cm Base Fibre Glass	78.65 (8.00)
WX4	2/70cm Base Fibre Glass	101.16 (8.00)
CF416MH	2m/70cm Duplexer	28.00 (4.00)
OSTDHP	10/80m trapped dipole	86.75 (8.00)

**ICOM**

IC785	HF Transceiver	2550.00 (10.00)
IC781A	HF Transceiver	1635.00 (10.00)
IC735	HF Transceiver	1000.00 (10.00)
IC728	HF/Bm base str.	1015.00 (10.00)
IC728	HF Base Transceiver	779.00 (10.00)
AT150	150W ATA (73B)	335.00 (8.00)
PS69	Ext PSU (73B)	198.00 (8.00)
IC625	50MHz multi-mode portable	639.00 (8.00)
IC229E	NEW 2m 25W FM Mobile	299.00 (8.00)
IC25E	2m New Mini Handheld	279.00 (8.00)
IC278E	2m 25W Base Stn	1090.00 (10.00)
IC45E	70cm H/Held	354.80 (8.00)
W2E	NEW 2m/70cm H/Held	P.O.A.
IC24ET	2m/70cm Dual Band H/Held	385.00 (8.00)
IC480	70cm 10W H/Held	Special price (8.00)
IC2400	2m/70cm FM Dual Band Mobile	649.00 (8.00)
IC3220E	2/70 FM Mobile	610.00 (8.00)
ICR71	Gen Cov RX	875.00 (10.00)
IC7000	VHF/UHF Scanner	1012.00 (10.00)
AH7000	25-1300MHz Discone	64.28 (4.00)
SP3	Ext Speaker	66.39 (4.00)
CK70	DC Cable (R70/R71)	8.18 (2.50)
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GCS	World Clock	76.38 (3.00)
BC35	Desk Charger	38.58 (2.50)
BP83	Empty Battery Case (SE SERIES)	10.75 (2.50)
BP84	Battery Pack 72,1000m AL (SE)	74.03 (3.00)
CP12	12V Cigar Lead (SE SERIES)	12.72 (2.50)
DC1	DC/DC converter operates from 12V	18.40 (2.50)
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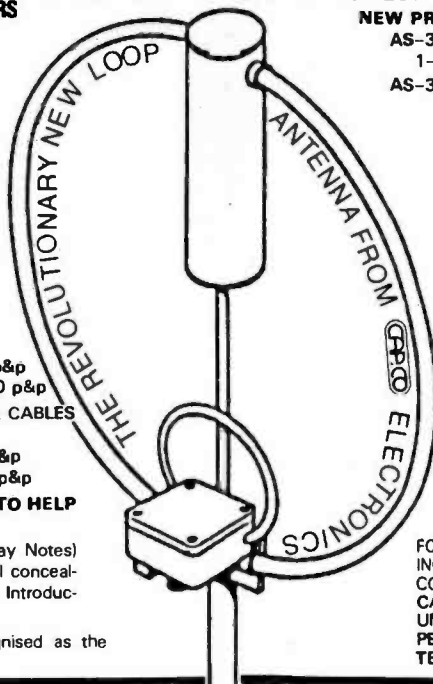
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# A Three Element Portable 144MHz Beam Antenna

*Do you live at a poor v.h.f. site? If so, Kevin James G6VNT suggests that you try portable operation from your local 'high spot', using his lightweight beam antenna design to work that elusive 144MHz DX.*

I've had many memorable contacts with this antenna design over the years, and thought it would interest others with a liking for home construction. Contacts into the continent have been obtained with ease, under favourable conditions, using only a modest 25W.

The design is a narrow band 3-element Yagi antenna, which is omega matched for ease of tuning, good s.w.r. and high gain. In theory a 3-element yagi yields about 8.5dBd of gain, but you can never achieve this in actual practice, due to various losses in matching, etc. My design was made narrow band, to obtain maximum gain, and was tuned for the s.s.b. portion of the 144MHz band.

Many hours of tests, which were carried out over a period of several months, took place before I was satisfied that it was not possible to squeeze any more gain out of three elements.

## Construction Details

You should refer to Fig. 1 for the basic design lengths. The antenna boom consists of 740mm of 15mm square hollow aluminium tubing. This tubing has standard end caps and is the same type used on many broadcast TV and v.h.f. f.m. radio antennas.

The elements were made from 8mm diameter hollow tube, with the ends flattened about 8mm in from the outer ends. This stops them whistling in the wind!

When you're making the antenna, the elements can be mounted on standard black mounting blocks for 15mm square tube. These are bolted on with 25mm long 4BA screws and nuts.

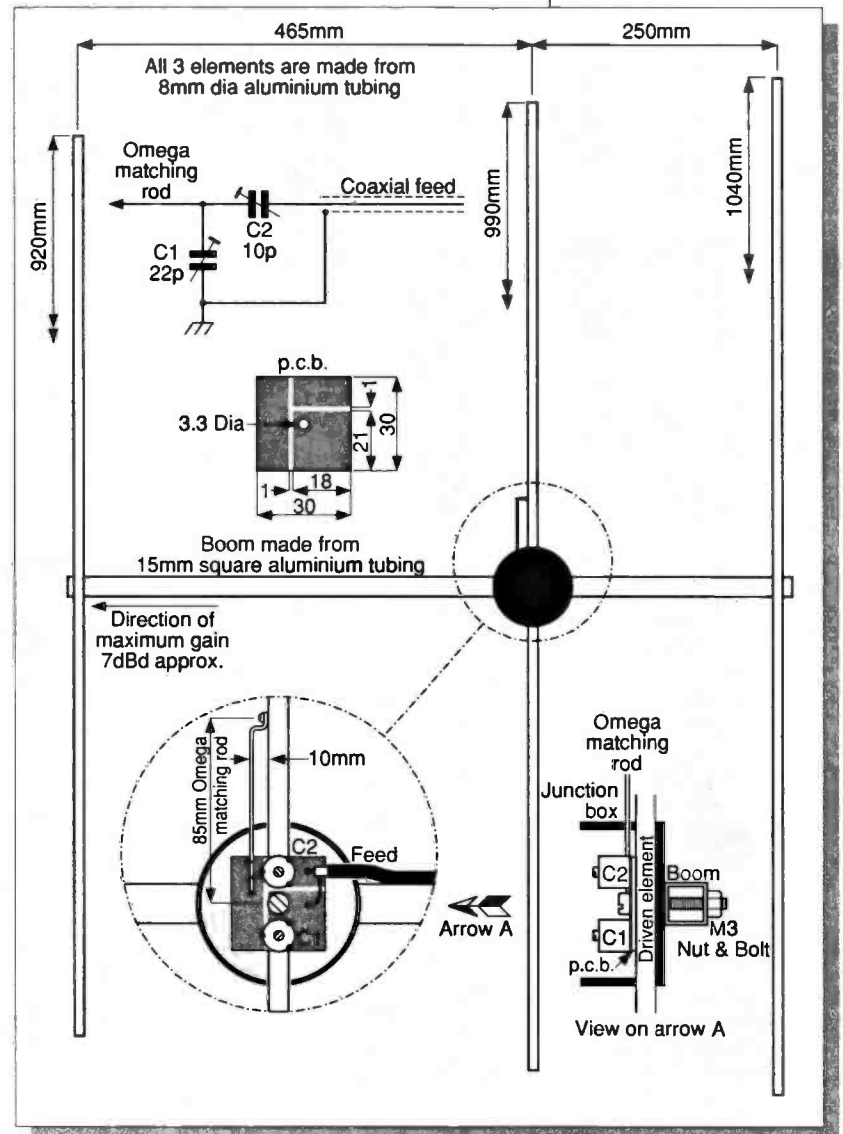
When blocks have not been available, I've filed a groove across the boom to stop the elements rotating. This can stop problems occurring especially if they are accidentally knocked when the antenna is being hoisted aloft. It doesn't appear to have affected the performance in any of the antennas I've made.

## Making The Connection

A small p.c.b. inside a waterproof junction box matches the 4.7m length of RG-58 coaxial feeder to the driven element. The p.c.b. circuit is shown in Fig. 2, and the component placement diagram is shown in Fig. 3.

The omega match was chosen because it will provide a 1:1 s.w.r. when it's adjusted correctly. It also saves having to mess around altering the length of the omega wire to obtain a good match.

The wire is deliberately made short, and increasing the capacity of capacitor C2 effectively lengthens the omega wire, (or shortens it, if the capacity is reduced). This makes the antenna very easy to adjust, if slightly different materials are used in construction



**Fig. 1: The 144MHz beam antenna with insets showing matching, p.c.b., connection, layout and constructional details.**

to what I've specified. All the materials can be obtained on antenna stands at most of the mobile rallies. I actually bought mine from a local TV aerial manufacturer in the Bristol area.

## The Board

The p.c.b. is made from 1.6mm single-sided glass fibre board, 30mm square. As many of you'll already know, p.c.b.s can be made in a variety of ways. One simple method is to cover the copper foil side with masking or drafting tape. You should then cut away fine strips where you don't want copper to remain after the etching process. A scalpel or modelling knife is best for this, and don't forget to take care so as to avoid cutting yourself!

The board is then dropped into a small jar of ferric chloride solution and allowed to etch for about 15 minutes with occasional careful agitation. Take care when you agitate the solution, it can stain you and your clothing and it's toxic.

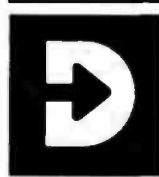
When the process is completed, you can peel the

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tape off and hey presto, one printed circuit! This method is only suitable for simple p.c.b.s such as this, but it's very quick and easy. The full p.c.b. details are shown in the inset in Fig. 1.

A cross section through the junction box is shown, and as can be seen, one screw secures the p.c.b., the element and junction box to the boom. **Make sure that the element centre is in contact with the screw**, as this should ground it to the boom at this point. The physical sizes are not absolutely critical for the p.c.b. layout, so different junction boxes can be utilised.

### Setting-Up

To set up the antenna you should mount the assembly on a 1.5m pole with its junction box cover removed, and away from metal obstacles such as cars! Next, arm yourself with a plastic knitting needle filed to a screwdriver edge and stand behind the reflector element.

Once in this position you can alternately adjust C1 and C2, until the lowest s.w.r. is obtained. Before you begin this operation, ensure that the omega wire is about 10mm away from the driven element, until the point where it is connected with a solder tag and screw.

### Cable Points

One point to remember is that it's not advisable to use a length of RG-58 any longer than about 4m, as the loss in the feeder becomes objectionable. The alternative RG8 cable was not used as it's so thick it does not bend easily, particularly in cold weather. It's not so easy to thread in and out of car doors or windows either. Using this cable would defeat the convenience

and portability of the antenna.

Don't run high power through this antenna, unless you change the type of trimmer capacitors used. A heavy duty compression type with ceramic base with high quality insulation, able to work at higher voltages is required for higher power use.

### Better Results

The antenna gave notably better results than a HB9CV, it also had a very reasonable null on the rear. With an S-9+ signal in the front, swinging the antenna round gave less than S-1 on the rear. When pointed at a constant signal source, approximately 17m away, an S-5+ reading was obtained, as opposed to an S-4 from the HB9CV.

I hope that other readers will have as many happy hours, and memorable contacts, from this relatively compact and simple antenna as I had! I wish you good 144MHz DX next time you work portable. **PW**

**How Much? Approximately £10**  
**How Difficult? Intermediate**

### Shopping List

Lengths of 8mm aluminium tubing (see text), length of 15mm square section aluminium tubing (ex TV or v.h.f. radio antenna, see text), plastics junction box, p.c.b. material, masking tape, coaxial cable, trimmer capacitors, wire for omega matching rod, sealant, nuts and bolts.

# Radio Diary

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

**June 16:** Denby Dale & District ARS have their Rally at Salendine Nook High School, Huddersfield. Open 11am until 4pm. Same venue as last year. **J. D. Chappell at 221 Huddersfield Road, Shelley, Huddersfield HD8 8LJ.**

**\*June 30:** The 34th Annual Longleat Rally will be held, as usual, at Longleat House, Warminster, Wilts. **Sheun O'Sullivan G8VPG. Tel: (0225) 873098.**

**\*July 5:** Woburn rally.

**July 7:** The York Radio Rally will be held in the Tattersall Building, York Racecourse, Knavesmire, York. Doors open at 11am, entrance fee 50p and there's ample free parking. Attractions include amateur radio, electronics and computer traders, arts and crafts, Morse Testing, a licenced bar and cafe. Talk-in on S22. **Dave G7FGA. Tel: York (0904) 790079.**

**July 7:** Kings Lynn ARC present the Great Eastern rally at The Corn Exchange, Tuesday Market Place. Open 10am, entry £1, free parking, Bring & Buy, licenced bar, refreshments. Talk-in S22. **Derek Franklin G0MQL, Laurel Farm, 7 Holly Close, West Winch, Kings Lynn, Norfolk PE33 0PW.**

**\*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: (0672) 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 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 G3SZJ, 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 G60UN. Tel: (0202) 479038.**

**August 18:** The West Manchester Radio Club's 'Red Rose Rally' will be held at the Bolton Sports & Exhibition Centre, Silveawell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. All at pavement level, with facilities for the disabled. Refreshments available all day and bar. Doors open at 10.30am for disabled and 11am for the general public. Admission £1, children free. **Dave G110D 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-ins on S22. Approach roads will be signposted. **Ooris Thompson on (0268) 552606.**

**\*September 8:** the Lincoln Hamfest will be held at the Exhibition Centre, Lincolnshire Showground. Doors open 10.30am to 5.30pm (10am disabled). **Sue Middleton, 14 Toronto Street, Lincoln LN2 5NN.**

# The PW Robin Frequency Counter Part 1



Mike Rowe G8JVE developed the PW Robin as the replacement for his elderly frequency counter. Mike now shows you how to build his wide band, low power design.

My ancient counter used an enormous amount of power, and it struggled to count up to any reasonable frequency. Its replacement, the 'PW Robin', will count up to at least 450MHz with a resolution of 1 or 10Hz depending on the range (the prototype managed up to 900MHz Ed.).

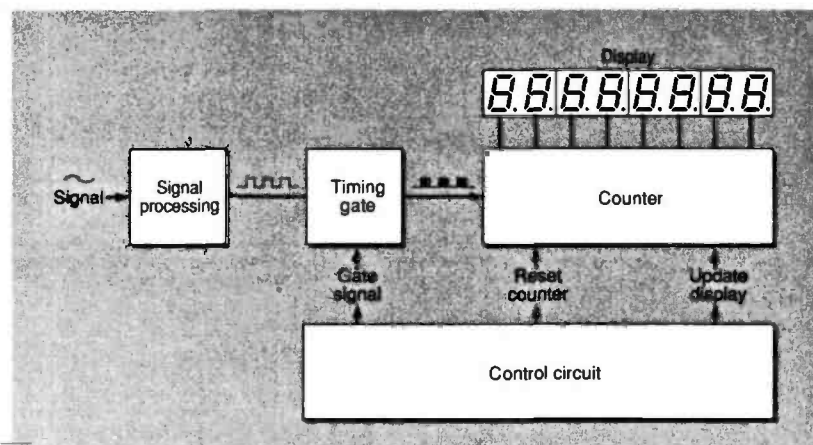
I could have used a complex counter device, such as the 7216 as the heart of my new instrument. However, after some consideration I decided to use individual i.c.s for several reasons:

- (a) They're much cheaper.
- (b) The minimum frequency is higher (50MHz compared to 10MHz).
- (c) If it goes wrong, probably only one i.c. will need to be replaced, at a much reduced cost. The system is also capable of modification. If you only wish to cover the h.f. ranges, simple changes make this possible. Another bonus is, that with the exception of the prescaler chip, none of the i.c.s cost more than £1.

## Basic Counting

If you refer to Fig. 1.1, you'll see that it's a simplified diagram of a frequency counter. Before being counted the incoming signal has to be processed.

Fig. 1: Simplified block diagram of a frequency counter.



This processing involves amplification and clipping so that the signal has a constant amplitude. The process also creates well defined edges to enable accurate counting.

The stream of processed signals is then passed to a timing gate circuit. This gate acts as a 'tap' on the signals. The 'tap' is opened for a known time, allowing signals through. The series of gated signals are then passed on to the counter circuits.

Once they're passed on the total number of pulses is counted. If the gate was opened for one second, and one million pulses were counted, then the frequency is 1MHz (one million cycles per second). If two million were counted, it will be 2MHz and so on. The control circuit acts as the manager of all the various timing pulses, to ensure that the counter control pulses occur in the right order.

## Control Chain

The diagram, Fig. 1.2, shows the control and count circuitry. The control chain derives all the control signals from one crystal frequency. This process begins with integrated circuit IC1, which combines an on-chip oscillator with a  $2^{14}$  (16 384) divider. The oscillator is crystal controlled and runs at 4.194304MHz.

In order to obtain an exact gating period of one second, a frequency of 0.5Hz is required as, only the positive going half-cycle of the clock is used for gating the signals. To obtain the required 0.5Hz, the crystal frequency has to be divided by  $2^{23}$  (8388 608). The oscillator i.c. only divides by  $2^{14}$ , so a further division of  $2^9$  (512) is needed. This extra division is carried out by IC2.

From this point, the 0.5Hz output from the i.c. is split into different paths. The first pathway is into the counter gate (IC4b). The second path is to the counter timebase. This timebase is another c.m.o.s. type device, and it's a dual precision monostable.

Both halves of the device are connected as non-retriggerable monostables. One triggers a pulse of approximately 30ms, by the trailing (falling) edge of the clock pulse. The NOT-Q output on pin 7 is a negative going pulse fed to the latch inputs of the decoder/driver i.c.s. This pulse triggers the second half of IC3, again with an output pulse width of some 30ms. The Q output of this monostable is a positive going pulse, which is then fed to the counter i.c.s resetting them to zero, before beginning the count sequence again. So, after all that, you can see that all the timebase functions are dependent upon satisfactory operation of the clock oscillator.

## Counter Stages

The counter i.c.s are all high-speed c.m.o.s. type 74HC390. This i.c. is a dual decade counter with b.c.d. (binary coded decimal) outputs. They are cascaded to give total count of  $10^8$ . This allows a resolution of 1Hz on the h.f./l.f. inputs and 10Hz on v.h.f./u.h.f.

The b.c.d. outputs feed the decoder/latch/driver i.c.s. These i.c.s (c.m.o.s. type 4511) then drive the four dual seven segment common cathode i.e.d. displays.

## Better Display

The use of the latching inputs ensures a non Practical Wireless, July 1991

blurring display. The count data presented on the b.c.d. input pins, will only be passed to the driver section of the i.c. when the latch input is low.

When the count is proceeding, data is continually changing on the data outputs of the counters. This only ceases to change when the gating signal is removed. At this point the latch pulse is still high. When the first monostable is triggered, the latch line goes momentarily low allowing the data on the inputs to be transferred to the display. This line then goes high again isolating the counters from the decoders. The display is updated every two seconds.

The reset line is a positive going pulse which resets the counters to zero at the end of each counting period. If this isn't done, the counters would display a cumulative total, each count then being added to the value of its predecessor. This pulse must arrive after the latch pulse, if it doesn't, the counter will only display zero.

### Signal Processing

Now we'll carry on by turning to the signal processing and gating circuits shown in Fig. 1.3. You'll see that from the diagram, that the signal gate circuitry uses a pair of quad two input NAND gates. The switching of the h.f./l.f. inputs is entirely automatic and it uses the logic gates of IC6.

To raise the h.f. signals to defined logic levels, an amplifier consisting of TR2-6 is included. The amplifier input is protected by D4/5, with current limiting provided by R5. Isolation is given by the capacitor C13. The bandwidth of this amplifier, incidentally, is from approximately 1-40MHz.

Low frequency signals are processed by the Schmitt trigger pair comprising TR7/8, with TR9 raising the level to the input requirements of IC6a. Overload protection is provided by D6/7, necessary limiting by R18 and suitable isolation by C17. The response of this amplifier extends up to about 1MHz.

On v.h.f./u.h.f. TR1 is a common emitter amplifier driving the Plessey SP8680 pre-scaler device. In this application the i.c. is connected to divide-by-ten.

The inductor, RFC1, in the collector circuit provides a rising h.f. response to the amplifier. To provide overload protection, the input is equipped with diodes D2 and 3, with limiting by R2. Capacity coupling is used at the input of the SP8680 i.c. which has its own internal input biasing circuitry.

### Input Selection

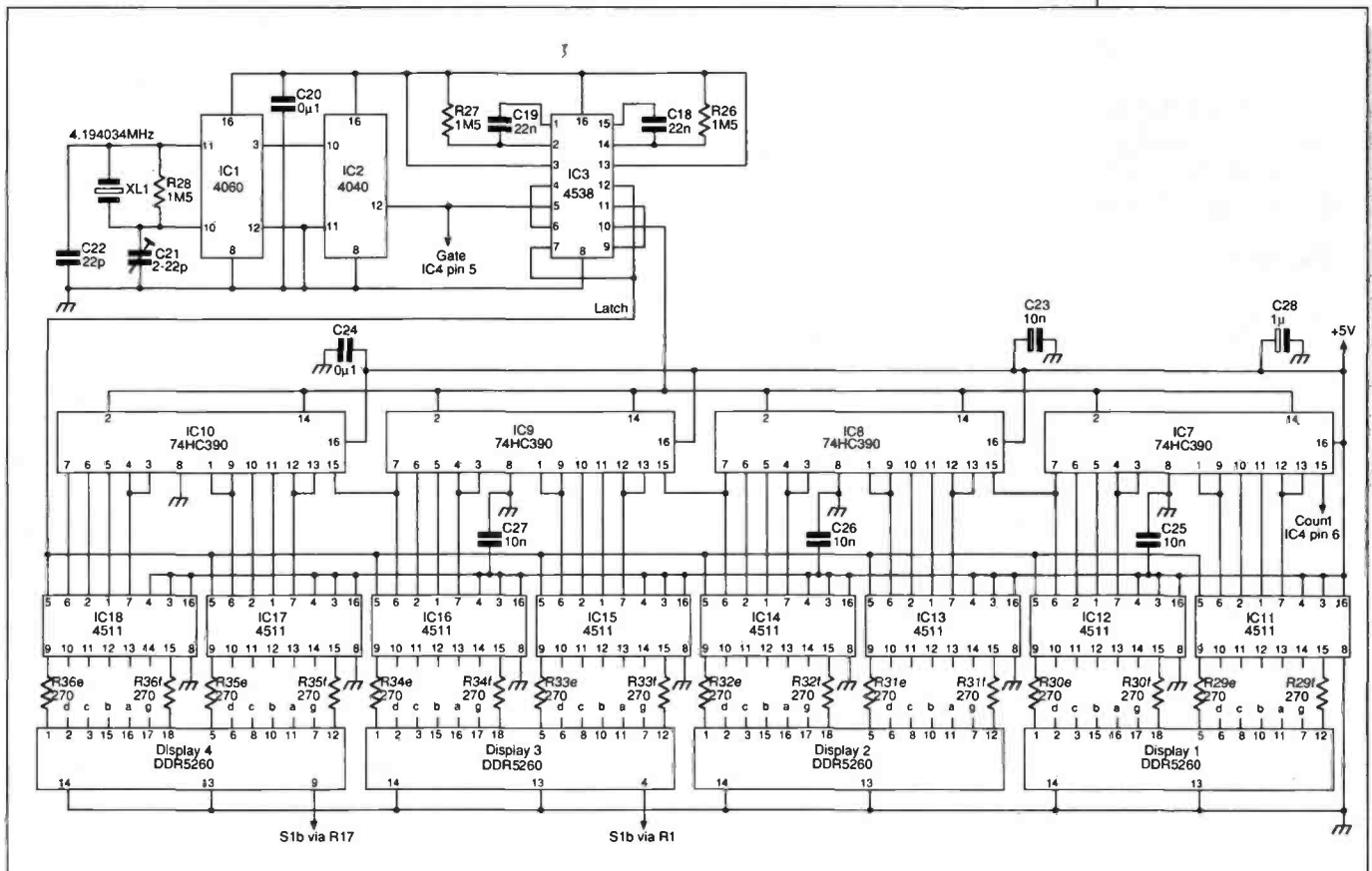
The selection of input and decimal point switching on the display is performed by S1, which is a front panel mounted switch. When the l.f./h.f. range is selected, you can see that the 5V rail is connected to the l.f./h.f. circuitry.

Power is not fed to the pre-scaler circuitry, in order to conserve energy as IC5 consumes over 100mA. The front panel switch S1, a double pole centre-off device, also serves as an on/off switch.

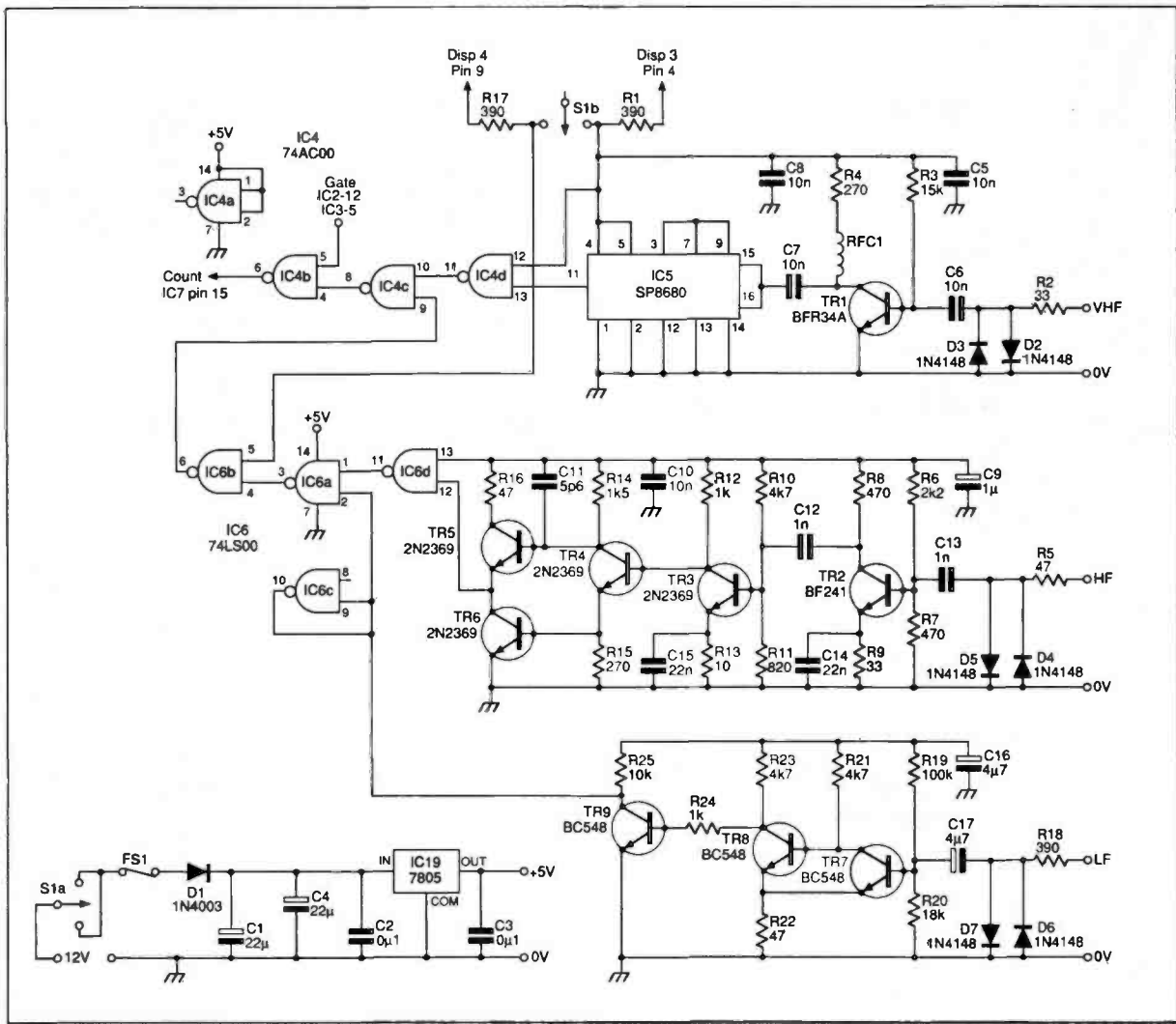
The 5V supply for the counter is derived from a 12V supply. This supply comes via IC19 with C19 and 20 suppressing any tendency to self-oscillation, which is evident with some 7805s. Reverse polarity protection is by D1, with short circuit protection by F1.

Well, that's the basic circuit described. Next time, I'll describe how to build the PW Robin frequency counter.

Fig. 1.2: The Controller/timebase and Counter Circuits.



**Fig. 1.3:**  
The processing circuits for the three frequency bands covered by the PW Robin. Integrated circuits IC4 & 6 form the gate circuits.



*Next month Mike brings the circuits together.*

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47Ω	3	R5, 16, 22
270Ω	58	R4, 15, R29(a-g), R30(a-g), R31(a-g), R32(a-g), R33(a-g), R34(a-g), R35(a-g), R36(a-g)
390Ω	3	R1, 17, 18
470Ω	2	R7, 8
820Ω	1	R11
1kΩ	2	R12, 24
1.5kΩ	1	R14
2.2kΩ	1	R6
4.7kΩ	3	R10, 21, 23
10kΩ	1	R25
15kΩ	1	R3
18kΩ	1	R20
100kΩ	1	R19
1.5MΩ	3	R26, 27, 28

**Capacitors**

Disc Ceramic		
5.6pF	1	C11
22pF	1	C22
22pF	2	C12, 13
1nF	9	C5, 6, 7, 8, 10, 23, 25, 26, 27
10nF	4	C14, 15, 18, 19
22nF	4	C2, 3, 20, 24
0.1μF	4	C2, 3, 20, 24

**Miniature Axial Electrolytic 16VW**

22μF	2	C1, 4,
------	---	--------

**Foil Trimmer**

2-22pF	1	C21
--------	---	-----

**Tantalum Resin Dipped Bead 16VW**

1μF	2	C9, 28
4.7μF	2	C16, 17

**Semiconductors**

1N4003	1	D1
1N4148	6	D2-7
2N2369	4	TR3-6
BC548	3	TR7, 8, 9
BF241	1	TR2
BFR34A	1	TR1

**Integrated Circuits**

4040	1	IC2
4060	1	IC1
4511	8	IC11-18
4538	1	IC3
74AC00	1	IC4
74HC390	4	IC7-10
74LS00	1	IC6
7805	1	IC19
SP8680	1	IC5
DDR5260	4	Display 1-4 (common cathode dual 7-segment displays)

**Miscellaneous.**

Crystal 4.194304MHz, miniature coaxial cable, switch s.p.c.o. (Biased centre-off), BNC sockets (3), d.c. single hole input socket (1), Heat resistant sleeving (1mm bore), Case (Maplin 1605), 6mm mounting pillars, nuts, bolts and washers (3mm), red filter for display, Connecting wire, fuse (1.6A) and suitable fuse holder. Printed circuit boards (counter and display) will be available from our PCB services, in time for the construction stage.

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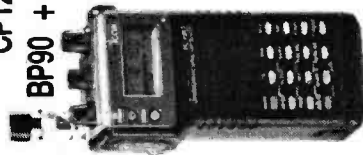
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*This month Quaynotes looks in more detail at slow scan TV work on 934MHz, has some information of a possible solution to 27MHz antenna diplexing problems and reports on CB activity in South Africa.*

**W**elcome to YOUR column once again. I'm pleased to see from my mailbag arriving from the office that you've been writing and expressing interest in what we're doing in 'CB High & Low'. Keep it up!

I've no doubt you'll remember that I showed an interest in the 934MHz slow scan TV (SSTV) activities of **Bill Reynolds UK161**, who lives in Kettering Northamptonshire. Following the picture and mention of his activities in the May 'High & Low', a number of other operators wrote and said that they were also interested in Bill's activities.

Well, Bill has come up trumps and sent several photographs in for me to use in the column. Bill's photograph, **Fig. 1**, showing the SSTV set-up is very interesting and he explains how he approaches this fascinating aspect of the radio hobby.

### Transceive Program

In his letter, Bill tells us that "I use a Sinclair ZX Spectrum computer with the GIFTU Transceive Program. I've enclosed a print-out of my set-up which I use as a CQ caption".

Although we're not showing the separate print-out Bill sent, it can be seen clearly on-screen in **Fig. 1**. He mentions that the audio output of the Spectrum computer is connected directly to the microphone socket of his 934MHz Cybernet Delta One transceiver, with the incoming signal being taken from the extension speaker.

Unfortunately, the photograph of Bill's extensive antenna system wouldn't reproduce very well. Fortunately Rob Mackie, the *PW* technical artist helped out (you've guessed it - I'm no artist) and produced the excellent diagram of the antenna 'farm' shown in **Fig. 2**.

After help like that from the *PW* office - I'd better not complain about them like I did last month regarding the competition entries!

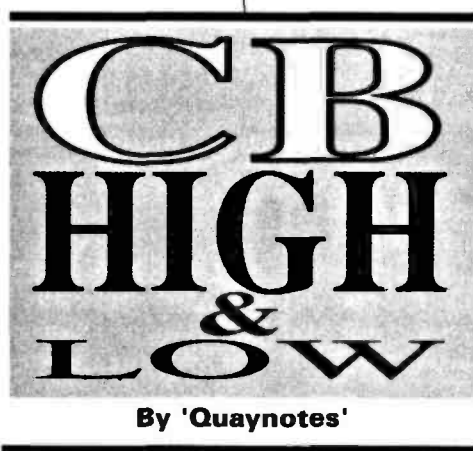
Another keen 934MHz operator, **Les Jenkins GB37**, has written to me with news of his activities. Les, who lives near Godalming in Surrey was a frequent contributor to Ron Ham's 'Propagation' column in 'Backscatter'.

### Holiday Home

Les is fortunate in having a holiday home in Deal, Kent. At this location he has a 12-element loop quad antenna, and a 7-element

collinear antenna. Also operating a Cybernet Delta One, Les also uses a masthead transmit and receive amplifier as the QTH is nearly at sea level with the mast only being 3m a.s.l!

Despite his station being so low down, Les reports that he worked out to Felixstowe, and up to Clacton-on-Sea on April 23. He also reports working to Ashington - that's not so bad if it was the



Ashington in Northumberland (or was it the West Sussex version?). Either way, I'm pleased to welcome you to 'High & Low' Les, and I hope we'll hear from you regularly.

### Good Ideas

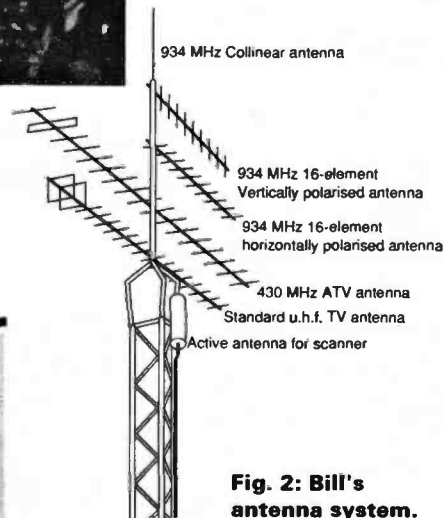
I'd also like to pass on greetings to **Fred Crease G4WMI**, who took the trouble to try and contact me on the 'phone via the *PW* office. Fred ended up chatting to the editor Rob Mannion G3XFD, to whom he wrote a letter. Rob duly passed the letter on to me, and so I'm very pleased to hear from you Fred, especially as you have come up with some good ideas!

Fred reckons that a number of 'old timers' on 934MHz have gone QRT when their rigs have developed faults or when their antennas have been damaged in storms. Why not, he suggests, publish some simple 934MHz antenna designs that can be built by, or on behalf of, the old timers? Fred has even suggested that he and his friends could possibly help get people back on air in some cases. I thought that this was such a good idea that I talked it over with the editor. The end result, I'm pleased to say, is that a simple replacement 934MHz antenna project is now in the pipeline!

Fred also mentioned the



**Fig. 1: Bill UK161's SSTV set-up.**



**Fig. 2: Bill's antenna system.**

27 and 144MHz. He kindly offers to "Dig out the article" for Wyn. I've no doubt others will be interested too Denis (including me), so you can expect other letters to be passed on to you!

It's not often that I get letters from abroad for this page, but I had a pleasant surprise when **Mr D. M. Carmichael** wrote from Bryanston in South Africa to comment on 'High & Low'. Despite the fact that he's so far away, Mr Carmichael is very pleased that *PW* has given CBers "A voice".

He reports that "Unfortunately, CB activity in South Africa is difficult, mainly due to the fact we can't get good equipment". Mr Carmichael (sorry to be so formal, but like so many of you who write, he forgot to include his christian name!) is interested in the CB loop antenna featured in the May competition, so I've sent him some more details. He also says how much he enjoys *PW* and, in particular the 'High & Low' monthly offerings.

Well, I'm pleased to hear that you enjoy the CB page Mr Carmichael, but it only works because you, like the many others who write, take the time and trouble to do so. I hope we'll also hear more about CB activities from other countries, and perhaps you'll send us some photographs and other details of your activities in South Africa very soon.

Well, that's the lot for now, keep writing and working on CB 'High & Low' - it's all part of the radio hobby!

*Quaynotes*

problems associated with repairing faulty rigs, especially the question of spares. However, his letter was sent to me before the June issue of 'High & Low' appeared, so I'm fairly sure that he will have seen the special offer from Nevada Communications in Portsmouth. If you're lucky enough to own a Cybernet Delta - that's got to be the best way of getting the rig on air again.

That's the lot for now at the 'high end' - but keep writing to me. I'm trying to catch up with all the personal replies to those that need them. I'm sorry to have kept some of you waiting for so long.

### Scene On Twenty-Seven

The first letter dealing with 27MHz comes from **Denis Soar G1DWR** in Nottingham, who comments on antenna diplexing units for combining two or more widely differing frequencies. Denis wrote to me because of the query from Wyn Mainwaring GW8AWT, which appeared in the May 'High & Low'.

Denis informs me of an interesting article, published in 1984 on a mobile antenna multiplexer enabling a 5/8 wavelength 144MHz whip antenna to be used on the broadcast bands,

# THE DAYTON HAMVENTION

## '91 REPORT



*The Dayton HamVention in Ohio USA celebrated its 40th anniversary this year. Rob Mannion G3XFD, went on behalf of PW, made a lot of friends, enjoyed himself immensely and has a lot to tell us!*

Despite the fact that I knew how big the Dayton HamVention would be, I was totally unprepared for the event itself when I was there. It was huge! I quickly came to the conclusion that the HamVention is not an event - it's an experience of a lifetime and one that I shall never forget even when I attend future shows.

Everyone in the UK jokes about how big everything in the USA is, whether it be distance, the size of cars, the countryside or the large quantities of food available. Well, it's no joke, the countryside, people and food are wonderful. The show is the hub of all activity, but there's something for everybody and you can be sure that I didn't see everything, as there just wasn't enough time.

### Getting The Picture

It's very difficult, but enjoyable to paint a picture of this show in words. However, it's been made easier and part of my job has been done by our ever co-operative cartoonist John Worthington GW3COI.

John's interpretation in cartoon form of our aircraft taking off from Gatwick and then struggling back, stuffed to the roof with 'goodies' sums it up. It was a good trip indeed, but it's not my job to tell you about those adventures, Roger Hall G4TNT plans to do that next month. I'm going to concentrate on the show and some of the equipment on sale.

Although we were still jet-lagged the morning after arrival, it was another early start for my roommate Don Watson GW3RJY and I. Fortunately, getting to the show was no problem as we had a very comfortable free mini-bus ride straight to the giant Hara Arena, on the outskirts of Dayton. Even the mini-bus was a giant of the species and it was very effectively air-conditioned!

### Remote Parking

The first-time visitor begins to get an inkling of the size of the HamVention when the first car parks are passed. Some of them seem a very long way from the

arena itself. In fact, Don and I were glad to be on the bus as it whisked us, in presidential style, straight to the entrance of the show.

Of course, we'd got there early so I could join the other PW team members at our stand. Don soon found himself working on the G-QRP stand, much to his, George Dobbs G3RJV's and other friends delight.

We spent a short while, between the rain showers, looking around the Flea Market. When it comes to the biggest, and most likely attraction for UK visitors, I'll put my reputation on the line and state firmly that it's got to be the outdoor Flea Market.

The outdoor market was stupendous. Although I had seen photographs taken from the air, I was still quite unprepared for its immense size. Even now, after I had attempted to walk round it in three or more sessions, I'm not at all sure that I managed to see everything!

There's so much to see in the outdoor market, that I became dizzy with looking at it all. If you have the money with you, it's even possible to come away from the show with a complete broadcast transmitter. Yes, I even saw one of those for sale. Anyone want a 5kW medium wave transmitter for \$3 000?

### Something For Everyone

Despite the huge number of wonderful, bargain-filled stands in the main hall, the Flea Market amazed me. I was quite taken aback when I saw the sheer variety of equipment on offer. I expected to see a great deal of surplus computer gear, plus the inevitable stands of cheap imported electrical and electronic consumer goods from the Far East on sale, as happens at many UK rallies.

Although computer gear and imported products were there, with very reasonable prices I might add, this sort of trading did not dominate the market in any way. In fact, I'll be honest in saying that the only thing that did dominate in the Flea Market were variety and people!

One stand seemed to be surrounded by broadcast receivers from the 1930s and 1940s. Surprisingly, the sets that were all switched on and working, seemed to be tuned to separate stations broadcasting different, but obviously 'dated' programmes.

Fascinated, I stopped and summed up the situation. Listening to each radio was like travelling back in time to the period it represented. The late 1930s front-room style console radio was tuned into the stunningly effective radio drama version of *The War Of The Worlds*, produced by Orson Wells.

Listening to this programme made me realise why America became almost panic-stricken when the programme was first broadcast. Even standing there in a Dayton car park in 1991 it seemed rather frightening! To add to the realism, the mid-1940s radio was reproducing news of the successful D-Day Landings and the cheaper-looking white Bakelite-cased set was obviously tuned into the McCarthy era with a programme on 'Un-American activities'.

The spell was only broken when the stall holder had to rewind a tape, or do some other adjustment on the multi-track (multi-deck even!) system in the van. Despite the fact that he was very busy, he took the trouble to show me the sophisticated, home-built equipment.

The illusion was created by professional recordings of the required period. The recordings were then played on a system capable of broadcasting up to

ten channels on the medium wave band, to radio receivers within 30m of the vehicle. I was spell-bound and fully intend to look him out next year!

### Projects And Ideas

I was of course on the look-out for ideas and projects to use in *PW*. I wasn't disappointed! During my look around the show I had noticed that quite a few kit manufacturers were showing their products.

My attention was drawn to the kits made by the American company Ramsey Electronics. These kits, attractively packed and very reasonably priced, seemed to be the most popular. I eventually found that Ramsey Electronics had a stall not so far from the *PW* stand, and very appropriately it was even closer to the G-QRP Club stand.

On my way to the Ramsey Electronics stand, I had to pass a seething mass of radio amateurs gathered around another stall. I needn't have worried, it wasn't a 'bun fight', it was only the G-QRP stand! The stand was very popular, with Dick Pascoe G0BPS and George Dobbs G3RJV coping with a very interested group of North American visitors.

On arrival at the Ramsey Electronics stand, I was very interested to find that their range of kits is very wide and their list is expanding all the time. Especially interesting was their delightful newly-introduced 144MHz fully synthesised f.m. transceiver kit and it only cost around the \$100 mark!

I made the mistake, when I bought the Ramsey Electronics 50MHz f.m. receiver kit for \$29, of not buying a 144MHz version and others to bring home. The mistake was unfortunate, as this price advantage is diminished somewhat by transport, import duty, VAT and other costs by the time they arrive in the UK. Despite that, there is nothing available from UK manufacturers, in the v.h.f. area, to compete with the Ramsey Electronics kits as yet.

The 50MHz f.m. receiver kit arrived home safely in my bag, and I aim to build it as a review feature in *PW* as soon as possible. I was so impressed with the

obvious quality and care taken with the kits and their excellent instruction manuals, that I also intend to use the kits for a school radio club I help run.

### New Receiver

There were a lot of products being launched at the show. Among them was the newly-introduced, simple-to-look at, but attractively styled Drake R8 communications receiver. Locally-made in Ohio, this receiver is packed with useful features and presented in a 'no fuss' professional way. I wasn't surprised to find that the appearance of the R8 ensured that the Drake stand was very crowded!

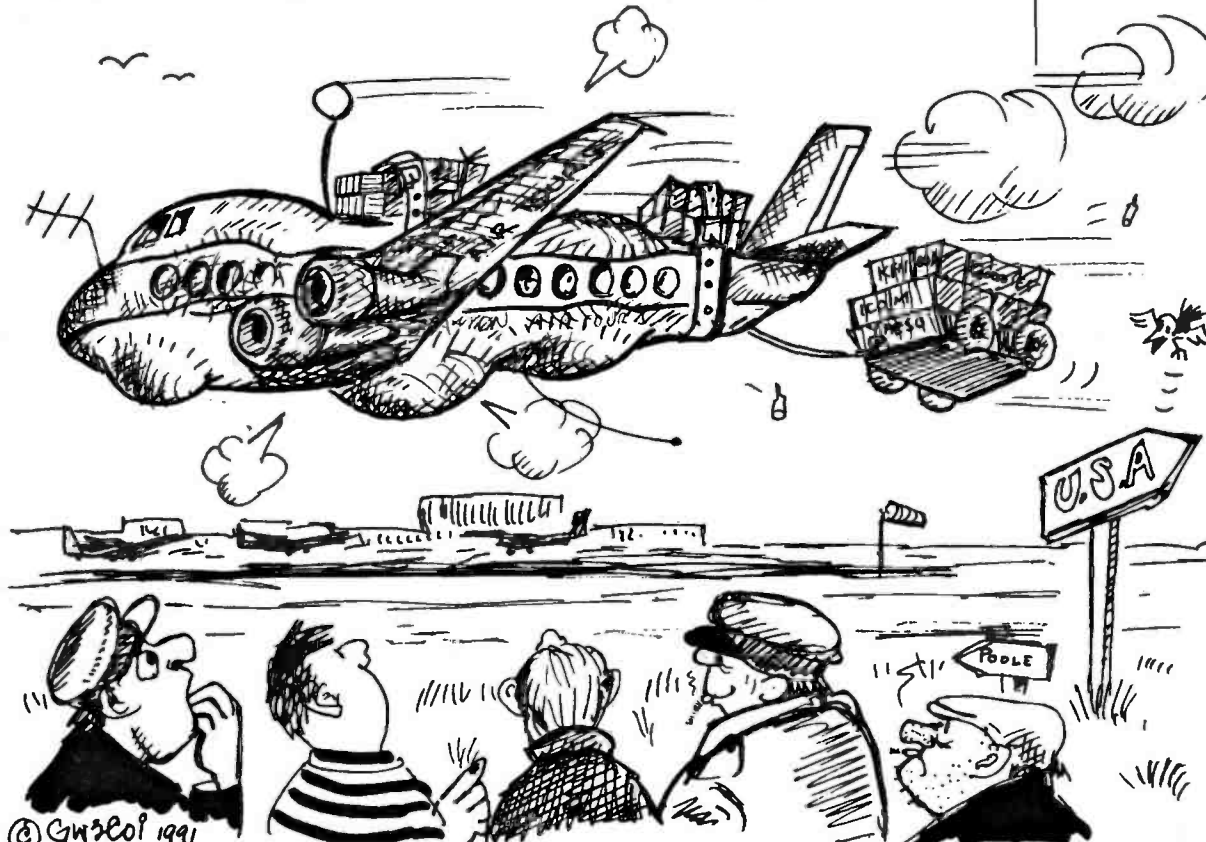
The specification on the receiver is mouthwatering to both licenced radio amateurs and the keen s.w.l. and it's marked up at a very good price. I'm pleased to report that our sister publication *Short Wave Magazine*, intends to review it as soon as one is available. They can't make them fast enough it seems.

Well, I could write a book on my experiences in Dayton, but I'd better save some of the various little incidents for future 'Keylines' hadn't I? However, I'll round off by saying that I came away from Dayton with several good ideas on mobile safety, and with the conviction that we must revive enthusiasm in the UK (and elsewhere of course) for h.f. bands mobile working. The Americans do it so well, and I've several ideas for rather special little h.f. mobile transceivers.

Finally, would you believe that I drove a trolleybus in Dayton? Well, I did, even if it was only for a few yards! Dayton has an extensive pollution-free system and I spent an hour and a half gliding around the city and suburbs for 60¢!

Unfortunately, they may scrap them before next year, but for someone who is very keen on electric traction - that was certainly my 'last day' treat. When the photographs are processed, I'll keep them on my office wall and bore everyone to tears about the day G3XFD went mobile under 'open wire' feeders at 400V d.c. with a p.a. taking 200A or more!

*We're looking forward to seeing YOU at Dayton Next year. You've read Rob's account of the trip, and next month Roger Hall G4TNT will explain how you can join the Dayton '92 party. You'll also be able to read what our readers thought about the trip and the adventures we had on the way!*



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HF225	General Coverage HF Receiver	£425.00	
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STR 11	HF6V Radial Kit	£33.50	£3.00
MPS	Mounting Post HF6 & HF2	£8.00	£2.00
20MRK	HF2V 20m Add on Kit	£33.50	£2.00
30MRK	HF2V 30m Add on Kit	£33.50	£2.00
TBR180S	180m Add on Kit for HF6 & HF2	£64.48	£3.00
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203CD	Cushcraft 20-3CD 3E1 20m Beam	£238.91	-
204CD	Cushcraft 20-4CD 4E1 20m Beam	£238.99	-
215WB	Cushcraft 15E1 2m Yagi Antenna	£98.99	£8.00
4218XL	18 Element 2m Boomer	£121.90	£8.00
A3SS	Cushcraft 3 Ele Tribander SS	£324.02	-
A4S	Cushcraft 4 Ele Beam Antenna	£391.95	-
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APB	8 Band Vertical	£184.78	£3.00
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R5	Cushcraft 1/2 Wave Vert 10-20m	£259.01	-
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MFJ1704	4 Position Ant Switch	£66.41	£2.50
MFJ202B	RF Noise Bridge	£63.20	£2.00
MFJ204B	Antenna Noise Bridge	£84.31	£2.00
MFJ260	300W Dummy Load	£32.57	£2.00
MFJ401B	Electronic Keyer Kit	£78.73	£3.00
MFJ407B	Electronic Morse Key Bencher	£146.25	£3.00
MFJ422B	Electronic Morse Keyer W/O Bencher	£76.46	£3.00
MFJ422BX	Grandmaster Memory Keyer	£182.32	£3.00
MFJ484C	CW/SSB Filter	£76.46	£2.50
MFJ722	CW Filter	£48.54	£2.50
MFJ752C	Tunable Filter	£104.42	£3.00
MFJ815	SWR Meter 2kW	£78.74	£2.50
MFJ840	2m Wattmeter	£21.02	£2.00
MFJ841	2m In-Line Wattmeter	£42.14	£2.00
MFJ901B	200 Watt ATU	£70.05	£2.50
MFJ931	Artificial Ground	£86.61	£3.50
MFJ941D	300 Watt Basic Tuner	£105.40	£3.50
MFJ945C	Versa Tuner 11 Mobile	£97.37	£3.50
MFJ949D	De Luxe 300W ATU	£188.82	£3.50
MFJ962B/C	1.5kW ATU	£258.84	-
MFJ986	1.5kW Roller Inductor Tuner	£279.82	-

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T200	Toyo 200W 1-500MHz Dummy Load	£64.00	£2.00
DL1	Texplo 1.5kW 160-10M Dummy Load	£75.00	£2.00
KS 2	Koyo Coaxial switch 2 way 1.0kW	£28.89	£2.00
S20N	Koyo Coaxial Switch 2 way 1.0kW 1-1000MHz N	£32.86	£2.00
SA 450M	Toyo Coaxial Switch 2 way 2.5kW 1-500MHz SO239	£18.50	£2.00
KA 450N	Toyo Coaxial Switch 2 way 2.5kW 1-500MHz N	£26.00	£2.00
DRAE UHF	UHF 3 position Antenna Switch N	£24.15	£2.50
DRAE VHF	VHF 3 position Antenna Switch SO239	£18.69	£2.50

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W570	Koyo 5/20/200 1.8-1300MHz	£124.75	£2.00
K 20	Koyo 15/50W 2m	£24.60	£2.00
K 100	Koyo 2kW 1.8-60MHz	£79.98	£2.00
K 200	Koyo 200W 1.8-60MHz	£61.55	£2.00
K 400	Koyo 200W 140-525MHz	£63.65	£2.00
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Item	Description	Price incl. VAT	P/P
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IC-725	HF All Band, General Coverage Rx 12V	£759.00	-
IC-505	6M Transceiver, SSB/CW 12V	£529.00	-
IC-2SE	2M FM Handportable with Nicad/charger	£275.00	-
IC-2SET	2M FM Handportable Keypad entry DTMF	£295.00	-
IC-2GE	2M FM Handportable with Nicad/charger	£265.00	-
IC-228E	2M FM Mobile 25W 20 Memo 12V	£365.00	-
IC-228H	2M FM Mobile 45W 20 Memo 12V	£385.00	-
IC-290D	2M SSB/FM/CW 25W 5 Memo 12V	£559.00	-
IC-275H	2M Transceiver SSB/FM/CW 100W 12V	£1,039.00	-
IC-45E	70CM FM Handportable inc Nicad/charger	£310.00	-
IC-48ET	70CM FM Handportable Keypad entry DTMF	£310.00	-
IC-45E	70CM FM Handportable inc Nicad/charger	£295.00	-
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Item	Description	Price incl. VAT	P/P
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TT 585	Paragon General Coverage HF Transceiver 200W	£1,839.00	-
TT 961	Power Supply for Omni, Paragon	£215.00	-
TT 282	6.3MHz 250Hz Filter	£60.00	£2.00
TT 285	6.3MHz 500Hz Filter	£60.00	£2.00
TT 288	6.3MHz 1800Hz Filter	£60.00	£2.00
TT 1140	Circuit Breaker	£16.00	£2.00
TT 217	9.0MHz 500Hz Filter	£60.00	£2.00
TT 218	9.0MHz 1800Hz Filter	£60.00	£2.00
TT 219	9.0MHz 250Hz Filter	£60.00	£2.00
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TT 700C	Ten Tec Electret Hand Microphone	£32.00	£2.00
TT 256	Ten Tec Electret Desk Microphone	£35.00	£2.00
TT 238	Ten Tec ATU 2.0kW L match 160m-10m	£361.69	-
TT 254	Ten Tec ATU 200W T match 160m-10m	£153.33	£3.50

## YAESU

Item	Description	Price incl. VAT	P/P
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FT1757GX	Mk II HF Transceiver	£969.00	-
FP700	20A P.S.U.	£219.00	-
FC700	Manual ATU	£149.00	£3.00
FP757HD	Heavy Duty 2m P.S.U.	£258.75	-
FT1700	New 2m/70cm Dual Band FM Mobile	£875.00	-
FT290	Mk II Super 290 2m Multimode 2.5W	£429.00	-
FT690	Mk II 6m M/Mode 2.5W	£399.00	-
FT411	New 2m H/H Keyboard	£225.00	-
FT811	New 70cm H/H Keyboard	£239.00	-
FT470	New 2m/70cm Dual Band H/H	£389.00	-
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G400RC	Yaesu Round 360° metre	£169.00	£5.00
G600RC	Yaesu Round 360°	£239.00	£5.00
AR200XL	Offset lead unit, 3 wire, rotary dial control	£49.50	£4.00
G250	Yaesu twist and switch control	£78.00	-
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The use of the printed circuit board (a prepared p.c.b. is available from the PW services) simplifies construction of the project. You should start this operation by inserting the 12 Veropins into the board from the copper track side.

After checking that the heads of the pins are correctly located snugly against the tracks, you can apply the solder. The next stage is to prepare the components for placing on the p.c.b.

Referring to the component overlay, Fig. 1.2, fit the socket for IC1 to the p.c.b, Fig. 1.3, where shown, and solder. Observing the polarity of the transistors, the diode D1 and the electrolytic capacitors C1 and C6, fit and solder the components to the board. Set the adjuster of R6 to mid position.

**Boxing Up**

Referring to the photo next to Fig. 3, you can now drill two holes in the lid of the box. One hole is 16mm in diameter. If a drill bit of this size is not available, drill the largest size hole that is available and file to size, taking care not to mark the exterior of the lid. Cut a circular piece of material about 25mm in diameter out of an old pair of ladies tights (don't forget to ASK the YL or XYL!).

Using epoxy resin adhesive, glue to the inside of the lid over this hole, stretching the material from the tights (you did ask didn't you?) to remove any creases and wrinkles

**Another Hole**

Noting that there is another 16mm hole, drill the front panel described above, taking particular care not to bend the panel or to scratch the anodising. Thoroughly de-burr the holes on both sides and degrease the panel using hot soapy water. After rinsing thoroughly, allow the panel to dry.

Using 2.5mm and 3mm rub-on lettering, you can now apply suitable lettering to the front panel. Once the lettering is fixed, you can brush on three coats of clear varnish to protect the anodising and lettering from abrasion. Allow the varnish to harden for 48 hours before fitting the components to the front panel.

Using four small self-tapping screws, secure the



**The PW Morse-Master**

**Part 2**

*This month Steve Farrow G8IWY describes the final wiring, setting up and boxing the Morse-Master project ready for use.*

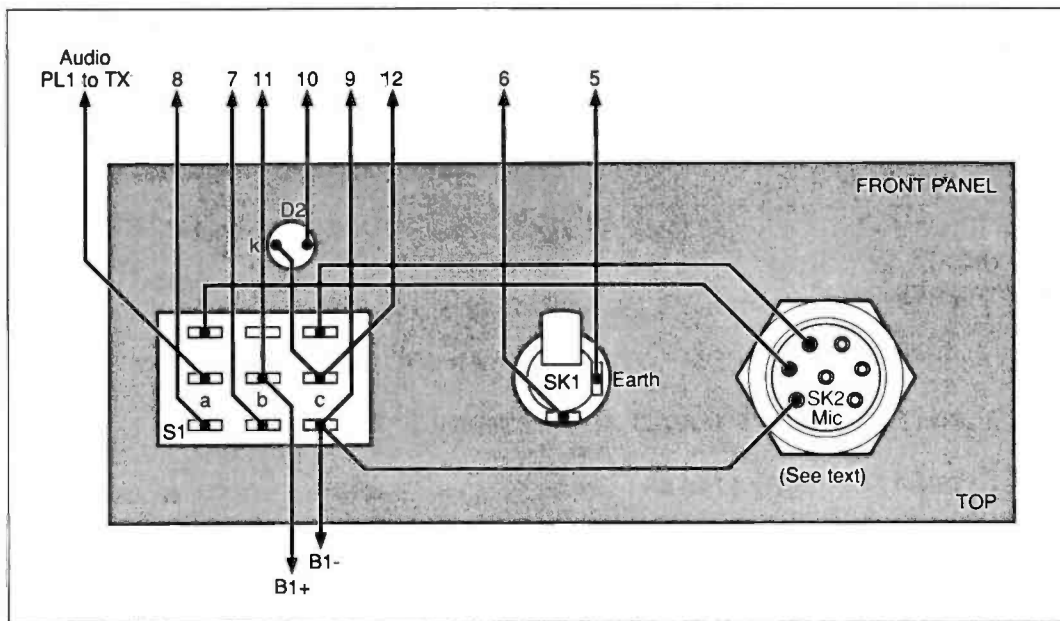
p.c.b. to the moulded-in p.c.b. mounts in the lid of the box. Fit the switch and the sockets for the microphone and the Morse key to the front panel.

Using equipment wire, connect the switch and sockets to pins 5 to 12 of the p.c.b. as shown in the view of the box wiring photograph, and the circuit diagram, Fig. 1.3. Shorten the leads of the TX i.e.d. and solder short lengths of the equipment wire to the leads. Insulate the joints with short lengths of sleeving.

The next stage is connecting the anode of the i.e.d. to pin 10 of the p.c.b. and the cathode to terminal 'C' of the switch. Push the i.e.d. through the hole in the front panel.

Next, connect the piezo transducer to pins 1 and 2 of the p.c.b. Wire the built-in battery compartment in the base of the box to the negative and positive terminals of the switch.

Then fit the grommet into the hole in the rear of the lid and feed a length of twin screened cable through



**Fig. 2.1: The Morse-Master front panel wiring, switching and control lay-out diagram.**

the grommet. Terminate one core of the cable at one end of the terminal 'D' of the switch and the other end to pin 2 of the plug that connects to the transceiver plug.

### Tidy Up

Tidy the wiring and lace into a cableform inside the box. You can refer to the photograph in Part 1 to help your lay-out. The diagram, Fig. 2.1 in this part, shows the wiring diagram for the front panel, plug, sockets and switching.

Fit the cable tie tightly onto the cable connected to the transceiver. This should be done inside the box adjacent to the grommet, to strain relieve the connections to the p.c.b. Then fit four stick-on feet to the base of the box.

Take care when you insert IC1 into its socket. The device is static sensitive and to prevent damage, an earthed wristband should be worn or you should place the i.c. while standing on an earthed metal tray!

### Final Testing

Check the board and wiring for faults. Insert four AA size batteries into the battery compartment and switch the unit to MCW, it is shown as this in Fig. 1.1. Check that the TX l.e.d illuminates and measure the battery current, which should be approximately 5mA.

Plug in a Morse key, check that the tones are heard from the piezo transducer and that the battery

current rises to about 10mA when the key is down.

Next, you should switch the unit to 'voice' and plug a microphone into the unit. Check that the TX l.e.d illuminates when the p.t.t. button of the microphone is depressed, and that the l.e.d. is extinguished when the button is released.

The battery current (about 5mA) is only drawn when the l.e.d is illuminated. Connect the unit to the transceiver and with the help of a friend, adjust potentiometer R6 'on air' to set the level of the tone output.

### Using Morse-Master

Using the Morse-Master on air couldn't be simpler! You should connect into the transceiver in place of the microphone. Plug the key and the microphone into the Morse-Master. To speak, all you have to do, is set the switch to 'voice', press the p.t.t. on the microphone and start your 'speech'!

To send a Morse signal, set the switch to MCW and start transmitting. At the end of the Morse 'over', you simply return the switch on the Morse-Master to 'voice' to place your transceiver ready to receive.

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PW

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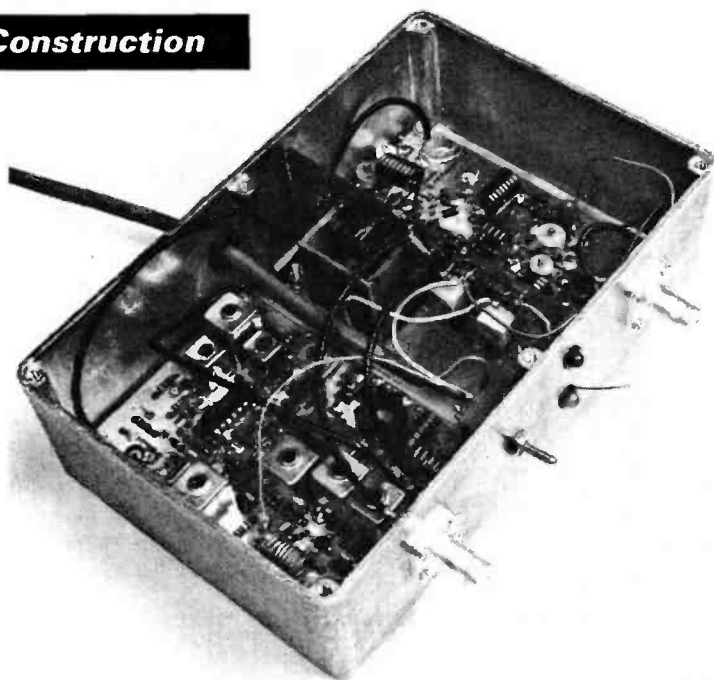
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# The PW Meon-4

## (Part three)

*In the final part of the PW Meon-4 project, Andrew Talbot G4JNT, describes the switching circuits so you can get busy on 70MHz.*

### Errors & Updates

In part one of this project, on page 25 of the May '91 issue of *PW*, there were two small errors in the parts list. There were only three 68Ω and five 100Ω resistors required. The lists of component names were in both cases correct. Our thanks to those who brought it to our attention.

The necessary change-over between transmit and receive is achieved by switching the supply rails to the various sections of the circuit. The circuit diagram in **Fig. 3.1** shows this change-over switching. The attenuator, made up of R204-208, reduces the 145MHz transmission down to 1mW. This level is more suitable for the input of IC1 of Fig. 3(† *PW Meon-4*, part 1 in May).

The attenuator is made with standard value components, and does work even if not numerically correct. The prototype was designed to compliment a 144MHz portable transceiver of some 2-3W of r.f. output. If you intend using it with a transceiver of differing output power, changes (†) will have to be made to the attenuator.

As shown, +12V is directed to the receive converter and the 145MHz out from this circuit is routed to the transceiver. Diodes D210 and 202 rectify the small amount of 145MHz sensed by C202. This rectified signal is filtered, before being fed to the base of TR201. This transistor switches the two relays RL201 and 202 from the receive to the transmit state. As the relays operate, the l.e.d. D206 illuminates, showing that +12V is being passed to the transmit converter and the p.a. circuitry. The 145MHz from the transceiver is transverted to 70MHz and transmitted.

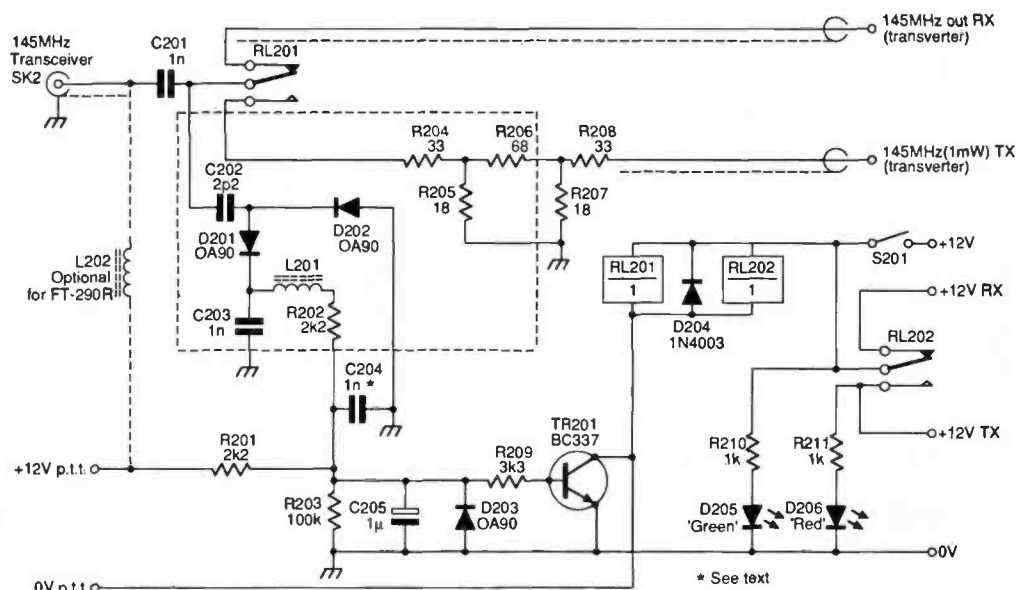
### Optional Items

There are several optional, or variable, components in the circuit. Inductor L202 may be fitted if the unit is used with an FT-290R, or other transceiver, having a d.c. voltage present on transmit. Space has been left in the layout if this component is to be fitted. Another optional component, capacitor C204 may be fitted in one of two positions, or even left out all together. If fitted, it may be either within the area bounded by the screening material, or on the land near R203/205. This component was not needed on the prototype, but may cure certain cases of 'relay chatter'.

### Hang-Time

The capacitor C205 with R209, controls the hang-time of the circuit. This interval, before the circuit returns to the receive state after the end of transmission,

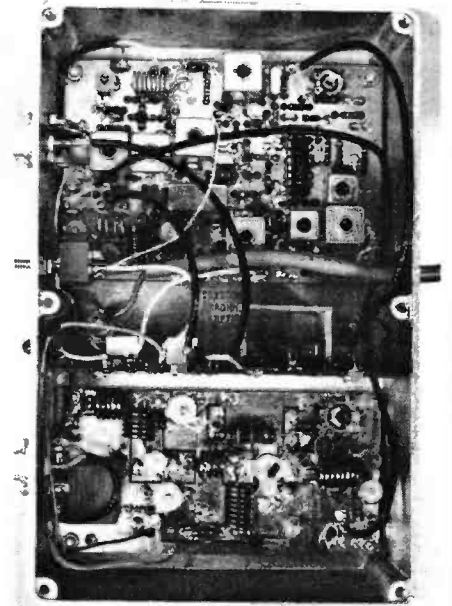
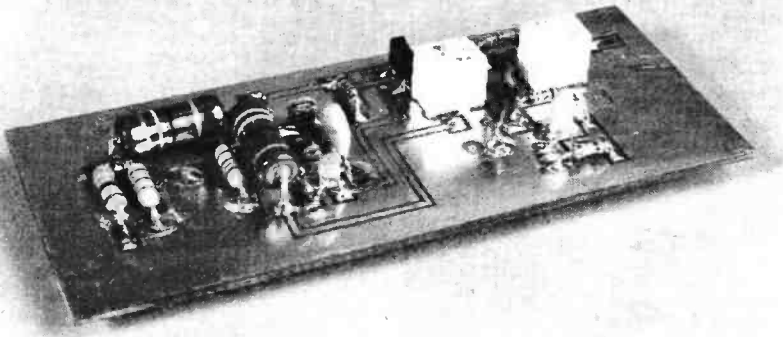
**Fig. 3.1: The PW Meon-4 transmit/receive change-over system circuit.**



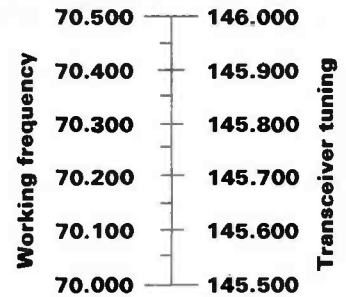
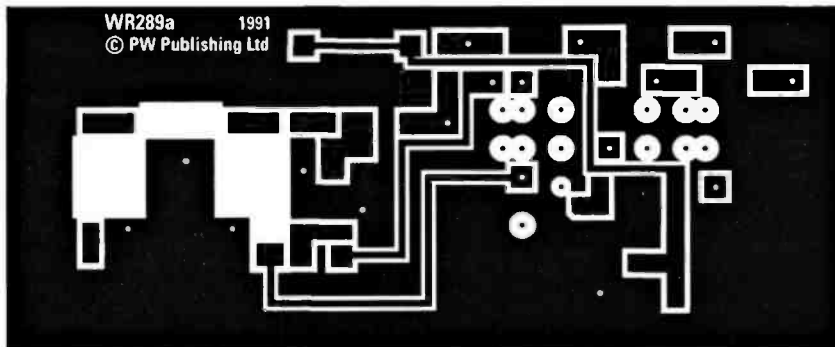
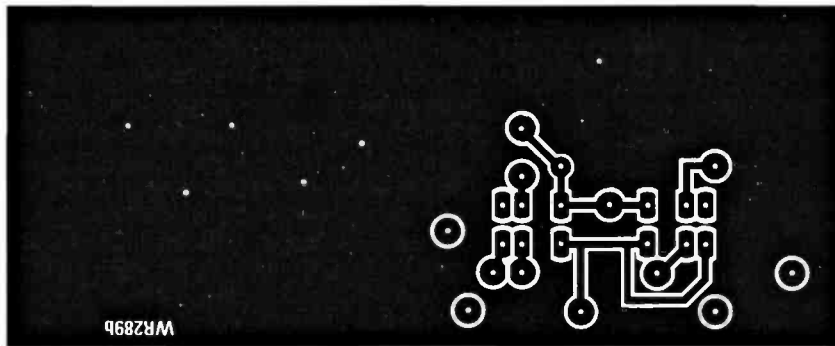


may be lengthened by increasing the value of C205 to 100 $\mu$ F or more. The hang-time for the prototype was set for a period more suitable for f.m. transmissions (under a tenth of second). For s.s.b. working this should be increased to at least one second or more.

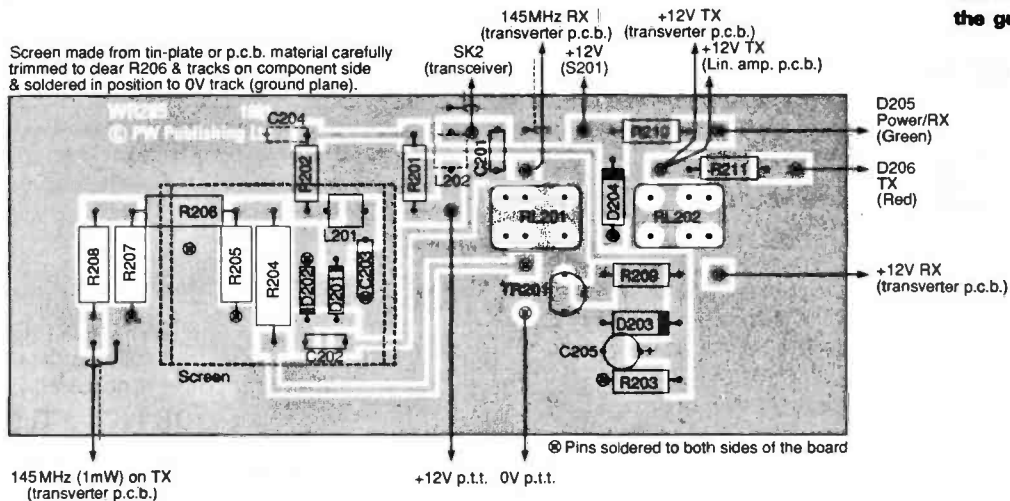
Tantalum bead capacitors of the required value (100 $\mu$ F) may be difficult to find. If you can't find one, the value may be made up from more than one capacitor. They should all be grouped on the land, which is shown low on the right on the p.c.b. overlay drawing of Fig. 3.2.



**Fig. 3.3:** The prototype 'PW Meon-4'. You can use the illustration as an aid to connecting up the various sections.



**Fig. 3.4:** A frequency conversion chart to take the guesswork out of it!



**Fig. 3.2:** The overlay and track pattern of the change-over board. The relays are physically small and must be treated with care. Care must also be taken when soldering the screening material to the earth plane. A solder-bridge can short one of the signal tracks to ground.

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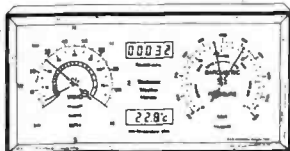
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### Layout Guide

Using the photographs of the p.c.b. and complete unit as a guide, you should mount the various circuit boards into the die-cast aluminium box. In the original 'PW Meon' (‡) a second die-cast box was used, inside the main box, to contain and screen the power amplifier. In this design the switching board itself acts as a screening shield between the two other boards. The method of screening used on the prototype unit is a cheaper technique that works well. A heat-sink is not necessary for the unit. Even on full transmitted output, the die-cast box was only hand warm after several hours of operation.

### Local Oscillator Reduction

A final check can now be made for l.o. leakage. Start the check by removing the 144MHz drive and connecting the power meter already described above. Using one of the p.t.t. lines, put the system into the transmit state. The linear amplifier has sufficient bandwidth to show if significant levels of 75.5MHz are leaking through. Should there be any residual l.o. output, L3 on the transverter board may be adjusted to minimise the problem. A 'zero' reading on the meter should be possible. You may need to readjust the tuning if any changes have to be made to the setting of L3. It may be necessary to realign all stages again with the new settings of the 75.5MHz trap filter. On the prototype, a level (75.5MHz l.o.) of -50dBc was achieved.

### Final Tweaks

The final stage of the alignment process is to set the correct operating point. This is carried out with maximum operating power from the transmitter applied. You should adjust R38, on the transverter board, to give **no more** than 8W output for s.s.b. operation. If too much output is obtained, at maximum attenuation, then this may be corrected by increasing the value of R3 to give a suitable range of adjustment. If a second, external, linear amplifier is to be used, R38 should give a suitable output power to drive the amplifier. Adjust the drive signal to the linear amplifier to at least 3dB lower than that needed for maximum output. This will allow a reasonable overhead, so reducing 'splatter'.

### No Pre-amplification

The prototype had sufficient sensitivity not to require a pre-amplifier at any stage. Should one be needed, or desired, there are two possibilities. A 70MHz pre-amplifier could be placed between the 'Receive converter' output of the p.a. board and the '70MHz in' connection on the transverter p.c.b. If a 145MHz pre-amplifier is available, this could be placed between the '145MHz out RX' of the transverter p.c.b. and the similarly marked pin of the switching p.c.b. As with the use of any pre-amplifier, gain should be kept to the minimum needed to make a signal usable. PW

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33Ω 1 R204

1W 5% Carbon Film  
68Ω 1 R206

0.5W 5% Carbon Film  
18Ω 2 R205, 207  
33Ω 1 R208

0.25W 5% Carbon Film  
1kΩ 2 R210, 211  
2.2kΩ 2 R201, 202  
3.3kΩ 1 R209  
100kΩ 1 R203

### Capacitors

Miniature Ceramic Plate  
2.2pF 1 C202  
1nF 3 C201, 203, with C204 (optional)

Tantalum Bead 16V working  
1μF 1 C205 \*see text

### Inductors

L201 consists of 4t of 22s.w.g. enamelled copper wire wound on a ferrite bead. The optional inductor L202, if required, is similarly wound.

### Semiconductors

1N4003 1 D204  
BC337 1 TR201  
OA90 3 D201, 202, 203  
l.e.d. 2 D205, 206 (colours to suit)

### Miscellaneous

Two ultra-miniature s.p.c.o. relays (Electromail order No. 345-038), a suitable single pole power switch, interconnecting cable. Miniature coaxial cable (RG174), plugs and sockets as required. Change-over p.c.b. (WR289 PW Services), plus p.c.b. pins, die-cast aluminium box 186x106x56mm (or similar). Screws/nuts and washers for mounting the various boards.

### Further Reading (‡)

'PW Meon-4 Transverter', part one PW May 1991 p19. Part two PW June 1991 p34.  
'PW Meon 50MHz Transverter' by Dave Powis G4HUP and Sam Jewell G4DDK, PW October 1985, p36, + 'Kindly Notes / Errors & Updates'.  
*Radio Data Reference Book* by G.R. Jessop G6JP. ISBN 0900612673 published by RSGB (attenuators p151 in the fifth edition).  
PW March 1991 page 69 gives a 70MHz bandplan. This was in the regular column 'VHF-Up', by David Butler G4ASR.

# Reflections

*This month, Ron Ham reflects on the fact that there was a lot more behind the Central Post Office than the handling of the Royal Mail!*

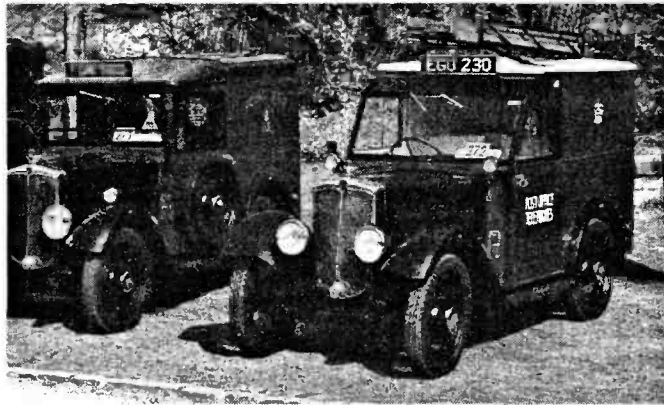
## The GPO

Now that it is becoming history, let us reflect on the fact that there was a lot more behind those three well known letters 'GPO' (General Post Office) than the handling of the Royal Mail. They stood for the massive amount of research that went into the mechanical and electronic sorting of letters and parcels for daily distribution around the world.

The GPO were responsible for the telegram service and, for developing, installing and maintaining the telephone network throughout the UK and connecting it to overseas systems by cable, wireless and satellite. Their engineers were very much involved in the many aspects of radio and television from the very beginning because, communications was their business.

I was reminded of this on April 14 when I saw a rare sight, a couple of 1936/7 Morris 8 vans, **Fig. 1**, in Post Office livery (left red, right dark-green), parked in Sussex at **The Amberley Chalk Pits Museum** during a vintage vehicle rally. Such custom-built vans were ordered by the GPO for use by their postmen (left) and telephone-linesmen (right) and now, 55 years later, these two are kept in their former glory by **J. Bambrough** of Hordean, near Portsmouth.

Ninety-five years ago it was **Sir William Preece**, then Post Master General, who encouraged the young **Marconi** by asking him to demonstrate his wireless techniques to senior Post Office staff. The result was that signals were transmitted, in London, from St. Martin's-le-Grand to the Victoria Embankment and later similar experiments were successfully



**Fig. 1: 1936/37 PO Vehicles.**

carried out on Salisbury Plain and across the Bristol Channel.

Marconi and Preece were contemporaries of **Sir Oliver Lodge** who, at that time, had suggested that there was more to solar radiation than visible light. Fifty years later, in the early days of 405-line television, a matter where I had first-hand experience, it was the Post Office Interference Department who were called upon when electrical equipment, ranging from light bulbs to motors and medical apparatus to RADAR, were carving up the pictures on newly installed, Band I (40 to 70MHz), television receivers. It was in 1947/8 that I first saw the effect of American R/T traffic chopping up BBC television signals on 45MHz while a massive Sporadic-E opening was in progress.

## Natural Causes

Engineers from the BBC, the Post Office and the radio industry pioneered international communication routes around the globe via ionospheric reflection. They soon became very much aware that random activity, associated with sunspots, could suddenly

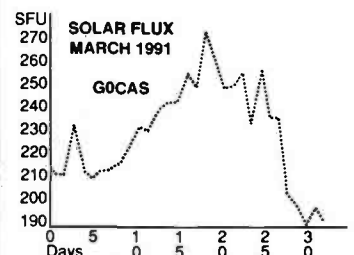
disturb the ionosphere and consequently disrupt the paths of radio signals being carried via that medium. The majority of wireless operators, both amateur and professional, have experienced, at some time, the effect on incoming signals of echoes, rapid-fading and total blackouts, resulting from enhanced solar activity. In addition, many have heard the wide-band fluctuations in the receiver background noise caused by radio waves originating on the sun.

## Better Understanding

There can be little doubt that the consistent use of radio receivers, as a scientific tool to record these happenings, have led to our better understanding of the sun and its influence over the earth and its complex atmosphere. This is of course a never ending story and is why I try to use as many reader-reports as possible each month. In this way, this column can make more information available for posterity and to the students of radio and astronomy who may require it for their research projects.

## More About March

After my deadline for June 'Reflections', in which I reported that the sun was very active during March, further important information arrived. Reports such as the daily graph of solar flux, **Fig. 2**, kindly sent by **Neil Clarke** (Ferrybridge) who told me that "many of the daily solar flux figures were flare enhanced and consequently it is rather difficult to see any real variations". However, Neil calculated the mean level for the month at 225 units. From the 23rd to the 25th inclusive, **Ron Livesey** (Edinburgh) identified 5, 6 and 4 active areas, respectively, on the sun's disc using a 2.5in refracting telescope and a 4in projection screen. Ron's equipment is no doubt similar in principle to that used by **Clive Brook** in Plymouth, **Fig. 3**. Despite cloudy conditions around noon on the 23rd and 24th, Clive's screen revealed 3 sunspot groups with 12 and 15 spots respectively and at 1537 on the 28th he added 2 groups to his solar log and **Ted Waring** (Bristol) counted 14 spots.



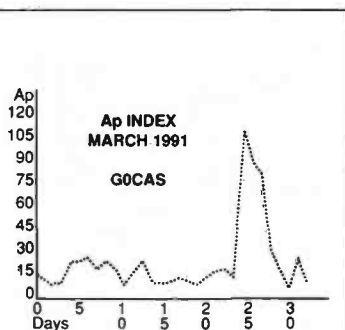
**Fig. 2: Daily Solar Flux for March.**



**Fig. 3: Clive Brook's projection apparatus.**

### The Earth's Magnetic Field

Last month I referred to the solar activity and the radio blackout on the 25th, which I now know spread over to the 26th, so, in addition to Fig. 2, it is also interesting to see Neil Clarke's print-out of the 'Ap' magnetic index, Fig. 4, showing that massive peak on the 25th. "After 4 months of very quiet geo-magnetic activity, March 1991 saw a major storm", wrote Neil and added that this storm began on the 24th and lasted until the 28th with 'Ap' figures for those days at 115, 92, 83, 32 and 20 respectively. Neil is currently experimenting with his own magnetometer, which clearly detected that big storm and I hope to learn more about this instrument in due course. The magnetometers used by Tony Hopwood (Worcester), Karl Lewis (Saltash), Ron Livesey, David Pettit (Carlisle) and Doug Smillie (Wishaw), between them, recorded the big magnetic storm from the 24th to the 26th inclusive.



**Fig. 4: Ap Magnetic Index for March.**

### Aurora Reports

Ron Livesey is the auroral co-ordinator for The British Astronomical Association. He received reports of "all sky, all night" aurora for the 24th/25th from 38 observers, ranging from many parts of the British Isles, North Dakota and Denmark. "Active aurora" was again seen from North Dakota and Scotland by 7 observers overnight on the 25th/26th. Doug Smillie reported hearing auroral reflections on terrestrial signals in the 50 and 144MHz bands on the 24th and 25th, and Tony Hopwood noted this effect around 2100 on the 25th. Ern Warwick (Plymouth) heard the German beacon DK0WCY on 10.144MHz, give weak auroral warnings between 1800 and 1910 on the 27th, 2000 to 2100 on April 1 and 1215 to 1900 on the 4th.

### April's Active Sun

Another large group was observed on the central meridian of the sun's disc and it was drawn at 1450 on April 15, Fig. 5, by Patrick Moore with his projection system installed at his observatory in Selsey. Ted Waring counted 17 spots on the 8th and Clive Brook identified 4 groups on the 5th, 20th and 5 on the 15th and 16th. Cmdr Henry Hatfield (Sevenoaks), using his spectroheliograph, observed 2 groups on the 10th, 21st and 28th, 4 groups on the 3rd, 12th and 13th and 5 on the 11th. Henry also recorded individual bursts of solar radio noise with his radio telescopes on both 136 and 1297MHz on days 2, 11 and 20. Ern Warwick (Plymouth) reports a noisy background at 1720 on the 14th and a high noise level on the 15th, 16th, 19th and 20th on 28MHz. He also noted echos on the signals from the African beacons ZS5VHF and Z21ANB on the 13th and on the United States beacons WA4DJS on days 5, 6, 8 and 9 and W3VD on the 14th and 15th. On checking the 14MHz beacons he found 'fast-fading' on the signals from KH60/B on the 12th, 13th, 14th and 22nd and W6WX on the 13th and 22nd. Both 'echos' and 'fast-fading' are due to some form of ionospheric disturbance and this is not surprising when the state of the April sun is considered.

### Drawing Sunspots

Any experienced astronomer will tell you, and I have WARNED readers many times in my articles in *PW* and *Short Wave Magazine*, that you should NEVER LOOK DIRECTLY AT THE SUN THROUGH ANY OPTICAL EQUIPMENT. This is because this could seriously damage your eye-sight and brain. Our regular sunspot contributors like Henry Hatfield, Ron Livesey, Patrick Moore and Ted Waring all use some form of projection apparatus attached to their optical telescopes. This simple device, usually home-made, is attached to the eye-piece end of a tripod-mounted refractor telescope while its object glass is pointed in the general direction of the sun. The final adjustment is made, with your back to the sun, by moving the main telescope tube and centering the solar image on to the screen.

### Thanks

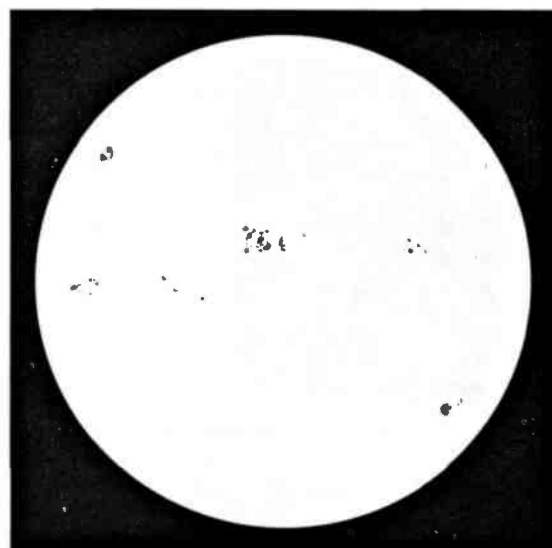
My thanks to Clive Brook for sending the photograph, Fig. 3, of his 2.5in telescope and the projection screen which took him less than an hour to make. I have included this because I have indications that many of you are keen to know when sunspots are present and how to go about drawing them. "The projection apparatus was made from balsa wood, cardboard, a jubilee clip and a length of telescopic radio aerial," said Clive, and he quite rightly

added, "The materials are much easier to obtain than a new eyeball!"

It should be obvious by looking at Fig. 3, that the drawing paper would be placed on the lower "shelf" in front of the eyepiece and would be held in place by a couple of paper clips or small bulldog clips. Adjustment for the solar disc size and fine focus is made with the telescopic rod attached to the base of this 'shelf' at the lower end, and also to the base of the 'light-deflector' at the top end. The latter has a centre hole through which is passed the focus tube. Don't run any risks, if any of you are not sure about making a projector. Please have a word with someone in your local astronomical society. The address of the secretary is almost sure to be in your public library.

### Sporadic-E

By the time you read this, the 1991 Sporadic-E season should be well under way and among those who will be active is Bob Cooper, Jr. currently ZL0AAA. Bob will be operating from the Azores from approximately June 4 to 27 and plans to have 100W plus equipment running on the 28, 50 and 144MHz amateur bands. His liaison frequency will be 28.885MHz, and his keyer beacon frequencies will be 50.105MHz and 144.105 or 144.205MHz. He will also have f.m. and TV monitoring gear covering 30 to 150MHz. PW



**Fig. 5: Large sunspot Group - April 15.**



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# Mathematics For The RAE

## Part 4

### Theory

#### Errors & Updates

Twelve year old Peter Maunder of Streatham has earned himself a £5 voucher for spotting the mistake on page 32 of the May issue of *PW*. Halfway down the right hand column, when multiplying 0.0376 by 25.1, the line '1880', should have read '18800', even though the answer was correct. Well done Peter (we'll take it out of Tex's pocket *Ed.*).

#### Answers

Now to put you out of your misery, here are the answers to last session's problems on fractions and decimals.

- |         |          |         |
|---------|----------|---------|
| (i) c   | (ii) d   | (iii) b |
| (iv) a  | (v) c    | (vi) a  |
| (vii) d | (viii) b | (ix) d  |
| (x) d   | (xi) a   |         |

You did get them all right, didn't you? Well done if you did.

#### Indices

Now we've got fractions and decimals out of the way, the next to be tackled are INDICES or POWERS OF NUMBERS. Indices aren't difficult, especially if we look at them this way: If we multiply a number by itself, the number is said to be 'squared'. If we multiply the 'squared' answer by the original number again, the number is said to be 'cubed'. If we represent the number (which can be ANY quantity) by the letter 'a', this 'squaring' and 'cubing' can be written mathematically (or algebraically) as below.

- $a = a^1$  the number itself ('a to the first power')
- $a \times a = a^2$  (or a 'squared', 'a to the second power')
- $a \times a \times a = a^3$  (or a 'cubed', 'to the third power')
- This multiplying can go on theoretically forever:
- $a \times a \times a \times a = a^4$  (or 'a to the fourth power')
- $a \times a \times a \times a \times a = a^5$  (or 'a to the fifth power') and so on.

The '2' in  $a^2$  is called an INDEX (plural INDICES) and that is what this part is all about. If we want to write down the number 'one hundred', we can do it the normal way using '0s' like this: 100

- or another way would be:  $10 \times 10$
- Using indices it would be written as:  $10^2$

Not a lot of space saving there! Supposing we want to write down the number 'one million' in the way we wrote 'one hundred' - what then?

- 1000 000 or
- $10 \times 10 \times 10 \times 10 \times 10 \times 10$

Using the 'index' method it only needs to be  $10^6$

You are less likely to make mistakes, like losing a '0' or two if you always use indices when you can. With quantities less than 1, where small numbers like 'a thousandth' or 'a millionth' are quite common in radio problems, indices can help. They keep you from

losing '0s' AFTER a decimal point as they can in front of it!

For example:

$$\frac{1}{10} = 10^{-1}, \text{ or } \frac{1}{100} = 10^{-2}, \text{ or } \frac{1}{1000} = 10^{-3} \dots$$

$$\frac{1}{1000000} = 10^{-6} \dots \dots \frac{1}{10^n} = 10^{-n} \text{ (general rule)}$$

If we can have '+' and '-' indices, what about  $10^0$ ? What does that (ten to the power of nought) mean? The answer, although unusual, is 1 (see later in this section for the explanation). ANY QUANTITY RAISED TO THE POWER '0' IS EQUAL TO 1 (or unity). So  $10^0 = 1$ ,  $99^0 = 1$ , also  $X^0 = 1$  and  $Y^0 = 1$ . This means that any number raised to the power of nought is the same as any other number raised to the power of nought. i.e.  $397^0 = 1^0 = 1$ .

#### Indices In Multiplication

What happens when we have to multiply numbers together if they have indices? If the numbers to which the indices are appended are the SAME, (and the numbers are quite often '10s') all we need to do is to ADD the indices together. A few examples:

- (i)  $10^3 \times 10^6 = 10^{(3+6)} = 10^9$
  - (ii)  $10^2 \times 10^3 \times 10^6 = 10^{(2+3+6)} = 10^{11}$
  - (iii)  $10^6 \times 10^9 \times 10^{-7} = 10^{(6+9-7)} = 10^8$
- That was simple and easy wasn't it?

#### Indices In Division

Dividing is just as simple. To divide using indices you should just SUBTRACT the index of the number of the denominator from that of the numerator, as long as the numbers preceding the indices are the same (again usually '10s'). Here are some more examples:  $(10^6 \div 10^2) = 10^4$  and  $(10^{10} \div 10^4) = 10^6$

Using the same rules on a more complicated example:

$$\frac{10^4 \times 10^8}{10^9 \times 10^{-3}} = \frac{10^{(4+8)}}{10^{(9+(-3))}} = \frac{10^{12}}{10^6} = 10^{(12-6)}$$

$$= 10^6$$

And another:

$$\frac{10^2 \times 10^3}{10^{-6} \times 10^{-5}} = \frac{10^{(2+3)}}{10^{(-6)+(-5)}} = \frac{10^5}{10^{-11}}$$

$$= 10^{(5-(-11))} = 10^{16} = 10\ 000\ 000\ 000\ 000\ 000$$

#### Coefficients

A COEFFICIENT is a number which multiples a term including an indexed number. It mostly appears at the beginning of the term. If no coefficient is written, a '1' is assumed. The coefficient multiples the rest of the term. To help you understand, we'll look

*As we progress further into the fascinating world of maths, Ray Fautley G3ASG thinks it's time to turn to numbers with indices.*

at some numbers having both indices and coefficients.

In  $3 \times 10^2$ , the '3' is the coefficient, and is the same as 3 times  $100=300$ . In the case of  $12 \times 10^{-6}$ , '12' is the coefficient, and '-6' the index. This is the same as 12 times one millionth. A bit more care is necessary when ADDING together numbers which have indices. Only numbers which have the SAME INDEX may be added. You'll realise this by following these examples:

$$\begin{aligned} \text{(i)} \quad & 10^3 + 2 \times 10^5 + 6 \times 10^3 + 3 \times 10^5 \\ & \text{Collecting the '10}^3\text{'s together and then the '10}^5\text{'s:} \\ & (10^3 + 6 \times 10^3) + (2 \times 10^5 + 3 \times 10^5) \\ & = (1+6) \times 10^3 + (2+3) \times 10^5 \\ & = 7 \times 10^3 + 5 \times 10^5 \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 7 \times 10^{-6} + 4 \times 10^6 + 3 \times 10^{-6} + 7 \times 10^6 + 5 \times 10^3 \\ & = (7+3) \times 10^{-6} + (4+7) \times 10^6 + 5 \times 10^3 \\ & = 10 \times 10^{-6} + 11 \times 10^6 + 5 \times 10^3 \\ & = 10^{-5} + 11 \times 10^6 + 5 \times 10^3 \end{aligned}$$

The same rule applies when subtracting numbers having indices.

$$\begin{aligned} \text{(i)} \quad & 5 \times 10^{-2} - 2 \times 10^{-2} \\ & = (5-2) \times 10^{-2} = 3 \times 10^{-2} \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad & 8 \times 10^3 - 3 \times 10^3 - 2 \times 10^3 - 5 \times 10^6 \\ & = (8-3-2) \times 10^3 - 5 \times 10^6 \\ & = 3 \times 10^3 - 5 \times 10^6 \end{aligned}$$

### Thinking Cap Time

Now that you've read about dividing indexed numbers, have you worked out why any number to the power of nought is always 1?

Maybe a little help would be appreciated?

$$5+5=1, 7+7=1, 15797+15797=1$$

If the above statement is true then:

$$10^y + 10^y = 10^{(y-y)} = 10^0 = 1$$

It's easy once you know how, isn't it?

Now for the 'exam' part. Try the following problems on indices, the answers will appear with the next part of the series.

(i)  $10^6 \times 10^3 = ?$

(a)  $10^3$  (b)  $10^{18}$

(c)  $10^{-3}$  (d)  $10^9$

(ii)  $10^{-5} \times 10^6 = ?$

(a) 10 (b)  $10^{-11}$

(c)  $10^{-1}$  (d)  $10^{11}$

(iii)  $10^3 \times 10^2 \times 10^6 = ?$

(a)  $10^{-1}$  (b)  $10^4$

(c)  $10^9$  (d)  $10^{11}$

(iv)  $10^{-6} \times 10^7 \times 10^3 = ?$

(a)  $10^{-16}$  (b) 10

(c)  $10^4$  (d)  $10^{13}$

(v)  $(3 \times 10^2) \times (2 \times 10^{-3}) \times (12 \times 10^3) = ?$

(a)  $17 \times 10^2$  (b)  $72 \times 10^2$

(c)  $72 \times 10^8$  (d)  $17 \times 10^8$

(vi)  $(2 \times 10^4) + (7 \times 10^{-6}) + 10^4 = ?$

(a)  $(3 \times 10^4) + (7 \times 10^{-6})$

(b)  $(9 \times 10^4) + (7 \times 10^{-6})$

(c)  $(2 \times 10^8) + (7 \times 10^{-6})$

(d)  $(14 \times 10^4) + (7 \times 10^{-6})$

(vii)  $(7 \times 10^{-3}) - (3 \times 10^{-3}) = ?$

(a)  $4 \times 10^{-6}$  (b)  $21 \times 10^{-3}$

(c)  $21 \times 10^{-6}$  (d)  $4 \times 10^{-3}$

(viii)  $[(3 \times 10^2) + (6 \times 10^3)] - [(2 \times 10^2) + (2 \times 10^3)] = ?$

(a)  $10^2 + (8 \times 10^3)$

(b)  $(6 \times 10^2) + (8 \times 10^3)$

(c)  $10^2 + (3 \times 10^3)$

(d)  $(6 \times 10^2) + (3 \times 10^3)$

*That's all for now, keep up the practice and above all - don't be frightened of maths, it can be fun.*

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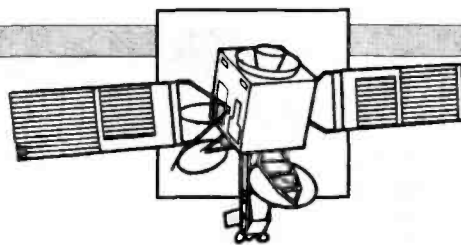
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# SATELLITE SCENE

by Pat Gowen G3IOR

*This month Pat Gowen G3IOR looks at topical news on the main current and future amateur spacecraft activities, with an update on the microsats to follow next month.*

## MIR

Musa, as shown by the Fig. 1 inset, which is the packet radio message he sent down to readers in late April, has been rather too busy to be able to get onto speech f.m. as often as he wished. However, his automatic packet radio has been on and operative continuously.

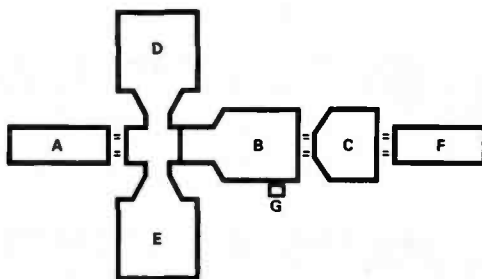
John G6SVJ, managed to connect to U2MIR-1 at 0941UTC on April 19 to read the mailbox contents. There he found headed messages from VO1SA, KF0QN, XE2KAF, ZL1AFC, WG2G, ZL1AAN, VK2BY, IW1BMJ, N6TAF, N5PNU, K3JDG, KV4FZ, KP4BJD, HK4NNJ, VK4JON, LU7DSU, WG2G, VK2YOD, CE2FME, WA1GUD, KC4UZA, KJ9U, but none from Western Europe. Some of the message titles John saw were fascinating, such as 'Thanks Musa', 'Strawberries', 'Not much new', 'TNC software', 'Saluti' and 'Tanti Saluti', 'Saludos', 'Keps for STS-37', 'Space-space', lots of 'Hello Musa's' and 'Very Happy Birthday from Flo'. Quite a few messages were from TR8CA, who, because of the multiple up QRM and the difficulty to access from Europe, takes the RK3KP UA traffic via h.f. packet to pass on to U2MIR. Perhaps the best contest prize that we could offer readers for our next competition, would be a holiday at a packet radio QTH well away from Western Europe. This would enable the winner to have a QSO with the spacecraft crew!

Due to thousands of stations calling, very few European stations can successfully work MIR, because of the onboard QRM. One of the lucky few was Paul Goodrum G1WWX, Downham Market, Norfolk, as shown in Fig. 2, stayed up until 1am on May 15, which paid off. He is believed to be, at the time of writing, only the second 'G' station to have successfully entered a message into U2MIR-1's mailbox.

Musa Manarov U2MIR from MIR and Ken Cameron KB5AWP, pilot on the Shuttle, made the first amateur radio manned space-to-space QSO over Australia at 1241UTC on April 9, when seven radio amateurs were in orbit at once. Due to the usual problems, only callsigns were exchanged.

By the time you read this, Helen Sharman's GB1MIR mission will have come and gone, hopefully without intruders calling over the scheduled school contacts. Helen has her licence, as does Tim Mace, which is seen being passed to them in Star City by Richard Horton G3XWH, in Fig. 3. Boris Stepanov UW3AX, who has been of enormous organisational help in the official amateur radio commu-

"The closer our landing, the more work there is. We are now changing blocks of apparatus and are installing new ones in my 'radio shack', so now the room is a shocking mess. I have almost stopped working Ham radio. My Ham radio gear is installed in the 'Kvant' module - the astrophysical one. Here is the sketch of our space station":



- A - Cargo ship
- B - Main module (main controls, main life space-cooking, exercises, Victor's sleeping place)
- C - Module 'KVANT' (my rig is here)
- D - Module 'KVANT-2' (life systems, exit for EVA)
- E - Module 'KRISTALL' (ovens for technology semiconductors, etc. My sleeping place)
- F - Our space ship (very good indeed)

"This month we have to go out twice on spacewalks (EVA). Our task is to transfer two drives for the solar batteries from module E to module C. The last time we went out, we installed special bearings (supports) on module C. The work is rather difficult. For transferring the drives we use a special cargo (load) Shaft G. It is telescopic like some antennas.

Now, about a few rumours:

We always have a stock of food to last several months, so hunger never threatened us, (and I have remained stout and handsome).

If the Progress cargo ship had not arrived, there would not be new equipment for subsequent experiments. However, there is still enough food, water, oxygen, forks and knives.

About a possible collision: Progress lost radio contact with the station and missed the docking unit. But for these events, we have some automatic control in the Progress on-board computer to put the cargo ship right back. In addition, at the moment of docking the crew must be inside the space ship with the hatch closed.

You see, it was not so dangerous.

We succeeded only in exchanging callsigns with STS-37. They had a damaged antenna.

73, Musa U2MIR

Fig. 1.

nications mission, can be seen in his Moscow office in Fig. 4, together with his 'JUNO' certificate.

## Phase III Satellites

OSCAR TEN showed the first signs of its recovery in late April, with a rather weak and wobbly, but continuous carrier on the 145.810MHz beacon frequency. The Mode B transponder, with care, should be fully usable again now, but please first check into the nets to ensure that full transponder operational status is now advisable.

An attitude change was planned for OSCAR-13 in May, despite the

fact that solar eclipses affecting this satellite began on 22 May 1991. In the past, it has been the policy of the command team policy not to institute magnetorquing operations during eclipses. This is because of the demand made upon a limited charge battery supply. However, in August this year, as there is no choice but to perform this operation during periods of eclipse, it was considered that some experience of the techniques of magnetorquing during the June eclipses could be effected. This has the added bonus of an extra month of operation with the more favourable attitude of 180/0° in the process.

Problems then occurred in late

April and early May because of the wild magnetic field variations during the post equinoctial period of intense solar activity. This was combined with a severe series of non-scheduled geomagnetic storms of long duration. A delay of the final desired orientation resulted, but all was eventually mastered by the dedicated control and command team.

To keep us informed G3RUH and DB2OS report that the current transponder schedule, operative until 17 July 1991, will see the finish of the joint Mode BS. This is because Mode S operation while the Mode B transponder was still activated was found to be impractical, due to the interference caused by the high-power Mode B users. Thus, from Mean Anomaly 130 to Mean Anomaly 140 the Mode B transponder will in future be commanded off. The present schedule is now:

- Mode B: MA 000 to MA 095.
- Mode JL: MA 095 to MA 125
- Mode LS: MA 125 to MA 130.
- Mode S: MA 130 to MA 140
- Mode B: MA 140 to MA 256

The omni-directional antennas will be in use from MA 240 to MA 030. Perigee eclipses up to a maximum of 29 minutes duration will occur from May 21, until the end of September. The latest May spacecraft attitude was ALON/ALAT 179.5/0.0.

The command team report that all transponders will have to be switched off from MA 200, through perigee to MA 035 from 22 May 1991 to 24 June 1991, even though further magnetorquing will not commence until 17 June 1991. Having the transponders off over this period, will provide a needed opportunity to gauge the state of the battery prior to the start of the eclipse period.

## RS-Satellites

Whilst RS-10/11 continues to perform perfectly without a break, RS-12/13 took a tumble in early May. Nothing was heard from the new RS-12 transponder on either 29 or 145MHz for many weeks. A common command system to the main NAVSAT satellite and the RS-12/13 passengers was responsible, and the overall command station had sent signals, either accidentally or intentionally, to turn the amateur satellite off. Prior to then it was functioning perfectly, and until the decay of the equinoctial high solar flux which will not return again until September, I managed to work 24 countries via the satellite. These included W1,2,3,4,8,9 and 0, VE1 and 3, CZ3ANIK, UAO's ICA and JDV in far Zone 19, ZL2 and

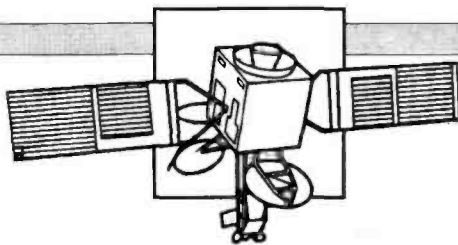


Fig. 2.

many Europeans. I found that I could access the 21MHz input and hear the 29MHz return, even when the satellite was up to 48° sub horizon from 320° through north to 20° azimuth. The RS-12 is highly recommended to old and new satellite fans alike. You will find it to be quite fascinating, of high DX-potential, and a source of superb ionospheric data and research to boot!

The full set of parameters and the means of decoding the letters and figures sent down by the RS-12/13 c.w. telemetry beacon, have now been supplied by Leo RA3AT, head of the RS3A command station. Being two full pages long, they are too extensive to fit into the restricted space of our column, but an s.a.s.e. marked 'RS-12/13 TLM PSE' sent to *PW* will result in a copy being sent to you by return of post.

The RS-14, known as OSCAR-21, still has its share of problems, and apart from the 145MHz c.w. telemetry, remained inactive for most of April. The sudden demise of the operating and fully functioning satellite, was rumoured to be a little 'finger trouble' from the command station. It is thought that the problem accidentally inserted the -12dB attenuator pads into the command receiver input, thus giving a distinct 'deafness' to signals intended to restore the situation. Leo UA3CR and his AMSAT-U-Orbita group have made good use of the telemetry findings that so many kindly sent in at his request, and found this to be of paramount importance in analysing the situation on board. He writes "We think there is some failure with the switching system in the RX input, probably relays activating the input attenuator. We plan to do some experiments to repair this". He hopes that all systems will be active and functioning again by the time you read this.

### Coming Satellites

Whilst Dr. Karl Meinzer DJ4ZC, assures us that the future of the next Phase III-D satellite is secure, the same cannot be said for the projected Phase IV geosynchronous satellite. The earth pointing antennas diagram of this satellite are shown in Fig. 5. There is no doubt as to the technical feasibility nor the construction possibility, but unless international funding can be found for the project within the limitations of a poor economic climate, the future is doubtful at the moment.

### UoSAT-F

On April 26, Arianspace announced that the earliest possible

ARIANE launch of ERS-1 from Kourou, French Guiana would be on Monday May 6. The ERS-1 is accompanied by UoSAT-F, which to be placed into a sun-synchronous 800km Low Earth Orbit. This latest satellite from the University of Surrey stables was first planned, and later dropped, but is now definitely to carry amateur radio equipment operating on a time-share basis.

The satellite's primary non-amateur radio mission is to provide store-and-forward communications for 'Satel-Life', an organisation formed by 1985 Nobel Prize winner Dr. Bernard Lown. Satel-Life will use UoSAT-F to provide a non-profit electronic mail network for health professionals. This will be initially to five African medical schools, to run 'Health-Net' for the exchange of electronic mail and reception of up-to-date medical literature.

Health-Net is a direct application of the current store-and-forward satellite communications techniques, developed in the Amateur Service and used by the microsats. When not serving Health-Net on non-amateur frequencies, UoSAT-F will work on Amateur Satellite Service frequencies, transmitting and receiving AX.25 data using 9600 bit/second f.s.k. modulation. The 2 or 5W downlink is on 435.120MHz (+/- Doppler shift) and supports a 1200bps a.f.s.k. backup. The uplink is on 145.900MHz, also 9600bps f.s.k. with 1200bps a.f.s.k. backup, and this channel will be used by ground stations transmitting 'hole lists' and requests for the PACSAT Broadcast Protocol.

There should be little interference with the UoSAT-OSCAR-14 microsat using the same frequency, format and modulation. However, it has the advantage that stations already equipped for UO-14 operation will be able to receive UoSAT-F with exactly the same software and hardware they already use. The UoSAT-F will transmit telemetry and status messages as U-o-14 and files will be broadcast using the PACSAT Broadcast Protocol as already used on PACSAT, LUSAT and UO-14.

The UoSAT-F's role in the amateur satellite service will be similar to that of UO-9, UO-11 and



Fig. 3.

WEBERSAT. Instead of providing a two-way communication service, it will transmit experimental data and telemetry. The most exciting aspect of this mission will be the charge-coupled device (c.c.d.) camera. The UO-F's c.c.d. camera design incorporates all of the lessons learned from previous UoSAT c.c.d. experiments. It has a 110° wide angle lens providing a field of view only slightly smaller than the satellite's footprint itself. Images will measure 1600 by 1800km, making identification of ground features much easier than those from the previous cameras of UO-9 and WO-18. The image will be 578 pixels by 576 pixels, providing ground resolution on the order of 2km. Each pixel is 8 bits, giving a black and white image with 256 levels of grey.

In service UoSAT-F will broadcast its c.c.d. images regularly, using the standard PACSAT Broadcast Protocol. The two transputer microprocessors in the c.c.d. camera module will take the image and send it over an on-board network to the main 80C186 on board computer OBC186. The OBC will put the image into a file, with 256 bytes of image header information and a standard PACSAT File Header. This file will then be broadcast. For those interested in

writing their own display program, complete technical details of the image file contents will be published soon, and as soon as confirmed that the camera is working, a display program for PC compatible computers will be distributed as software by the satellite itself, using the Broadcast Protocol.

The wide-angle black and white c.c.d. camera on UoSAT-F will complement the WEBERSAT camera that has recently been so successful, and taking advantage of the stable, Earth pointing UoSAT and the 9600 bit/second downlink, it should provide very interesting results for experimental and educational users.

### Satellite Modes And Frequencies

Finally, many readers have asked for the frequencies and modes used by the many amateur radio satellites. Your s.a.s.e. with a request for 'SATFREQS' to *PW* will provide this comprehensive information to you.

Remember that an s.a.s.e. sent to *PW* marked 'KEPSETS PSE' will provide you with latest fully titled sets of all satellites. **PW**



Fig. 4.

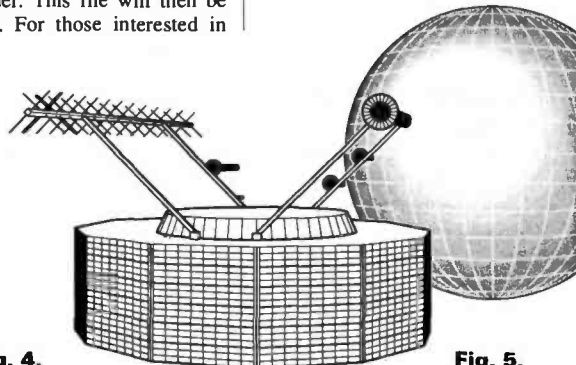


Fig. 5.

# PACKET PANORAMA

*This month Roger Cooke G3LDI, provides some statistics and some sound advice on improving the packet networks.*

I'm pleased to report that I've been asked to join the RSGB Data communications committee. This will be as a corresponding member mainly, due to the fact that I work most Saturdays with the day job, then run quite a busy function-band in the evenings.

However, having been active on h.f. packet since mid-1985, with a BBS on h.f. since early 1986, I hope I'll be able to contribute something constructive. I'm especially interested in the band-planning situation. If any of you have any strong views on this matter that you would like me to present, please let me have them. Either way, I am not prejudiced. Biased yes, but prejudiced no! We desperately need to get the situation sorted out, internationally, not just in our own back-yard.

## Traffic

Just to give an idea of what goes where, who sends what to whom, etc., I am including some of my log-file analysis for the month of March, together with that from Manos SV1IW.

This will give you some indication of just what the BBS has to get through in the course of one month. It will also serve to remind us that, as the users increase, so does the traffic. So please give a thought to that when planning your next bulletin.

Referring to the tables, it can be seen that Manos SV1IW, is one of my main forwarding routes, both for private mail and bulletins. Most of the @EU bulletins come via Jim 4X1RU, who edits them first, taking out all the out-dated, irrelevant, advert-related and foreign language items, that only serve to clog the system. These items are however, imported elsewhere and only serve to waste time both in forwarding them around GBR, and being listed but hardly ever read by users.

## Reading In Chambers

Speaking pedantically, a bulletin is, according to Chambers Dictionary, 'an official report of public news, or of a patient's progress'. This

statement covers the BBS system admirably. It does indeed have some very interesting and informative 'bulletins' posted, but they're interspersed amongst others that should never have been posted in the first place.

## Garbage Defined

The proliferation of what must be called garbage, is causing the system to become self-strangling. This is in spite of many sysops attempting to ease the situation by employing second, third and even fourth radio ports. I think we can view the system as a 'sick patient' that requires medical attention, indeed surgery in some cases! I feel it is time to take the whole system to task. I'm sure that you all know what I mean by 'garbage'. This occurs in several different categories:

1) Foreign language bulletins. I admit some can be useful for students of that language, but the majority should never have come over the channel in the first place. Most seem to be asking for help

from their own people so why target the bulletin @EU?

2) One station was issuing 5k bulletins of temperature measurements in all major capitals - one month old!

3) Bulletins emanating from Japan and such places issued @WWW, containing heard lists on 50MHz, six months old!

4) Humour bulletins, some very risqué, some downright disgusting, some very racial. All totally unnecessary, (I am not a kill-joy, I just think that a BBS is not the time or place for it).

5) The endless debating society debacle. Say no more!!

6) The adverts, whatever type.

To use a system, such as amateurs have established over the last five years, in any of the above ways, is, to my mind advocating chaos. Each sysop has contributed a vast amount of equipment, money and time, in order to provide a resource which should be a virtual reference library of immediate, up-to-date information on amateur radio (am I the only idiot editing at 6am?).

However, in order to make the system work under the

### GB7LDI From Fri Mar 01 1991 to Mar 28

Total Message #'s Used	4035
( From #2185 To # 6220)	
Total Messages received	628
Total NTS traffic handled	6
Local NTS traffic handled	2
Total Messages Killed	3576
Total Log Records Read	19268
Total Number of Users	58
Number of Restarts	49
Number of Quits	17

### Messages Forwarding Data

Messages forwarded	4005
Messages rejected on forwarding	2331
NTS messages forwarded	4
\$ type bulletins forwarded	2661

### Messages forwarded to other BBSs

2384 To/from GB7VLS	921 To/from SV1IW
278 To/from WA3TAI	81 To/from TF3KB
4 To/from 4X1RU	37 To/from RK3KP
33 To/from RS3A	19 To/from GB7TLH
5 To/from G0MWH	3 To/from [44.131.16.2]

### Log analysis SV1IW

Traffic of SV1IW BBS for all available ports.  
For the period from 18-03 to 24-03.

Total connection time	9147 min. (152h 7 min.)
Total time on local console	29 min.
Total time on h.f. 10/15/20	248 min.
Total time on v.h.f. 144.650	5769 min. (96h 9 min)
Mean time per connection	9 min.
Mean time per user	132 min.
Number of messages killed	107
Number of messages read	560
Number of users	69
Number of LOG lines	6327

### Number of forwarded messages per day

Number of forwarded messages	1511
Messages received on forward	620
Messages received on reverse	82
Number of messages refused	272

# PACKET PANORAMA

strain, forwarding is virtually continuous all day, leaving a few evening hours for users. The situation is, of course, exacerbated if the private mail pool is suddenly increased due to a change in propagation! Collisions and retries occur, complaints come in and so on.

## Non-Bulletins

What I would like to see with reference to the above is:

Foreign language bulletins. Remove them all (except, of course, the private mail to and from that particular country).

Temperature charts a month old. They are killed on sight and should never have been originated in the first place, unless it is personal mail to an individual who might want it. I wonder why though?

Heard lists, etc. The same applies - as above.

Humour bulletins. Send them to the *Beano* or *Dandy*. I run a BBS, not a comic!

Debating Society. Letters to the Editors of *PW*, *RadCom* or other radio magazines please, NOT the BBS.

Adverts. NONE whatsoever allowed, I don't run an *Exchange and Mart* and have no intention of doing so. Just think of the awful proliferation if it was 'legal'.

Please ask yourself 'Is my bulletin really necessary?' before placing it on the BBS.

You're a 'Forthright, autocratic beggar' I hear you cry! Perhaps, but I pay the electricity bill and own the gear, so I consider I am entitled to express these opinions! I would, however, be pleased to hear your opinions and will be more than happy to present them in this column. If I am outnumbered, I stand to be corrected.

Just enough space to remind those who are coming to the EADG Barbecue (QTH G3LDI) on June 30. The catering arrangements have now been made, but there are just a few spaces left if you're quick. See you there.

Brickbats, rocks and verbal abuse to G3LDI @ GB7LDI, QTHR or tel: (0508) 70278.

73 and happy packeting.

*Please send a large s.a.e. envelope to the editorial office, if you would like a more detailed analysis of the figures shown in the tables.*

BBS	Received		Sent		Efficiency Bits/s
	NbMess	Size	NbMess	Size	
4X1RU	48	73344	161	305180	204
DK0MWX	2	208	1	516	6
EA4BS	0	0	8	5567	20
F6FBB	2	933	10	12097	46
GB7LDI	156	193135	91	110320	44
HB9JAM	6	7507	89	108523	82
I1HUH	0	0	2	1254	31
I5SGG	35	2164	19	16428	27
PA0SCH	29	49630	114	169688	45
PA3AIR	80	141237	11	22821	42
RK3KP	9	4405	8	6385	15
SM5BKI	3	1803	11	13587	21
SV1ML	255	313327	196	318407	100
SV2DXC	18	18112	289	597189	66
SV7QI	1	297	11	6424	165
SV8RV	29	47397	204	320364	76
VS6UF	22	20298	47	60403	30

## Starting Frame

**Backbone:** A packet radio network that transfers mail automatically; access to this network is limited to BBSs only.

**Backbone frequency:** The operating frequency of the backbone network.

**Backspace:** A terminal (screen/keyboard) key or control character that deletes, in reverse order, previously typed characters.

**Balanced:** A relationship where two stations communicate with one another as equals; that is, neither one is primary (master) or secondary (slave).

**Balanced Link Access Procedure (LAPB):** The CCIT X.25 link-layer protocol that was the model for AX.25.

**Battery-backed RAM (bbRAM):** RAM that is powered by a battery to enable it to store data while its host device is switched off.

**Baud (Bd):** A unit of signalling speed equal to the number of discrete conditions or events per second.

**Baudot Code:** a numerical definition of characters used in passing messages between computer systems. It is almost identical to the Murray Code, used in Great Britain.

**Baycom:** A packet system comprising a very simple, build-it-yourself, cheap t.n.c. and a program for IBM/clones. Written by programmers in Germany, the program is available as 'Shareware' (try-before-buy).

**BBS:** Abbreviation for Bulletin Board System, (see below).

**Beacon:** A t.n.c. Command/function (normally shortened to 'b') that permits a station to automatically send unconnected (or general call) packets at regular intervals.

**Bell 103:** The designation for the (Bell) telephone company standard modems that transfer data at 300 baud using 200Hz frequency-shift-keyed tones centred at 1170 and 2125Hz. It is more common now to use 1600 and 1800Hz, producing a centre frequency of 1700Hz.

**Bell 202:** The designation for the telephone company standard modems that transfer data at 1200 baud using frequency-shift-keyed tones at 1200 and 2200Hz; commonly used for v.h.f. packet applications. Use of these frequencies again produce the same centre frequency of 1700Hz.

**Bit:** Binary digit. A signal that is either on/off or one/zero. Bits are combined to represent alphanumeric and control characters for data communications.

**Bit rate:** The speed at which information is transferred, usually expressed in baud or bits per second (b.p.s.). Also called Baud-rate or data rate, though Baud-rate and b.p.s. may not be the same.

**Bit stuffing:** A process that prevents AX.25 fields from having the same unique contents as the flag field. Also called zero bit insertion.

**Bits per character:** The number of bits combined to represent alphanumeric and/or control characters for data communications. Baudot and Murray code both use a reduced range character set (see ASCII).

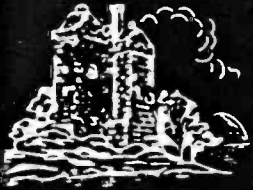
**Buffer:** A portion of the computer memory that is set aside to temporarily store data that is being received or transmitted.

**Bug:** A term used in computing to describe a recurring program error that causes an unwanted, or unexpected result.

**Bulletin Board System (BBS):** A computer system where messages and files can be stored for the benefit of other users.

**Bye:** BBS command (often just 'b') to 'log off' or disconnect from most bulletin boards or message systems.

**Byte:** A group of bits, usually eight in number.



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Certain types of test and measuring equipment require the use of a 'scope to 'see' some aspects of the application. One, for example, is in the measurement of Total Harmonic Distortion (THD) from quality audio amplifiers.

This technique will be apparent from details of this application and the oscillogram, Fig. 3.7, included in this article. Incidentally, full constructional details of a combination sinewave generator and THD meter were published in *PW*, March and April 1983. (The 'PW Durley Distortion and SINAD Meter, by E.A.Rule).

Of course, there are books available dealing with various kinds of testing and measuring equipment requiring the use of a 'scope (Reference 2, Part. 1). Other applications are dealt with in the following sections.

### Phase Differences Again

Although the simple methods illustrated in Part 2, will indicate phase difference between two signals at the same frequency within the audio spectrum, or even at very low radio frequencies, they're not particularly accurate.

This lack of accuracy is mainly because there's no indication of the difference in a finite number of degrees. Remember that a complete sinewave, or parts of it, can be measured in degrees, as in Fig. 3.1, and that 360° is also the equivalent of a complete circle.

### Circular Time Bases

More accurate measurement of phase difference, or shift, can be obtained by using a 'circular timebase'. I demonstrated in Part 2 that a perfectly stationary circle can be displayed on a c.r.t. screen.

Do you remember the 'OXO' oscillogram in Part 2? For the letter 'O', a sinewave (about 1000Hz) was fed 'direct' to one Y input and simultaneously, but via a capacitive/resistive network to the other Y input as in Fig. 3.2. This network is used to shift the phase of one signal by 90°.

The two signals are shown separately in the oscillogram, Fig. 3.3, in which (A) is the direct signal and (B) is the same signal via the network. The phase difference is not instantly apparent until both signals are displayed, one over the other, as at (C).

A 'circular timebase' is produced in the same way with a sinewave direct to one Y input and via a 90° phase shift network to the other as in Fig. 3.2. The sinewave signals to the c.r.t. itself are adjusted to the same amplitude and the 'scope switched for 'XY' function as described above. Slight adjustment of the gain of each Y amplifier, and the X shift control may be necessary to produce a nice round circle centralised on the crt screen as (C) in the oscillogram, Fig. 3.4.

### Using A Circular Timebase

The 'bright spot' (A) on the circular timebase in Fig. 3.4, is a signal we can call (S2) but which is out of phase with another (S1) which isn't visible but otherwise located at the top of the circle i.e. at 0/360°. Taking this point as 0 degrees and moving clockwise, the position of the bright spot (S2) is at approximately 100°. The signal S2 is made visible by feeding it to the 'Z input' (see 'Z modulation' below). Details for suitable external circuitry will be found in references 1 and 2, part 1.

However, as proof that the method is viable, the oscillogram, Fig. 3.5, is included and which was ob-

# The Oscilloscope In Your Workshop

*In part three of the series, Fred Judd G2BCX looks at measuring distortion, recaps on phase measuring techniques, other display types and photography.*

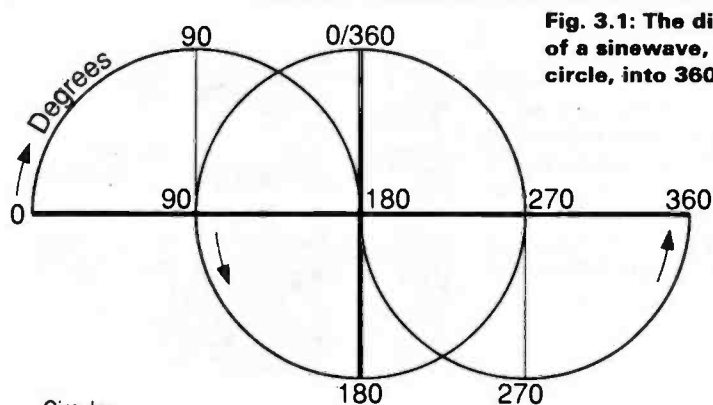


Fig. 3.1: The division of a sinewave, or a circle, into 360°.

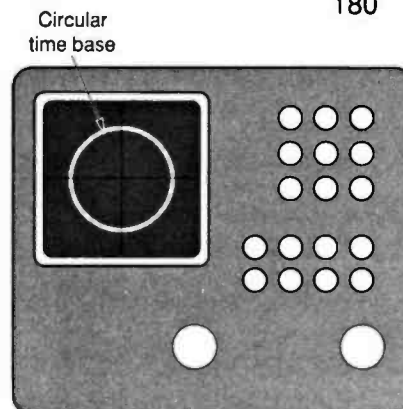


Fig. 3.2: 90° phase shift network and connection of a sinewave both direct and via the network to a 'scope Y amplifier inputs (see text). Values C1, C2, R1 and R2 depend on frequency.

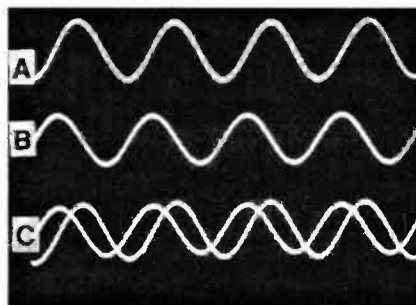
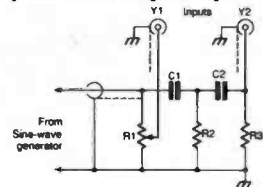


Fig. 3.3: There is a difference in phase between the sinewaves (A) and (B) but this is more apparent visually when they are one above the other as in (C).

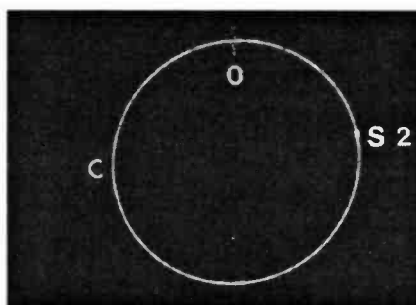
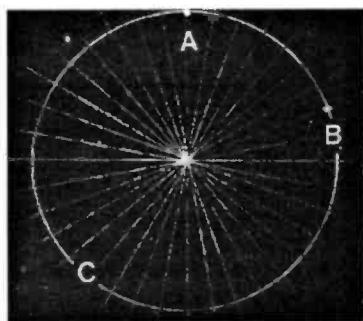
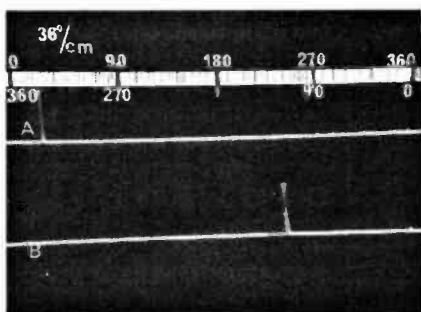


Fig. 3.4: The formation of a circular timebase (C) with a 'Z modulated' signal (S2) about 100° from the 0° point marked at top of circle (see text and Fig. 5).

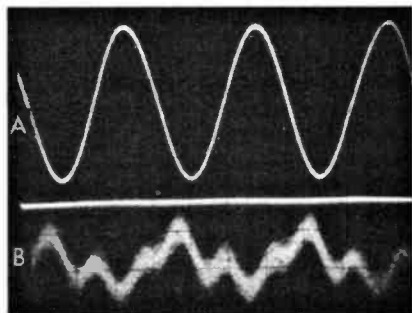
**Fig. 3.5:** A circular timebase (C) with a Z modulated signal (A) at 0° and another at (B) phase advanced by 70° from (A). The graticule divisions are each 10°.



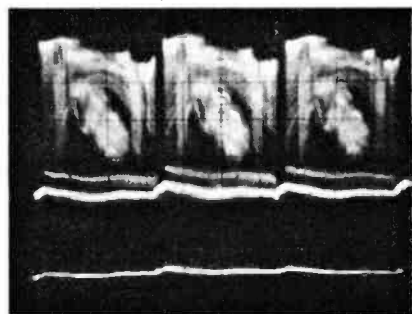
**Fig. 3.6:** Oscilloscope display of a more sophisticated method of measuring phase difference. See text for interpretation of relationship between the (A) and (B) and the markers.



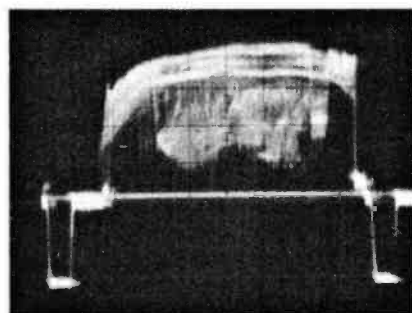
**Fig. 3.7:** Total harmonic distortion (THD) from a high quality amplifier at 1000Hz. (A) The sinewave at the amplifier output. (B) The THD at 0.1% or -60dB relative to output signal (see text).



**Fig. 3.8:** Three 'frames' of a still TV picture. Signals from video output to c.r.t.



**Fig. 3.9:** One 'line' from a still TV picture with video frequency modulation to c.r.t. and at the left, the next line pulse.



tained using specially designed external equipment. The 10° calibration lines are marked on a special graticule to which the circular timebase (C) is aligned.

The phase difference between signal (A) at 0° and signal (B) is 70°. A difference of ± 2 or 3° is quite easy to discern using this method.

### Z Modulation.

Most 'scopes have the Z modulation facility which allows signals to be fed direct to the grid of the c.r.t. Such signals may be + or - going. If they're + going, parts of the trace coincident with the signals will be brightened up and if negative will appear as blank spaces on the trace.

The Z modulation technique is used in the previous application, and it will be mentioned again later in connection with another task. You've already watched the technique in operation on TV! The video signals to construct your facsimile picture, are used in a form of Z modulation at the c.r.t. grid in TV sets to produce the light and dark parts of the received scene.

### Another Method

The following alternative method was originally devised by me for measuring phase difference. It can measure the phase difference between signals at different frequencies. It can also be used in the same way when evaluating the two channels of a stereo audio amplifier, the replay channels of stereo tape recorders and signals from a stereo gramophone pick-up. The equipment as a whole had other phase measurement applications, but the essential 'indicator' was a dual trace 'scope.

The oscillogram, Fig. 3.6, shows the phase difference between signals at the two outputs of a stereo amplifier. A sinewave was fed to the inputs of BOTH channels simultaneously. The two amplifier outputs were connected to separate inputs on the phase measuring equipment.

The 'blip' on trace (A) indicates a phase difference of 18° between the two channels at 1000Hz and on trace (B) a phase difference of 241° at 10 000Hz.

Note: the slight distortion in the photograph makes the readout appear slightly inaccurate. With the actual display it was possible to read ± 1 or 2° (Calibration 3.6°/ma).

### Total Harmonic Distortion

The measurement of THD, as it's usually called, involves the use of a very low distortion sinewave generator and harmonic distortion analyser. While 'readout' is usually from an analogue meter, a 'scope is necessary to 'see' the distortion content as well as residual hum and noise.

The noise is normally measured separately and hum is filtered out for THD measurement. The sinewave used for this application must have a harmonic distortion content of not greater than 0.05% at all frequencies used for testing. Any hum and noise with the signal must be in the region of -80dB reference the maximum level of that signal.

### A Practical Example

The trace (A) in the oscillogram, Fig. 3.7, shows the test sinewave of 1000Hz at the amplifier output. For measurement purposes, the output signal from the amplifier is fed to a correctly impedance-matched dummy load and simultaneously to the distortion analyser.



The THD, etc., is **RELATIVE** to the maximum output power of the amplifier before the onset of 'clipping'. Trace (B) shows the measured THD which was 0.1% or -60dB relative to the amplifier noise on the harmonic signals.

It's highly probable these days that full performance testing on high quality amplifiers is entirely automated, with the results being fed directly to a computer for analysis and readout. This was in fact being done experimentally by one large manufacturer in Japan, nearly 20 years ago!

### Video Applications

Oscilloscopes are much used in the TV and video engineering field, particularly by service engineers. I've already given as reference 3 in Part 1, the book *Servicing With The Oscilloscope* by Gordon J. King, and I recommend it once again.

You may now realise that to deal fully with most of the different applications using a 'scope, would mean writing a whole article for a each one. Because of this, our look into video must be limited to the two oscillograms, both of which were taken from a video recorder (video signal output).

The oscillogram, Fig. 3.8, shows three 'frames' of (Z) modulation for a still picture, while Fig. 3.9 shows 'one line' with the picture modulation applicable to that line. The pulse for the line scan itself, can be seen on the left and that for the next line on the right. Using suitable timebase speeds, a 'scope will also resolve a large number of the line scan pulses. It will also display the sync' pulses, frame scan waveform and even the Ceefax (or Oracle) information pulses between frames.

### Pulse Shaping Circuits

Again, and for the same reasons as the video applications, examples of pulse shaping circuits must be limited. Basic methods are shown, Fig. 3.10, with (A) being a simple 'differentiating' circuit for producing + or - going, narrow pulses suitable for triggering, or as markers.

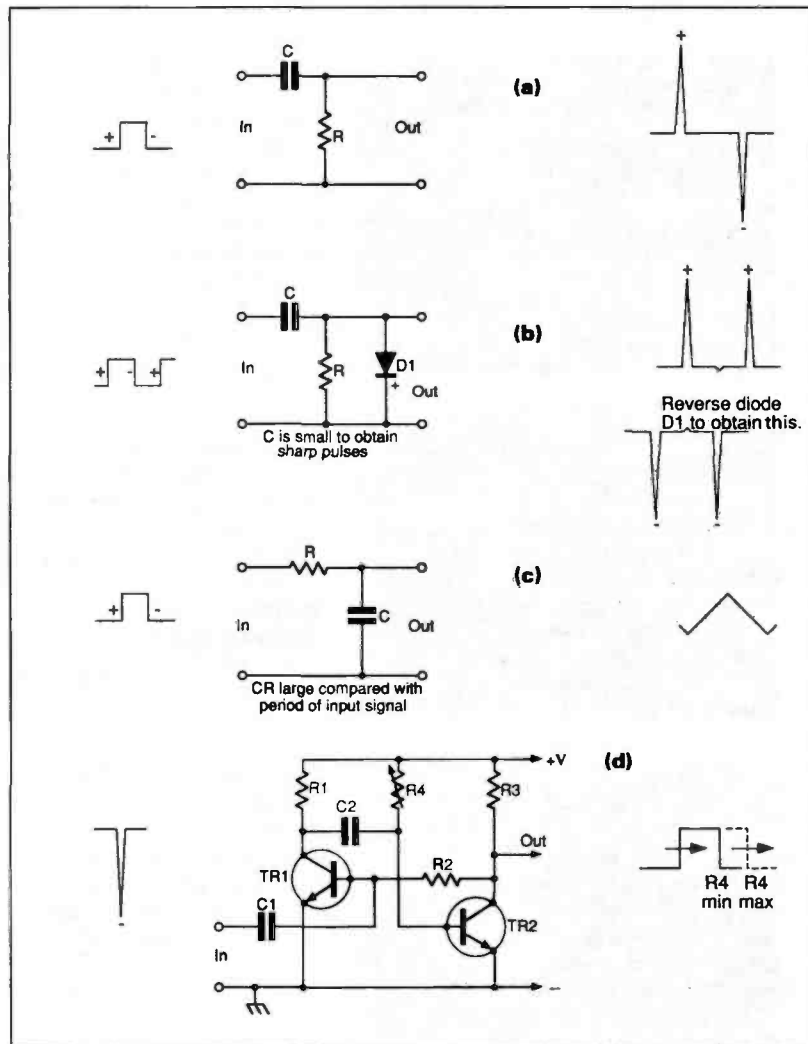
Pulses of either polarity are obtained with the addition of a diode as in (B). The circuit (C) is for 'integration' which, with suitable values of C and R, will produce a sawtooth-waveform.

Each of the circuits shown require a square wave input and can be used in conjunction with a transistorised amplifier. The circuit (D), is a 'mono-stable' (one shot multivibrator) which requires a negative going 'trigger' pulse to make it function.

The circuit will produce a variable width squarewave at the output, depending on the value of C2 and variation of VR1. This circuit is sometimes called a 'flip-flop' because of the way it functions. It is however, useful for providing variable 'gating' pulses. The oscillogram, Fig. 3.11, shows (A) an initiating squarewave, (B) complete differentiation (production of sharp + and - pulses) and (C) the - pulses rectified out to provide single + pulses. There are of course other 'shaping circuits' using transistors, as well as integrated circuits, for specific 'pulse' applications.

### Squarewaves And Y Inputs.

Most 'scopes have a provision for a.c. input (via a capacitor) or d.c. input, which is direct to the Y amplifier itself. The a.c. input is suitable for most repetitive waveforms. For the examination of squarewaves, especially at low frequencies and of course d.c. potentials, the Y amps: d.c. inputs must be used.



**Fig. 3.10: Basic waveform 'shaping' circuits (A) for differentiation of a square-wave. (B) A diode may be connected across R to provide either single positive or negative narrow pulses. (C) Integration. With suitable values of C and R a sawtooth wave can be obtained. (D) A 'one shot' multi-vibrator (flip-flop) will provide a variable width square-wave (see text).**

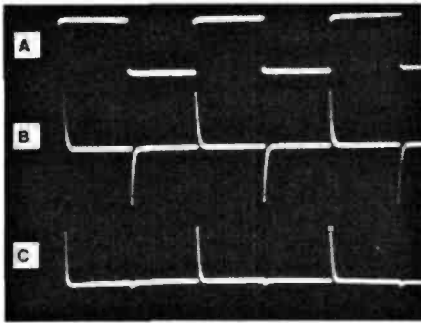
Low frequency squarewaves fed via a.c. inputs will suffer some differentiation, and the tops and bottoms will be slanting as in the oscillogram, Fig. 3.12, in which (A) is a 10Hz squarewave via the Y input, switched for a.c. signals, and (B) switched for a.c. input. This applies when a.c. coupling is used in normal amplifier circuits.

### Other Applications

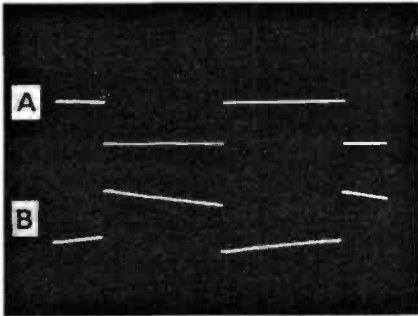
The flexibility of modern 'scopes allows for many different applications. We have dealt with only a few here, but there is room for one more. I devised this circuit some years ago, for using a dual beam 'scope for 'automatic plotting' of antenna radiation patterns from v.h.f. models.

The model antennas, operated at a frequency of around 600MHz, were working replicas of antennas intended for v.h.f. and u.h.f. amateur bands. Details of this, and later methods can be found in *Out of Thin Air, Wires and Waves* and my book, *The 2 Metre Antenna Handbook*, all available from PW Publishing.

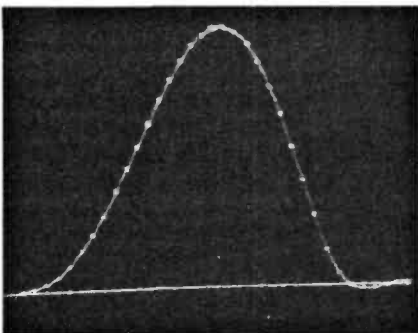
The oscillogram, Fig. 3.13, is a 'Cartesian' plot of the radiation pattern from a 600MHz model of a 2-element ZL Special antenna otherwise intended for operation on 144MHz. The 'dots' are sharp + going pulses used as Z modulation (trace brightness-up) and 10° apart. These measurements made it possible to re-plot the radiation patterns on polar graph paper. The continuous 'plot rate' was about 3 per second.



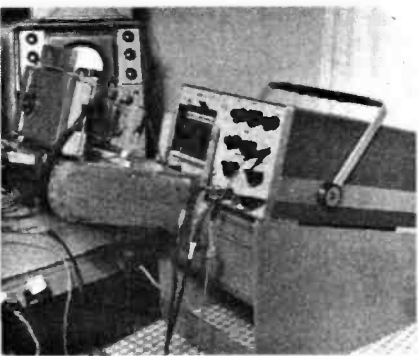
**Fig. 3.11: Oscillogram showing examples of Fig.10 (A) and (B). (A) Squarewave. (B) Differentiation. (C) Positive narrow pulses by differentiation and use of a diode.**



**Fig. 3.12: (A) A low frequency (10Hz) square-wave as it should appear using the d.c. input to the Y amplifier(s) (B). The tops and bottoms will appear to be sloping if the Y amplifier(s) a.c. inputs are used.**



**Fig. 3.13: A 'Cartesian' plot of the radiation pattern from a very high frequency model of a 2-element ZL special antenna. Markers 10° (see text for other details).**



**Fig. 3.14: Oscilloscope stand and camera support. The 'scope is an Advance OS250. Camera is a Polaroid model 350. The 'scope in background is a Cossor 1039 MKIII.**

**Oscilloscope Photography**

Some of the oscillograms in this series have been taken with a Topward 7021 3 trace 'scope, available from Maplin Electronics. Some were from an Advance OS250 dual trace model and a few were taken from a Cossor 1039 MKIII 'scope.

With the Advance and the Topward 'scopes, photography was carried out with a Polaroid camera model 350 using 3000 ASA black and white instant film packs, 'Polaroid 667 Professional' type. The camera was modified for time exposure, in addition to the electronically controlled shutter speeds, and the lens aperture was 'stopped' to about f16.

In order to obtain to maintain optimum focus and keep the camera perfectly aligned with the 'scope screen, a suitable stand and adjustable camera support was constructed as shown in Fig. 3.14. Photos were taken with the room darkened and the c.r.t. brightness at maximum. This is essential if there is any movement in the signals displayed on the screen.

*That's all for this month. Next time we'll look at the 'spectrum monitor', a specialised and very useful extension of the 'scope. Special Instruments using long persistence c.r.t. displays and large screen 'scope v.d.u.s.*

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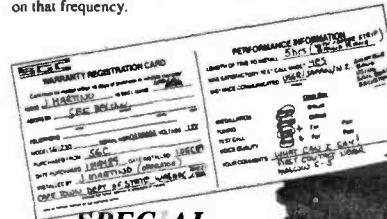
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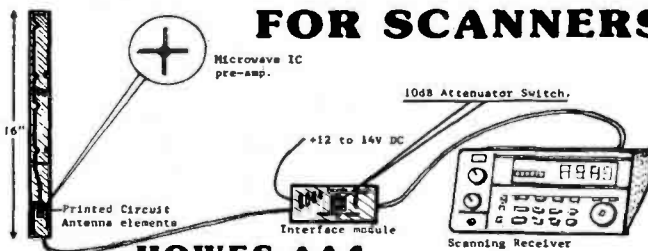
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**73 from Dave G4KQH, Technical Manager.**

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# Back-Scatter

## HF Bands

Reports to

Paul Essery GW3KFE

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

It has been a pretty miserable spring so far, with the long spell of good conditions coming to an abrupt end, although the bands are not too bad at the time of writing, even if the May Bank Holiday weather is of the sort to tempt me to write a column rather than enjoy fresh air!

Lots of contacts reported, so everyone's list has been severely pruned - sorry!

### Splatter

One of the disturbing trends of today, is that of incorrect operation of equipment. One of the trends is the 'wrong v.f.o.' syndrome, which occurs on modern equipment where the pushbutton reigns supreme and there's no room on the panel for an adequate indicator.

Far worse though, is the general tendency for DXers and contesters to over-modulate to the point where they splatter over several kHz. There are some stations who openly admit to a policy of deliberate overdrive, on the principle that by splattering nearby QSOs out of existence, they get a clear channel for themselves despite the annoyance caused.

This it seems, is a prime reason for the widespread perception in UK at least, that contest or DX operators are just an infernal nuisance. That is **NOT** a label most of us want.

### Bands

As indicated, the conditions were up and down. However, it's a rare wipe-out that kills all the bands. Anyway, if all else fails you can read a book, watch TV or even go on v.h.f. for a few minutes!

### The 1.8MHz Band

The s.s.b. transmission from **G2HKU** (Minster, Isle of Sheppey) managed **ON7BW**, but Ted tried his key for **PA3FPA**, **OY6FRA**, **UB5KFU**, **OK1FWQ**, **YL1YR** and **UW1ZE**.

I've already mentioned the Powys club net on 1.932MHz (Tuesdays, 1900 clock time), and now I have a letter from **Dave G0MJK**. He points out that the Northampton group have a net on Sundays, 1.925MHz 1245 clock time for about an hour. Dave has either an **FT707** or **FT101ZD** to make the QSOs, but doesn't say what antenna he uses on this band.

Another newcomer to the band is **Angie G0HGA** (Stevenage), since she received loan of a rig covering 1.8MHz.

### Pirate!

**Angie G0HGA**, notes that she has been receiving various reports that her call is being pirated. At the time she wrote it seemed that the pirate was mainly on 7MHz, he doesn't give a name, his keying is poor and he is a bit of a bore into the bargain. **Angie** had

the ultimate frustration when she heard the pirate twice herself! When she was QRT.

### Award

Up in Nottinghamshire **G0NRA** is the Awards Manager for the Mansfield Club, and kindly sent a specimen and a set of rules. To receive this handsome sheepskin, amateurs or s.w.l.s must obtain a minimum of 30 points, by way of five for the Club stations, **G1GQC** or **G3GQC**, two points for any member of the Mansfield club and one point for any other station in the county of Nottinghamshire. A station may only appear in the list once, regardless of band or mode. A list of Mansfield club members is obtainable from **G0NRA** in return for a s.a.e. Applications, by way of a certified copy of the log entries plus £2, \$4 or 7IRC's, go to **G. Lowe G0NRA**, 25 Manor House Court, Kirkby in Ashfield, Notts NG17 8LH.

### Complaints Corner

I've received, via the Editor, a letter from **G3GTF**, who objects to the mention of 3.5MHz inter-G contacts, and wants every QSO to have a time in GMT attached. Perhaps I should make the position clear. If **Joe Bloggs** is using QRP and has QRP antennas to boot, **G** contacts are DX to him, and I will therefore give 'em a mention. As for tacking times on to every call sign, if the QSO occurred at a 'normal' time, then I don't think the time needs to be mentioned, but if it happens at an 'odd' time and our correspondent mentions it, I do likewise.

### The 3.5MHz Band

**Pat ON7PQ** (Kortrijk), remarks that his c.w. got across to **WS5E**, **VE3BCH**, **KG5U**, **3A/DK6AS**, **RA9YY/RA0Y** in Zone 23 and **YU400/5B4**.

Turning to **G3LPS** (Blackburn) **Eric** keyed with **VE3EJ**, **VE1ZZ** and **9H1EL**.

Meanwhile, **G0KRT** runs 2W of c.w. from a Lake DTR3, with a Howes receiver, while on the antenna side he has 25m of wire out, fed against a counterpoise. Two-way QRP accounted for **G0JNA**, **G0KJN**, **G3NVV**. During the AGCW-DL Morse Memory Week (April 20-26) he raised **G3IVF**, **ON5AG**, **ON5NO**, **G0OEY**, **G0GKH**, **G3ZWH**, **G4USS**, **G3ATH**, which left **F6EQC**, **PA0AUV** and **G300K**.

For her efforts, **G0HGA** had **MORSE** as star of the month, plus a goodly selection of European stations, some QRP, some at the 50W mark, all on the key.

**Don G3NOF** (Yeovil) made a foray on the band with s.s.b. and raised **FP5DX** and **U040F**.

### The 7MHz Band

**Mike GW0HWK** (Wrexham) has been off work and in the 'bandage factory', but adds that he wishes he knew what they dripped into his arm - it was better than his home-brewed ale! On 7MHz he worked **GJ3DVC** and managed some European QSOs.

It's **ON7PQ**'s turn now: **Pat** has **VU2PTT**, **4Z0V**, **P40V**, **H44VU**, **9H30G**, **VK6BFW/VK9X**, **OJ0/OH3TC**, **4K2JL**, **RA9Y/RA0Y**, **4K2/UA3DJG**, **WA11JB/C6A**, **ZS6CDP** and **Z23J0**.

**Eric G3LPS**, has a long list and a severe noise noted in the DX part of the band. He made it through to **VU2FWW**, **5Z4FN**, **ZD8VJ**, **VE7CC**, **ZL1AIZ**, **VA7FJE**, **VE4JB**, **VK7RO**, **VK2APK**, **9H1EL**, **VK2BJ**, **YU400/5B4**, **CG7QP**, **4K1A**, **PS7BX**, **UA9KCN**, **Y88POL**, **LU1CC**, **CE7PVC**, **HK7/SM5HV** and **VU2SU**.

Next we have **Tim G4EZA** (Mablethorpe), who has an inverted-V fed with 10m of open-wire line, having parallel elements for 7 and 14MHz. By shorting the feeder at the bottom and feeding through a Z-Match, as a 'T' antenna against ground radials and the fences, the arrangement works quite well for long-distances. For the nearer stuff, the system is fed as a normal inverted-V, when the DX goes down by 3-4 S-points, and the nearer stuff goes up by 2 S-points. Full-power c.w. (around 80-100W) on 7MHz saw off **AB4FC**, **KE2TS**, **K3RAC** and **WB4BYX**. At 5W, **FE1LZJ**, **IK3NWU**, **SM5CCT**, **Y41RG**, and at 200mW **GM40MU**, **OK1DMS** and **PA3FSC**.

On this band **G0HGA** used 15W for **AA4V**, **K4MC**, **K1BU**, **WC1X**, **K2SB**, **W2QD**, **W3G0H**, while a rise to 90W yielded **K1BU**, **KA1DWX**, **NT1V**, **W2IRZ**, **K1ZZI**, **W0YR**, and **VE3VA**. Others included **OJ0/OH3TC**, **EA6ZY**, **TK4MI**, **CT1BQH**, **UL7TAM** **RH2E** and **MORSE**. For **G3NOF** the s.s.b. score was **LU1IV**, **UL2I/UA4HVV** and **UL8YLA**.

### The 10MHz Band

For 10MHz **ON7PQ** offers **3A/DK6AS**, **H44VU**, **TK/DL7HZ**, **J27P**, **MORSE**, **CU2AK**, **OX3FV**, **OA4ZV**, **JJ1VKL/4S7** and **ZS1JX**, all on the key. Now to **G4EZA**. **Tim** tried 100W for **WA6PSD**, **W7VY**, **WX7R** who was 449 with 4W. Down to 5W for lots of EUs, and with 200mW **G10NMZ**, **PA3ALX** and **Y26XN**. For **G2HKU** the tally on this band included **YL2PQ**, **KP2A**, **HV3SJ** and **WA1HUM**.

### Expedition News

Between July 20 and 27, the Island-Hoppers DX Group will sport an EJ prefix from Great Blasket Island for the IOTA fans. Frequencies will be around

1.965, 3.785, 7.085, 14.285, 21.385, and 28.585MHz, all  $\pm$ /- QRM. They will also be on 50MHz, 70MHz, 144MHz and 432MHz. QSLs, direct only to **E13BA**. Our thanks go to **Conor McGlynn EI6HF** for this news.

### The 14MHz Band

**Don G3NOF** heads off on 14MHz. He reports his s.s.b. contacts with **FR5ZN**, **SV2ASP/A** (Mount Athos), **5H3DC**, **5H3GN**, **7X5ST/3V8**, **9M2CW** and **9M8FH**.

Now to **Mary G0NZA**, as shown in **Fig. 1**, who worked **A61AD**, **SV0HV/9**, **VK6RI** (short path at 1717GMT), **ZP5KI** and **7X2DX**.

Meanwhile **G2HKU** raised **VK2DZD**,



**Fig. 1.**

**4L1QRQ**, **UA0QFC**, **UA0IG** and **YO3PQ/MM** in the Straits of Gibraltar.

I've had to prune the long list from **G0HGA**, but she piled up some 52 USA stations, of which 6 were W6s and 2 from W7; **VKs**, **VEs**, **VU2NI**, **ZL2QW** (a YL), **JX7DFA**, **P40V**, **PP7JR**, **VI9ISM**, **HK3RO**, **GW3INW/HK3**, **MORSE**, several **VEs**, and **G3LQI/M** on narrow-boat 'Moorlands', **EU**, **USSR**, all on c.w. plus **VK2ERY** (another YL) and **OE6JRD**.

Now to **G0MJK**, who found **K4ZWG**, **WQ4J**, **N3GPP**, **VK6NS** (Perth, W. Australia at 1803GMT!) **WA2YGV**, and a brace or Europeans, all on s.s.b.

**Tim** at **G4EZA** used his full-power c.w. for **PY2NN**, **PY3AVF**, **YN1CC**, **4K20IL**; 5W for a brace of SMs; cranking the mode switch to s.s.b. yielded **HK1FCG**, **TA2/LA6WEA**, **TA5/NOFYR**, **TF5BW**, **VK6NC**, **YC30SE**, **YW1A** (=VV), **3A2LZ**, and **5B4YX**. Only 5W was needed for **3A2LU**.

For his report, **G3LPS**'s long list can be summarised as **VKs**, **VE7**, **9H1EL**, **ZL3GQ**, **5B4**, **V07**, **A22GH**, **VA6BF**, **ZD8VJ**, **FY5F0**, a shoal of **VE1-2-3-4**, all in **BERU**, plus **MORSE**, **4K4/UA90DV**, **UF7Q/UL7LS** and **UA0WAD**.

**Mike** of **GW0HWK** reports that he managed **ZP6HR**, **J39CO**, **SV0HV/9**, **4L0DXC**, **V41MB**, **A92FN**, **0D5Z2**, **5B4ZZ** and **PT7YS**.

Over in Belgium, **ON7PQ**, the keyer connected with **H44VU**, **7P8EN**, **1A0KM**,

# Back-Scatter

4K4/UA9COV (IOTA AS-42), VK6BFW/VK9X, MORSE, 4K1A, VQ9JH and FK8FS.

The note in April's issue where GOGOP mentioned 28MHz reception of ZS6RF and ZU1B, brought forth an interesting letter from Jules du Plessis ZS6AH. He says that Grant Dalziel ZU1B was indeed in QSO with his father Leon, but mentions also that ZU1B is the very first of the new novice calls to be allocated. Apparently ZU1A had been allocated for demonstration purposes, to the Johannesburg Amateur Radio Club.

## The 18 and 24MHz Bands

Pat ON7PQ got on 18MHz for YU40Q/5B4, A92FN, 7Q7WW, VK6BFW/VK9X, H44VU, Y88POL, JR5JAQ/JD1, T77C, C02AW, ZS6QU, D68FT, FW0BX, A22GH, ZD8LI, 9Y4KB, VP2ES, and K9EL/VS6. The 24MHz band wasn't quite so good, but offered A92FH, SV11A/A, TA5/HA0MM, KC6VW, H44VU, 3C1EA, FM5WD, HF0POL (S. Shetland), 4U1UN, 9Y4KB, 3B8CF and Y88POL.

Another long list came from GW0HWK. On 18MHz he found D44BC, V2/VE2ODC, TU20P, 9H1LR, HF0POL, CP6XK, EL2SM, JH5AVM, ZB2AZ, XQ2X (Frans Ambrosio Is), A71AL, 9Y4RT, PZ1DK, 8P9BY, KP4QY, UG6LQ, VK7TK, KL7XD, VEs, Ws, and smaller fry. On 24MHz he found VK6BFU/VK9X, V47KJI, 8P6CC, HF0POL, EL2SM, VP8CFV, V41MB, 9J2AD, PZ1EL, JAs, 4X6DK, V51KCJ, 9Q5TE, 5Y4FO, 3B8CF, Z21CS, SV0HV/9, ZC4CZ, 5B4JE, PJ8AD, TL8MB, UH8EA, CU2AK, VU2R, LU8EWD, UA4HTT/RV4L, and the usual Ws and EU.

On this band, G4EZA found his c.w. useful for EA6/DF3FJ, JA7JI, W6DU while s.s.b. managed JR5JAQ, and UM8MCW; these were 18MHz, while 24MHz produced JA8AJE and UJ8KA

by keying, CN8BX, JL1UJG and UM8MTA on sideband.

A letter from Vince 9H1IP (M'Scala, Malta), was some ten days reaching me, despite being correctly addressed and air-mailed! However, sticking to s.s.b. on 24MHz he worked ZC4CZ, TZ5PS, V47KJI, HH2GB, VK6BFZ/VK9X, KP2BU/C6A, 4S7NB, PJ8AD, V51BG, VKs, VP8CES (Antarctica), various rare Ws, VE, EA6, A22AA, CP6XK, 9X5NH, XE3EB and VE1CBK/VO8. For 18MHz the tally included 9Q5TE, EL2SM, 9J2MK, VP8CFR, UA0FF, Ws, YV, VE7, VP2MLD, A71AL, CP6XX, YB, UM8, KP4CKY, TL8MB, FM5WD, N4YBF/6Y5, XE3EB and PY7EC.

Now to Andrew G3VWC (Bath). He has just recommissioned his 1967 bug key since his el-bug relay 'turned its toes up.' On 18MHz, the old key and transmitter made it out to U050LW, VE3HV, KB4GID, R18BQ, TA2A0, W8MJG, YQ3R and W6ZUL.

This time G2HKU had a sniff of 18MHz, with W7QK (Oregon), VK7AAQ, and VK3MJ, while 24MHz yielded C01HJ, JG1IEQ/3, N5TP, 4X1FC, KB2EA; all were c.w.

Up in Nottingham, G0NZA has been giving 21MHz a bashing. Mary dismisses 10, 18 and 24MHz as 'nothing of note!'

Down in Yeovil, G3NOF noticed that in mid-April VKs were to be found on 24 and 28MHz at around 2200-2400GMT. Don takes 18MHz as giving EX1RB, KL7XD, RM8MA/RM0T UM8MCW, VP8CFR, YB0WR, YU40Q/5B4. On 24MHz it included A61AD, CU8AI, D44BC, DU1KK, DU4DX, ER4L, FM5EP, FS/JA1FUJ, FS/JL1RUC, JAs, K4OVS/C6A, NH6C, PJ2MI, PZ1DY, S79KMB, SV0HV/9, T77J, TL8MB, UA4HTT/RV4L, UH8EA, UM8MCW, UM8MTA, VK3CEW, VK7GK, VK80B, VP8CFV, VQ9AY, Y88POL (Antarctica), YB0XX, ZS6AIS/7P8, 3B8CF, 4J0Q, 7Z1IS, 9J2AD and 9Q5TE.

## The 21 and 28MHz Bands

Lumped together to save space! This time G2HKU avoided 21MHz, but on 28MHz he worked PY20U, KB4GY and FY5FE.

Mary G0NZA used s.s.b. for RA1AKB (Kotlin Is), VP5LJ, SV5AJJ (Rhodes), VU2TTC, and 4X4MS, OD5Z, EW10WV 80km from Chernobyl, UZ9CWV, while c.w. went out to UA3LEY and HA0LPH.

From Somerset, G3NOF booked in, on 21MHz, BT80TUA (a 'special' from BY1QH), CK7C, C02VG, C06CG, F00IGS, FW0BX, FS/JG1TCB, H44MS, HC1EA, HK3JJH, HS0E, JAs, KG4AR, KL7s, KP4BZ, NL7DU, NU2L/VE2 (Sept Isles), T30A, UA4HTT/RV4L, UA0KBY, UZ0CXD, V47KJI, VA6SV, VKs, VY2QST, W0ACT (S Dakota), XK6GV (=VE6GV), YC0MNO, ZD7CRC, 8P9FF and 9N1MM. The 28MHz list is longer yet, and includes 9X5SW, 6Y5IC, 5T5HH, 5Z4s, 5N9ABY, 4X4s, 4S7, 4K20IL, ZP0Y, ZP5LOB, ZL, ZF, YB, XE, VU2SMN, VQ9s, VP5VDR, VKs, V31DF, T120V, TA, PJ9X, P40V, P29NMD, KC7V (Arizona), K8JP/V42, JAs, J37AE, J43AHRs, HU0WDX, HH7PV, HC10T, FS/JL1RUC, FR5DX, FL6YL, DU1ETU, D68FT, C40R, BT80TUA, A41KV and A22A.

On now to ON7PQ. Pat keyed on 21MHz with 9N1MM, 8Q7ZL, 7Q7WW, VK6BFW/VK9X, H44VU, FW0BX, 4K4/UA0KW, 4K20IL, VP5P, AH6JF, FW/VK2BEX, 9Y4KB, VP2ES, K9EL/VS6. On 28MHz he found 7Q7WW, H44VU, P40V, RA1YY/RA0Y, FW/VK2BEX, CE0FFD, ZD8LI, OK3CLA/5N0, WA11JB/C6A, 9M2ZA and Z21AB.

For GW0HWK his short visit to hospital meant he was able to get some extra shack-time in. The 28MHz band saw him chasing VP8CFN, Z21HD, ZC4DG, 5B4ES, AP2JZB, HK6MCK, UL8DGZ, 9H3MU, CU3AV, Z21DB, 5Y4FO, 4X1PB, P40V, VA8A, VP5E, ZP6A, V2/VE3ODC, 5Z4RT and GW/

Y26EO/M. Turning to 21MHz the list here says ZB2AZ, 7X4VAK, 9L2DG, ZD8DX, CX5CG, OD5ZZ, Ws, FM4FM, PY4PB, CU1AF, Ws, and smaller fry.

Over to the G3LPS key: Eric mentions YU40Q/5B4, ZB2EO, ZC4CZ, HK3RQ and 4K20IL in Franz Josef Land.

For his report G4EZA hooked on to 21MHz and worked YV1AD on the key, plus sideband to KP4BZ, TA5/N0FYR, YB4ZBY, YW3A (=YV), ZW4OD, ZX5C (=PY), and 4K2/UA3DJG. While 28MHz saw him working sideband to ZC4MK, ZD8DX, and c.w. to TA2DA and YU40Q/5B4.

At G3VWC, Andrew's key raised CX3EU, CX8DR, PZ1AV, PY1RCR, PY2BDN, PY8RR, VS6UW, LW2DFM, LU1FNH, JN1LZF, JH1BBT, JR7INP, UA9KFB, UA9KCN, UW0FP (Sakhalin), UA0UG, UA0IG, UD850DKW, UL7JW, EX3FJL (Franz Josef Land), W0UO (Colorado) and W7WHO in Oregon.

On 21MHz G0MJK managed VE3AGS, WA4RNN, VE30CW, PY2AIZ and 9H1GL, but on 28MHz, only SV3AGN was booked in.

Finally to G0HGA. On 28MHz, she had a c.w. QSO with NA8G at 2130 on 10W, plus JH1TZZ, JA0DWY, UA0MO, U3DR and LU6EF, while on 21MHz the scalps included VK3ELB, JG1PED, PR7BC, MORSE, 4L1QRQ, WX2L, W3ARK, NA8G, NX1X, WF1W, WJ2W, K4FU, KC4WWQ, W6UZ/4, WA7WOC and KA5QB plus the usual USSR and Europeans.


How about a photograph of you in your station to use in 'HF Bands'? Colour or black-and-white prints are welcome, provided they are sharp and clear.

## Deadlines and Things

Don't forget Wireless Line on (0898) 654632 for all the latest DX happenings. Meantime, your deadlines are June 24 and July 29 to arrive addressed as above. Till then, 73!

## Solar Data for April 1991

The quiet side of the sun was facing our way between April 1-7 but magnetic disturbances still continued. A major flare occurred at 2255UTC, on April 2, lasting for 100 minutes. From April 8, as the more active side of the sun rotated into view, there was a rise in solar activity. Sixteen M type flares were reported between April 8-14, the most active day being the 11th when five M class flares were observed. During the following week, from April 15-21, there were 22 flares but despite this, the solar flux levels remained fairly steady. It is interesting to note that during the period April 7-20 there was no recorded instances of long distance propagation effecting the 50MHz band. From April 22 to the end of the month there was a big decline in solar activ-



**Back-Scatter**

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

ity. A well positioned coronal hole contributed to an increase in geomagnetic activity from April 28. This intensified on April 29, giving rise to a major geomagnetic storm and the consequential auroral activity effecting all v.h.f. bands.

The solar flux index climbed from 193 units on April 1, to peak at 268 units between April 14-16. It then declined to 135 units by April 24, increasing

slowly to 160 units by April 30.

The daily geomagnetic A index was at a minor storm level of 32 units on April 4, and at a major storm level of 53 units on April 29. During the period, April 8-24, it was quiet to unsettled.

## Forecast For June-July 1991

We are now in the period when Sporadic-E propagation is most

prevalent. It will effect the 50 and 70MHz bands almost every day, and occasionally reach up to the 144MHz band. It may even be effecting that band at this very moment!

During the summer months it's expected that high pressure will dominate over Europe. Tropospheric conditions should therefore be enhanced on a number of days. Generally speaking though, the summer tropo openings never compare to the spectacular distances that can be worked during the autumn.

## Aurora!

Reports are still coming in regarding the aurora on March 24. Dave Lewis GW4HBK (I081) concentrated on 70MHz and between 2210-2310UTC worked G3CQJ (I091), G4ASR (I081),

G8GXP (I093), G8VZT (I082) and G0EHV (I094). At 2235UTC, Dave was called by a G station, but unfortunately the auroral distortion was so bad that the station couldn't be identified.

Rick SM7SCJ (J065QJ), managed to work 42 stations between 1722-0227UTC in the event on March 24. Contacts with the UK included G3BW, G3UTS, G4EZX, G4PIQ, G4SWX, G0CUZ, G0KON, G14KSO, GM4CXM, GM4YXI, GM/DL5BCU and GW4VEQ.

Another widespread aurora occurred on Monday April 29, effecting all bands up to 430MHz. Chris Tran GM3W0J (I077) got in the shack at 1530UTC, switched on the 50MHz receiver and heard auroral signals from all over N.W. Europe. Moving to 50.140MHz s.s.b., he called 'CQ Aurora' and worked PA3BFN, G3UHH and G8GXP in quick succession. At 1536UTC he was called in the pile-up by CX8BE (GF15), who was 55A. Assuming that it was F2 or TEP, Chris turned his antenna on the direct path of 220 degrees but nothing was heard. Returning the 6-element Yagi back to 45 degrees, contact was again established and 55 reports exchanged, GM3W0J giving him 55A and Jorge CX8BE giving him 55. Later in the event, Chris worked SM6HYG and SM7NNJ who both confirmed that they had heard CX8BE via the aurora. A telephone conversation with CX8BE also confirmed that the QSO had taken place and that GM3W0J was the only European station heard at the time, and that it was tone-A. It is assumed that in Uruguay, auroral signals have not been heard before, hence the 55 report. As both signals were tone-A, and as the contact could only be completed via the auroral curtain, Chris is claiming this as a new world record for 50MHz auroral working - 11300km! I have a copy of the tape recording made at the time and it really does sound exciting. Contact me if you want to borrow it.

At my QTH, I found little in the way of DX on 50MHz, and so I moved up to the c.w. end of 144MHz. There wasn't much in the way of DX there either but I did manage to work, between 1625-1805UTC, DJ1JJ/P (J052), DK1KR (J053), EI6GF (I062), PA3FJY (J032) and 5 GM stations in I067, I075, I077, I085 and I086. I tried making a number of calls on 70MHz but despite hearing GB3ANG (70.060MHz) fully auroral, I heard no other tone-A signals. I was pleased however to be called, on tropo at 1805UTC, by G4EJM (I094). Bill is located in Cleveland, a fairly rare 70MHz county.

Marcel FD1DQK (JN18), was a bit more fortunate in finding the DX on 144MHz. From his QTH in Paris, he made a number of c.w. contacts via the aurora between 1630-1730UTC. Towards the end of the event, while on a beam heading of 45 degrees, he was called by R1JEA. The signal was very weak and did not exhibit the normal auroral distortion. Marcel thinks that the mode was either Auroral-Es or



**Fig. 1: The shack and antennas of the well-known 50MHz DXer WB20TK.**

possibly FAI. The latter may well be so, as Didier FC1MXE (JN05) reported FAI propagation a few days later, working IC8CQF, IC8EGJ, IT9IPQ, IW8BZN and hearing IT90WA/9.

Field aligned irregularity is a new mode to most v.h.f. operators. However, because the FAI and Sp-E seasons coincide, it appears that some 144MHz openings that have been called Auroral-Es or Sp-E were in reality FAI. Although s.s.b. can be quite intelligent via FAI, signals are normally weak and fluttery, so c.w. may yield better results.

### Sporadic-E

As I have already mentioned, we are now within the main Sp-E season. In the northern hemisphere this is most likely to occur between April-August, with a minor peak in late December. Although it can occur mainly during daylight hours, the best times for monitoring the 144MHz band will be between 1100-1300UTC and 1700-2000UTC, especially throughout June and July. It is very common on 50MHz and you can expect to find one-hop signals, around 2000km, nearly every day. It should be noted that occasionally, a multi-hop path exists on 50MHz across the Atlantic to North America. Statistics tell us this is more likely to occur during the first and third weeks of July between 2200-0000UTC.

The Sp-E cloud can be quite small and moving very rapidly, so on 144MHz in particular, you may not have much time to make a contact and go looking for another. Callsigns, report, locator and 'roger' are all you need exchange, and with a little practice you can complete the contact in 10-15 seconds. See you in the pile-up!

### Meteor Scatter

During March/April of this year, Eckart DJ4UF operated from various locations in France and Spain. Using an FT290R, 150W and a 13-element Yagi on a wind-surfing mast, a number of m.s. contacts were made into the UK. Operating from JN12 on March 31,



he worked G0GMS, G0KON, G4EZX and G4YTL. On April 7, whilst in locator JN13, he contacted G0GMS and G4YTL.

Petros V1AAF located in Athens (KM18) is now active on c.w. meteor scatter. Want to work Luxembourg? The 'DL West v.h.f. DX Group' will be active from JN29 between June 28-30, using the callsign LX/DL4EBX. The group will primarily be active via meteor scatter on 144.073MHz. Schedules will be taken in advance on the v.h.f. net by DL1EFJ or DL8EBW. You can also arrange a sked by writing to Guido Junkersfeld DL8EBW, Gneisenaustrasse 10, D-5600 Wuppertal 11, Germany or by telephoning him on 010 49 202 781170. Lasse SM5DCX/3, is going to be active via c.w. meteor scatter from JP81 between July 22-28. He will take skeds on the v.h.f. net.

The following data, concerning meteor showers occurring during June-July, will help you determine in which direction to beam at specific times and when the shower is below the horizon. The June Perseids, alternatively called the 54 Perseids, are encountered between June 22-30, peaking on Wednesday June 26. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1500UTC beam south-east or north-west, 1500 to 1600UTC beam south or north. The radiant is below the horizon from 1700 to 0300UTC.

The Beta Taurids shower lasts for over a month, from June 5 to July 17, reaching a maximum on Thursday June 27. This shower has virtually the same beam-heading characteristics as the June Perseids, the only minor difference being that the shower is below the horizon from 1700 to 0500UTC.

The Alpha Orionids occur between July 9-15, with best activity being on Friday July 12. Between 0600 to 0800UTC beam north-east or south-west, 0800 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west. This shower does not favour the north-south path and is below the horizon from 1600 to 0500UTC.

The Nu Geminids stream is encountered between July 9-18, peaking on Friday July 12. Between 0600 to 0900UTC beam north-east or south-west, 0900 to 1200UTC beam east or west, 1200 to 1400UTC beam south-east or north-west, 1400 to 1500UTC beam south or north. The radiant is below the horizon between 1700 to 0300UTC.

The L. Geminids shower can be worked between July 4-29, the best day being Friday July 12. Between 0700 to 0900UTC beam north-east or south-west, 0900 to 1400UTC beam east or west, 1400 to 1600UTC beam south-east or north-west. The north-south path is not usable with this shower. It is below the horizon from 1800 to 0400UTC.

### The 50MHz Band

As predicted in a recent issue of *PW*, the band opened up to Africa and South America on a number of occasions with most openings occurring between April 1-6 and 21-29. Towards the end of the month, the first real signs of the summer Sp-E season was detected, allowing many inter-European contacts to be made. These European, African and South American openings continued into the first week of May, but more about these in next month's column.

The month started off slowly with only TL8MB, TR8CA and V51VHF being reported on April 1. It was a little better on the 2nd, with TR8, V51, ZS6, 3DA0BK, 7Q7JA and 9L1US being heard in a morning opening from around 1030UTC. Although GJ4ICD heard PY5CC and KP2A at 1400UTC on April 3, very little else was reported in the UK until April 5. The band was open all day from 0945-1645UTC with at least 12 African countries being worked. Some of the DX included A22BW, CN8ST, TL8MB, TU2MA, V51E, ZD8LI, ZS2/4/6, ZS9A, 3DA0BK, 3X1SG, 7Q7JA and 9L1US. The band was also open to North and South America with FM3AG and FM5WD on Martinique, KP2A, LU7DZ, LU9AEA, PP5WL and PY5CC all putting in an appearance. On April 6, PY0FF on Fernando de Noronha and ZP6XPW in Paraguay were worked from the UK. Some real DX at last! For the next fortnight however, the band was very quiet with nothing being reported until April 21, when a small opening into V51 and ZS9 took place around 1630UTC. The band was open to Africa again, on April 26, with V51, ZS6 and Z23JO being worked in a two-hour opening commencing from 1600UTC. The final DX opening of the month occurred on April 28 with propagation to South America. The band opened up from 1230UTC, with many UK stations working into CX, LU and PY. At 1250UTC, I heard the beacon ZP5AA, on 50.025MHz, peaking 529. It runs 5W into a ground plane antenna. Not a bad way to finish off the month.

Ela Martyr G6HKM (J001) made



# Back-Scatter

reference to my comments in the May issue of *PW*, in which I stated that the Republic of the Philippines (DU) were in Oceania. According to her Philip's Atlas, DU is listed as Asia and Ela would much prefer to claim DU than ZC4 for WAC. In fact she could have claimed it some time ago but wanted better DX for Asia! Whenever I need to find out which continent a particular country is in, I always refer to either the ARRL or RSGB operating manuals. Both of these show that the Philippines are in Oceania.

The shack and antennas of the well-known 50MHz DXer WB20TK are shown in Fig. 1. He uses an FT102, Microwave Modules transverter and amplifier. The antenna system consists of an 8-element Yagi at 34m for 50MHz, an 18-element Yagi at 38m for 144MHz and a 28-element Yagi at 40m for 430MHz. Mounted, off the side of the 33m high tower, is an array of four 6-element Yagis for 50MHz.

## The 144MHz Band

Conditions during April were unexceptional with only the aurora on April 29 livening up the band, and that only for 3 hours or so! Many bands seem to be getting quieter and quieter, with very little to report. Apart from the aurora, I only made 4 QSOs during the month, G6HEF (IO84), GM4DGT (IO85), MORSE (IO81) and PE1CZQ (JO22). Ela G6HKM found EI3GE and GU4XGG, but little else.

Geoff Brown GJ4ICD (IN89) mentions hearing some very strong EA1 and EA3 stations, via tropo, on April 4. He also heard a very weak EA6 station, possibly EA6FB on 144.290MHz. Did anyone else hear this station?

John Hill G7CLY (IO93), reports that he has been off the air for 6 months following the demise of his antennas in the December gales. He has now erected a 13-element Tonna at 8m a.g.l. and reports working 17 countries and 3 countries since the beginning of April.

## The 430MHz Band

Philip Lancaster G0ISW (IO84), has been concerned about the level of activity on this u.h.f. band. He sent out a packet radio bulletin to this effect, and was pleased to get a favourable response from G7HUD (IO83), G8DQK (IO83), GM4CXP (IO85) and GM6BIG (IO75). As everyone requested schedules to take place during the week, he has arranged activity periods to run on Wednesday and Thursday evenings starting at 1930UTC. The suggested meeting frequency is 432.210MHz with either s.s.b. or c.w. being used. Any suggestions for different modes, frequencies, times are welcomed. Philip is located in Cumbria at 166m a.s.l. and with 10W into a phased array of 16 dipoles, he can normally work to the south coast. He hopes that other operators will join in and increase activity on the band.

### Annual c.w. ladder

Station	Band (MHz)			Points
	50	70	144	
G4OUT	4	81	—	85
G4ASR	18	37	—	55
GW4VXX	—	11	—	11
GM4CXP	1	6	—	7

Number of different stations worked since 1 January 1991

Another station looking for schedules is Markus DH5YAU (JO41). He runs 150W to four 33-element Yagis. You can arrange a schedule by writing to Markus Toppmoller, Auf dem Knull, D-4830 Gutersloh, Germany or by telephoning 010 40 524 125 146.

## Beacon and Repeater News

Mike UL7GCC has passed on the news that he is running a private beacon on 50.055MHz, from locator MN83KB. Using the callsign UL7GCC/RL3Q, it is operational between 1500-0300UTC, running 3W into a ground plane antenna. Mike mentions that he hopes to change the antenna to a Yagi sometime in the summer.

Larus TF4LB is running a beacon TF4SIX on 50.57MHz. Located in HP86LB, it runs 15W into a 2-element cubical quad antenna. This beacon is replacing TF3VHF which was destroyed late last year. If you hear the beacon and there is no other TF activity, you can telephone Larus on 010 354 4 4386 and he will come on the air.

A microwave beacon GB3SEE, is now operational from Reigate (IO91VG) on 10368.850MHz. Reports should be sent to GOOLX QTHR.

A telephony gateway has recently been installed in Budapest. A 28MHz s.s.b. transceiver has been connected to a 144MHz f.m. repeater enabling Hungarians with 144MHz hand-helds to make DX contacts. Try calling on 28.444MHz and you might get a pile up of HA and HG operators. It may be an ideal way of arranging those meteor scatter skeds!

News has been received of repeater units located on the Channel Islands. The Jersey 144MHz repeater GB3GJ has unfortunately closed down

### Annual v.h.f./u.h.f. table January to December 1991

Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Countries	Counties	Counties	Countries	Counties	Countries	Counties	Counties	Countries		
G6HKM	43	31	—	—	38	11	12	3	10	2	150
G6ESB	4	2	13	2	36	6	25	6	4	2	100
G4ASR	—	29	41	4	10	7	—	—	—	—	91
GM4CXP	2	1	2	2	22	3	—	—	—	—	32

permanently, but on a more positive note the Guernsey u.h.f. repeater GB3GU is again up and running, this time from a new site near St Peter Port.

The Northampton microwave repeater/beacon is now operational on 1297.125MHz. Reports are welcomed by Paul Young G0HWC.

## DXpedition Update

Bo QZ1DJJ will be active on 50MHz from various squares in Greenland during 1991. Using the callsign OX3LX, he will operate from GP38 between June 7-22, GQ30 between June 25-July 6 and GQ12 from July 8-20. He will be running 50W into a 5-element Yagi.

During July and August, Laurant FJ5BZ will also be operating from Greenland on 50MHz. He will use the callsign OX/F6GDX and whilst there, will install a beacon OX3BCN, on 50.025MHz.

A group of French operators will be running e.m.e. from Jersey during July. Using the callsign F6KSX they will operate on 430MHz between July 4-6 and 144MHz between July 7-8.

During July, Johannes LA6HL will be making his annual trip to Iceland. He will use an FT726 into a 5-element Yagi on 50MHz, and the same transceiver on 144MHz into a 160W amplifier and 15-element Cue Dee antenna. Between July 4-9 he will operate from locator squares IP14, IP24, IP25, IP34 and IP35. He will then move to a camp site near Reykjavik (HP93), staying there from July 10-19, during which time he will increase the antenna system to two Yagis and work e.m.e. on 144.039MHz. Between July 20-25, Johannes will go to the south coast, IP03 and IP13, where the take-off is very good into Europe. He will operate

on 144.183MHz, via meteor scatter, transmitting during the first 2.5 minute period. As has been the practice in past years, Johannes will spend more time listening than transmitting. He mentions that the best time to make random calls, on 144MHz, would be from 2000UTC. Because of TV restrictions, he is only allowed to transmit on 50MHz between 2300-1800UTC. After leaving Iceland, he will be active from the Faroe Islands, operating on both 50MHz and 144MHz.

The Island Hoppers DX Group, based in Dublin, will be activating the Great Blasket Island between July 20-27. This Island will be of great interest to IOTA hunters as it has not been activated for a number of years. The callsign has not yet been allocated but it will have the prefix EJ signifying an island off the Irish coast. The frequencies to monitor are 50.150MHz, 144.260MHz and 432.220MHz. It's possible that there will be some activity on the 70MHz band. Further details may be obtained from Conor McGlynn EI5HF.

## QRZ Contest!

The Danish Society, EDR, have organised a microwave activity week to run between 1200UTC on June 15 to 1200UTC on June 22. The intention is to promote narrowband activity on the 10, 24 and 48GHz bands. Further information can be obtained from Steen Gruby OZ9ZI, Hogevej 1, DK-3660 Stenlose, Denmark.

Don't forget that our very own event, the *Practical Wireless* 144MHz Low Power Contest, takes place between 0900-1700UTC on Sunday June 16.

The RSGB cumulative contests, for all bands between 3.4GHz and 24GHz, will also be held on Sunday 16th, these events taking place between 0900-2100UTC. The next leg of the contest will be on July 14.

The German 144MHz c.w. contest, AGCW-DL, will be held between 1900-2300UTC on Saturday June 22. The contest exchange consists of the report, serial number, power section and locator. The power sections are; A = less than 3.5W, B = less than 25W, C = more than 25W. An example would be 599012/C/IO81MX. I can supply the rules for this contest plus other information sheets on receipt of an s.a.e.

Operators of the 430MHz band are well catered for during the weekend of June 22-23. An f.m. contest for fixed and portable stations will be held between 1400-1800UTC on the 22nd followed by a c.w. event between 2000-



Fig. 2.

# Back-Scatter

2400UTC. The 430MHz Trophy contest will be held on Sunday 23rd between 0900-1700UTC.

A QRP 144MHz telephony contest has been organised by the WAB group, to run between 0900-1700UTC on Sunday June 30. All licensed amateurs and short wave listeners are eligible to enter. The contest exchange is RST, serial number, WAB area and county. Further details of all WAB contests can be obtained from G4SKQ QTHR.

The big event of the year, the v.h.f. field day, takes place on July 6-7 between 1400-1400UTC. Activity will be

on all bands from 50MHz through to 2.3GHz.

The seventh annual CQ World-Wide v.h.f. WPX contest takes place on July 20-21. Further details in next months column.

Scandinavian activity contests will be held on the following dates. 50MHz activity on June 25, 144MHz on July 2, 430MHz on July 9 and Microwaves on June 18. All sections run between 1700-2100UTC. You can obtain a full set of rules by sending me a stamped addressed envelope.

The 50MHz contests and activity

periods mentioned above provide an ideal opportunity to build up your score for the UK Six Metre Group '6X6' Award shown in Fig. 2. For details of the group, send a s.a.s.e. to Ted Collins G4UPS QTHR.

## 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.

## 144MHz QRB Table

Top distances (kms)		
Tropo	3160	GM4YXI
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR

# Back-Scatter

## Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

There are continuing ups and downs in international radio broadcasting, with the full extent of Radio Canada's cutbacks now apparent. The station's present schedule is included in 'The Americas' news section. A campaign has been started in Canada run by former RCI producer Wojtek Gwiadzda. The Coalition for the Restoration of Full RCI Funding was launched in Ottawa during April, and calls on the government to reinstate RCI's full budget and recommence RCI-originated programmes in English and French, instead of domestic service relays. Listeners are urged to protest to the Canadian PM, the Rt Hon Brian Mulroney at the House of Commons, Ottawa, or to fax him on +1 613 957 5636.

Ian MacFarland of *SWL Digest* fame tells me that he'll be working at Radio Japan, as reported last month, for two years in the English news division, co-hosting the *News Round* programme on Thursday and Friday live at 0700 and 1100GMT.

Radio Japan is presently negotiating with the BBC World Service to use its transmitters for relays to Europe. At the moment, Africa Number One facilities in Moyabi, Gabon, carry Radio Japan's programmes to Europe and Africa, but it seems that coverage is not as good as Tokyo had hoped, and they believe that the BBC can do better. At the Tokyo-Yamata site of Radio Japan, three more 300kW transmitters will be added to the four 100kW and four 300kW senders already there by the year 1993. This is to improve reception in South East Asia and the Asian continent.

There's to be a Leningrad Hamvention during early August, where broadcasters including the Voice of America, Swiss Radio International, Radio Netherlands and Radio Japan will be exhibiting. Plans exist for a Broadcasters' Forum in Moscow before the Hamvention, and in Prague afterwards. The Forum gives listeners the opportunity to raise questions with broadcasters, and they are usually informative and very good fun. More news as it arrives.

Staying in the Soviet Union, there's news that Deutsche Welle is negoti-

ating with the powers that be, to use former Soviet jamming transmitters to relay its programmes to Asia. The German government has made available DM 6 million for this project, and the Director-General of DW suggests that the arrangement could be in place later this year, with 15 hours of broadcasting a day when the contract begins. Soviet television, carrying a report on the agreement, commented "What times we live in. Earlier this would have been considered fantasy".

Radio France International has announced that within the next six years it plans to increase the number of 500kW transmitters at its Allouis-Issoudun transmitting centre to an incredible 24. These will replace twelve 100kW senders presently there, and add four to the existing complement of eight 500kW transmitters. In addition, RFI will build a three-sender station in Djibuti, East Africa with a total of 1500kW of power, and add a fifth 500kW transmitter to the relay base in Montsinery, French Guiana. A transmitting site is also to be constructed in Thailand. Clearly RFI is planning to become the French-language equivalent of the BBC World Service.

Radio Finland meanwhile is not in the happy position of RFI, and will be cutting back some of its operations. Night-time transmissions to Europe are being suspended, and the station will close at 2200GMT, reopening at 0300, saving some 2000 programme hours a year. The affected programmes consist mainly of music so the loss is not too great. The transmitters to be silent during the dark hours will be the medium and long wave channels of 558, 963 and 252kHz, and the European short wave frequency of 6.12MHz. Radio Finland incidentally is one of the very

few stations which broadcasts a weekly programme in classical Latin.

Israel Radio's hours are to be cut back from the current 117 hours a week to less than 60. Portuguese, Hungarian and Romanian services will be axed, and there is a rumour that English, presently three and a quarter hours daily, and French, now two and a quarter hours, will be reduced to just an hour each. The money saved will be directed to new stations for immigrants, regional road safety stations (one wonders what they'll broadcast) and round-the-clock news on domestic Network Two.

## Europe All times GMT (=UTC)

We reported in May's edition that RTBF, the French broadcasting network in Belgium, had stopped its international service. We can now report that RTBF is back on the air with a relay of the domestic French Radio 1 network at:

0530-0630 on 17.68 and 7.14MHz  
1100-1130 on 25.645 and 9.925MHz  
1600-1715 on 17.675 and 15.54MHz

Radio Finland's English service is now:

0630-0645 on 11.755, 9.56 and 6.12MHz  
0800-0855 on 21.55 u.s.b., 17.80MHz  
1130-1200 on 21.55 u.s.b., 15.40MHz  
1330-1400 on 21.55 u.s.b., 15.40MHz  
1400-1430 on 21.55 u.s.b., 15.185, 11.82, 11.755 and 6.12MHz  
1830-1900 on 15.185 u.s.b., 11.755, 9.55 and 6.12MHz  
1955-2000 on 15.185 u.s.b., 11.755, 9.55 and 6.12MHz

2130-2150 on 11.755, 9.55 and 6.12MHz  
2300-2320 on 15.43 u.s.b., 15.185MHz

The Latin programme mentioned earlier can be heard on Sundays included in all the English broadcasts.

Radio France International with English is at:

1230-1300 on 21.645, 21.635, 15.195, 15.155, 11.67 and 9.805MHz  
1400-1500 on 21.765, 17.65 and 11.91MHz (via China)  
1600-1700 on 17.85, 17.795, 17.62, 15.53, 12.015, 11.705 and 6.175MHz

Lots of news this month from Roy Merrill, including a report of Iceland heard with assorted music and occasional R/T(I) on 3.296MHz u.s.b. at around 2030. The full schedule for Iceland to Europe and Scandinavia is now:

1215-1245 on 15.79 and 13.83MHz  
1855-1930 on 11.402 and 13.855MHz  
0000-2400 on 3.295, 6.10 and 9.265MHz

RAI from Rome has English transmissions to Europe at:

0425-0440 on 9.575 and 7.275MHz  
1935-1955 on 11.80, 9.71 and 7.275MHz  
2025-2045 on 11.80, 9.575 and 7.235MHz

Radio Kiev can be heard on 11.76MHz, sometimes as early as 1815 but is usually covered in QRM from at least three co-channel stations - VoA, Radio Pyongyang and Radio Moscow - with adjacent channel QRM from Radio Finland on 11.755. The signal improves from 2200 with SID up to 433, peaking occasionally to 544, in parallel with 4.94MHz.

Radio Moscow has doubled its Afrikaans service, which is now heard 1800-1900 on 15.18 and 17.58MHz.

Radio Tashkent has an English programme daily at 0100 for thirty minutes on 7.335 and 7.19MHz.

# Back-Scatter

Radio Yugoslavia has English 2100-2145 on 5.96 and 11.735MHz, but both suffer co-channel QRM from Moscow, with the 11MHz channel virtually unreadable, says Roy Merrall. English is also scheduled for 1830-1900 on 15.165 and 6.165MHz.

## African and Middle Eastern Stations

La Voix de la Revolution Congolaise is well received on 4.765MHz around 2200 with French language programming.

The Voice of Ethiopia has an English programme from 1500 to 1600 on 9.56 and 7.165MHz.

Kol Israel is in Hebrew on 13.7528MHz around midday, improving during the evening, occasionally rating SIO 544.

KBC Nairobi on 4.935 fades in around 1730 and provides reasonable musical entertainment up to SIO 433. Often clashes with Radio Kiev on 4.94MHz.

Radio RSA operates English to Africa now:

0400-0500 on 11.92, 11.86 and 5.96MHz

1000-1100 on 17.835MHz  
1100-1200 on 11.90, 11.86 and 9.555MHz

1500-1800 on 15.21 and 7.23MHz  
1600-1800 on 17.79MHz

Roy Merrall reports the Voice of Turkey, heard strongly on 9.445, with an announced schedule of:

2000-2050 to Europe on 9.795MHz  
2200-2250 to Europe on 9.445; SE Asia on 17.88; Middle East 9.665MHz  
0300-0350 to N. America on 9.445; SE Asia on 17.88MHz



Crystal clear reception from Roy Merrall's set up.

The latest schedule from UAE Radio in Abu Dhabi shows the North American English service 2200-2400 on 17.855, 15.305 and 13.605MHz. Arabic to Europe is on the air:

0600-1200 on 25.69 and 21.515MHz  
0600-1400 on 21.735MHz  
0600-1900 on 17.855MHz  
1400-2200 on 11.985MHz  
1900-2200 on 13.605MHz

UAE Radio Dubai is heard well at 1330-1350 on 13.675, and at 1630-1645 on the same channel.

Radio Zanzibar is heard sometimes as early as 1700, on variable 11.7342MHz, with an English by Radio programme noted on Sundays at 1705.

## Asia and the Pacific

Radio Afghanistan to Europe has returned its broadcasts by half-an-hour.

English can now be heard at 1800-1900 on 15.51 and 11.845MHz.

Radio Australia is noted with English for the Pacific, and Chinese simultaneously on 13.605 at 2054 onwards. The Chinese predominates with SIO 544 initially.

FEBA Radio in the Seychelles has an English broadcast to the Middle East at 0432-0502 on 17.81 with 100kW of power, at 1500-1555 to S Asia on 11.865 and at 1500-1600 on 9.59 and 15.33MHz.

Radio Japan via Moyabi is on the air in the evening in a number of European languages. One language programme noted by Roy Merrall was Japanese by Radio in the Italian transmission at 2115 on 15.355MHz.

Radio New Zealand International on 15.12, suffers co-channel QRM from FEBA Seychelles and later from SLBC in Sri Lanka at 2000.

The Sri Lanka Broadcasting Cor-

poration's English World Service comes in clearly from 2000-2130 on 15.12, in parallel with 9.72MHz.

## The Americas

Radio Cultura in Sao Paulo, Brazil, has been caught by Roy Merrall on 17.815MHz around 2130, albeit weakly. The signal improves rapidly to SIO 232 by 2200. Roy thinks that its pretty good for a 1kW transmitter!

Radio Canada International's remaining European English language transmissions are now:

0200-0229 on 9.65, 7.27, 7.23, 6.125 and 6.035MHz

0515-0559 on 17.84, 11.755, 9.75, 7.295, 6.15 and 6.05MHz

1400-1429 on 21.545, 17.82, 17.795, 15.235, 15.315, 15.305 and 11.935MHz

1500-1529 on 21.545, 17.82, 15.325, 15.305 and 11.935MHz (includes RCI news bulletin)

1600-1629 on 21.545, 17.82, 15.325, 15.305 and 11.935MHz

1700-1759 on 21.545, 17.82, 15.325, 9.555 and 7.235MHz

1900-1929 on 21.675, 17.875, 15.325, 13.65, 7.235 and 5.995MHz

1930-1959 on 21.675, 17.875, 15.325, 13.65, 9.67 and 6.17MHz

2100-2159 on 17.875 and 15.325MHz

Radio Havana Cuba has been heard testing in compatible single sideband (s.s.b.).

The tests have been on 5.965 at 0400-0600, beamed to North America. English to Europe is at 2000-2100 on 17.835MHz.

Radio Surinam International relayed by Radiobras is heard 1700-1750 on 17.75MHz at present. English is at around 1725.

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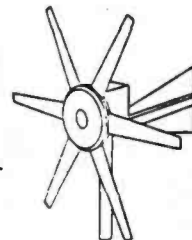
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into the IC-725 for use with the AH-3 H.F. Automatic Antenna Tuner for mobile or base station operation.

Accessory options available are the PS-55 20A P.S.U., AH-3 Auto Antenna Tuner, UI-7 AM Tx. FM Tx/Rx Unit, FL-100 500Hz CW Filter, FL-101 250Hz CW Narrow Filter and SP-7 External Loudspeaker.

For more information on the IC-725 budget H.F. and other ICOM amateur equipment contact your nearest authorised ICOM dealer or phone us direct.

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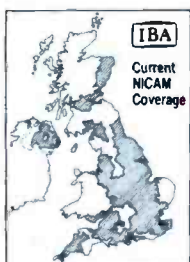
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