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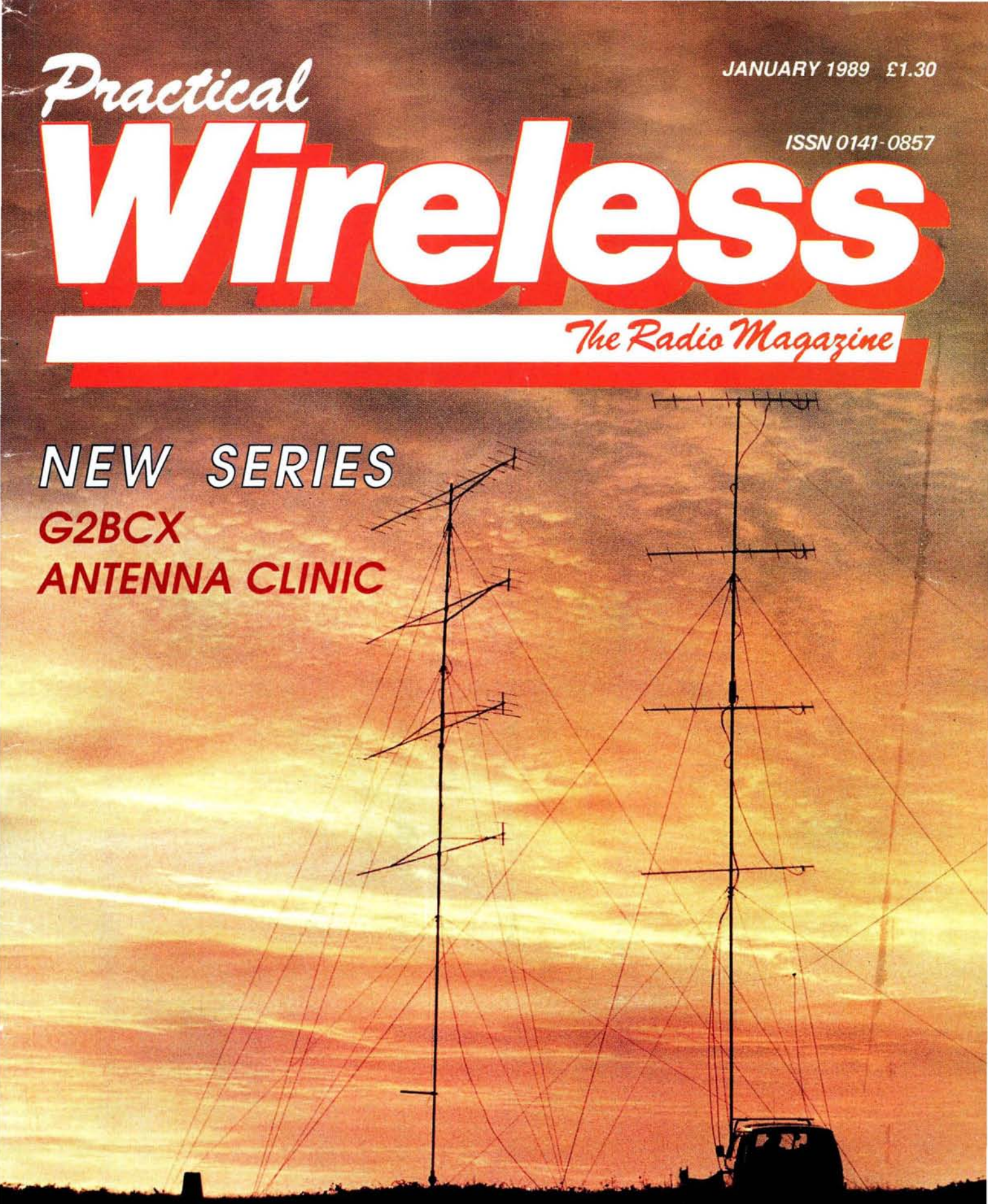
Practical Wireless

The Radio Magazine



NEW SERIES
G2BCX
ANTENNA CLINIC

THE "Fe-ONE" Experimental Transmitting Antenna

Expedition to OVØØ

HF performance you can have a real field day with.

With Yaesu's FT-757GX/II, you can enjoy full-featured HF performance just about anywhere.

On vacation. During field day. On the road. Or in your shack.

Because the FT-757GX/II packs all its HF performance into one highly compact, action-ready case. A case so small, it even fits under airplane seats.

Of course, you've probably noticed a similarity to its predecessor, the FT-757GX. That's purely intentional. And now its performance is even better.

With new features like memory storage of operating mode. Slow/fast tuning selection. Automatic step-change according to mode. IF notch-filter. 10 memories. And VFO to VFO scan.

Plus you get an iambic electronic keyer. Woodpecker noise blanker. 600-Hz CW filter. AM and FM modes. AF speech processor. And 25-kHz marker generator. All at no extra cost.

Three microprocessors. Dual VFOs. Single-button VFO/memory swap. Receive coverage from 500 kHz to 30 MHz. Transmit coverage from 10 to 160 metres, including WARC bands. All-mode coverage (LSB, USB, CW, AM and FM). 100-watt RF output.

QSK operation. Massive heatsink and duct-flow cooling system for continuous RTTY operation for up to 30 minutes.

Computer Aided Transceiver (CAT) System for computer control via optional interface.

Of course, the FT-757GX/II offers the kind of options you'd expect from Yaesu, too. Including standard and heavy-duty power supplies, automatic antenna tuner, hand and desk microphones.

So no matter where you work the DX, take along Yaesu's FT-757GX/II. The full-featured HF rig you'll have a real field day with.

YAESU

UK Sole Distributor *South Midlands Communications Ltd S.M. House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hants SO5 3BY Tel (0703) 255111*

Prices and specifications subject to change without notice.

Practical Wireless
The Radio Magazine

JANUARY 1989 (ON SALE 8 DECEMBER 1988) VOL. 65 NO. 1 ISSUE 982

THIS MONTH

We are sorry that, due to pressure on editorial space, the promised feature on Amateur Radio in Spain has had to be held over until next month

NEXT MONTH

Introduction to Digital Communications

PW Review Standard C5200ED Dual-bander

Amateur Radio in Spain

plus All the usual features

Don't miss it—place your order with your newsagent now!

On sale January 12

Contents subject to last-minute revision

Our cover this month shows the antenna arrays of The Hillbillies Contest Group, winners of the 1988 PW QRP Contest

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TL50-144-25	6M/144MHz IF	299.00
TL70-28-25	4M/28MHz IF	316.25
TL70-144-25	4M/144MHz IF	299.00
TL144-28-25	2M/28MHz IF	345.00

4M LINEAR AMPLIFIERS

LPM70-10-100	Lin/Preamp/Met 10w i/p 100w o/p	235.00

70CM LINEAR AMPLIFIERS

L432-1-10	*New Linear 1w input 10w output	74.75
LPM432-1-50	Lin/Preamp/Met 1w i/p 50w o/p	255.00
LPM432-3-50	Lin/Preamp/Met 3w i/p 50w o/p	255.00
LPM432-3-100	Lin/Preamp/Met 3w i/p 100w o/p	395.00
LPM432-10-100	Lin/Preamp/Met 10w i/p 100w o/p	395.00

6M LINEAR AMPLIFIERS

L50-3-25	*New Linear 3w i/p 25w o/p	74.75
LP50-3-50	Linear/Preamp 3w i/p 50w o/p	138.00
LP50-10-50	Linear/Preamp 10w i/p 50w o/p	138.00
LPM50-10-100	Liner/Preamp/Met 10w i/p 100w o/p	235.00

TRANSVERTERS

F50-L/U	50MHz Low Pass Filter	29.95
F70-L/U	70MHz Low Pass Filter	29.95
F144-L/U	144MHz Low Pass Filter	29.95
F144-L/N	144MHz Low Pass Filter	35.35
F432-L/N	432MHz Low Pass Filter	35.35

POWER SUPPLIES

12/6A	13.8V 6A cont 7A max	78.20
12/12A	13.8V 12A cont 15A max	129.95
12/25A	13.8V 25A cont 30A max	193.20
12/40A	13.8V 40A cont 50A max	423.20
12/5E	*New 13.8V 5A cont 6A max	57.50
12/10E	*New 13.8V 10A cont 12A max	97.75
12/20E	*New 13.8V 20A cont 24A max	132.25
12/30E	*New 13.8V 30A cont 35A max	195.50

CUE DEE PRODUCTS

VHF/UHF ANTENNAS

VHF-DUO	6/5 ele 6d Bd	129.95
650A	*New 6M 6 ele 6dBd	91.15
4144A	4 ele 8dBd SO239	26.45
4144AE	4 ele end mount 8dBd SO239	27.60
10144A	10 ele 11.4dBd SO239	50.60
10144AN	10 ele 11.4dBd N female	57.50
10X144A	10 ele crossed 11.4dBd SO239	74.75
10X144AN	10 ele crossed 11.4dBd N female	86.25
15144A	15 ele 14dBd SO239	73.60
15144AN	15 ele 14dBd N female	78.20
15X144A	15 ele crossed 14dBd SO239	98.90
15X144AN	15 ele crossed 14dBd N female	110.40
17432AN	17 ele 14.5dBd N female	51.75
17X432AN	17 ele crossed 14.5dBd N female	82.80
23432AN	23 ele 15.5dBd N female	63.25

STACKED SYSTEMS

10144A2H	2 × 10 ele horizontal	228.85
10144AN2H	2 × 10 ele horizontal	243.80
15144A2H	2 × 15 ele horizontal	277.15
15144AN2H	2 × 15 ele horizontal	293.25
10144A4H	4 × 10 ele	405.95
10144AN4H	4 × 10 ele	447.35
15144A4H	4 × 15 ele	501.40
15144AN4H	4 × 15 ele	537.05
15144A8H	8 × 15 ele	1436.35
15144AN8H	8 × 15 ele	1511.10
15144A16H	16 × 15 ele	3382.15
15144AN16H	16 × 15 ele	3496.00
17432AN2H	2 × 17 ele horizontal	194.35
17432AN4H	4 × 17 ele	334.65
17432AN8H	8 × 17 ele	583.05
17432AN16H	16 × 17 ele	P.O.A.
23432AN2H	2 × 23 ele horizontal	212.75
23432AN4H	4 × 23 ele	379.50
23432AN8H	8 × 23 ele	645.15
23432AN16H	16 × 23 ele	P.O.A.

STACKING FRAME KITS

4S2	2 × 4144	39.10
10S2	2 × 10144	59.80
15S2	2 × 15144	66.70
10S4	4 × 10144	109.25
15S4	4 × 15144	123.05
17S2	2 × 17432	39.10
23S2	2 × 23432	40.25
17S4	4 × 17432	59.80
23S4	4 × 23432	63.25

PHASING HARNESSES INCLUDING POWER SPLITTER

4L2	2 × 4144A & 4144AE	72.45
10L2	2 × 10144A	74.75
10L2N	2 × 10144AN	81.65
10L4	4 × 10144A	112.70
10L4N	4 × 10144AN	129.95
15L2	2 × 15144A	77.05
15L2N	2 × 15144AN	87.40
15L4	4 × 15144A	112.70
15L4N	4 × 15144AN	129.95
17L2N	2 × 17432AN	70.15
17L4N	4 × 17432AN	109.25
23L2N	2 × 23432AN	70.15
23L4N	4 × 23432AN	109.25

POWER SPLITTERS

2-144	2 way 144MHz SO239	37.96
2-144N	2 way 144MHz N female	42.55
4-144	4 way 144MHz SO239	41.40
4-144N	4 way 144MHz N female	48.30
6-144	6 way 144MHz SO239	57.50
6-144N	6 way 144MHz N female	87.40
8-144	8 way 144MHz SO239	63.25
8-144N	8 way 144MHz N female	100.05
2-432N	2 way 432MHz N female	34.50
4-432N	4 way 432MHz N female	41.40
6-432N	6 way 432MHz N female	83.95
9-432N	8 way 432MHz N female	93.15

MONOBAND YAGIS

27G	7MHz 2 ele 5.6dBd	581.90
37G	7MHz 3 ele 7.0dBd	861.35
314G	14MHz 3 ele 7.0dBd	216.20
414G	14MHz 4 ele 8.0dBd	249.55
414	14MHz 4 ele 8.0dBd	294.40
514G	14MHz 5 ele 9.0dBd	364.55
614G	14MHz 6 ele 10.0dBd	515.20
321	21MHz 3 ele 7.0dBd	148.35
421	21MHz 4 ele 8.0dBd	169.05
521	21MHz 5 ele 9.0dBd	264.50
621G	21MHz 6 ele 10.0dBd	331.20
721G	21MHz 7 ele 10.3dBd	416.30
328	28MHz 3 ele 7.0dBd	93.15
428	28MHz 4 ele 8.0dBd	116.15
528	28MHz 5 ele 9.0dBd	161.00
628G	28MHz 6 ele 10.0dBd	207.00
628	28MHz 6 ele 10.0dBd	249.55
728G	28MHz 7 ele 10.3dBd	309.35
928G	28MHz 9 ele 10.6dBd	416.30

DUOBAND YAGIS

DUO2G	14/21MHz 5/4 ele 9.8dBd	483.00
DUO3	21/28MHz 4/4 ele 8.8dBd	264.50
DUO4	14/21MHz 4/4 ele 8.8dBd	426.65

VERTICALS

VA40	7MHz inc guy wire & ground mount	93.15
2VA40	7MHz full 1/4 wave, complete	323.15
VA80	3.5MHz inc guy wires & ground mount	324.30
2VA80	3.5MHz full 1/4 wave, complete	796.95

PHASING HARNESSES FOR CIRCULAR POLARIZATION

IC144	10 × 144A & 15 × 144A	37.95
IC144N	10 × 144AN & 15 × 144AN	52.90
IC432N	17 × 432AN	51.75

PKW PRODUCTS

VHF/UHF ANTENNA'S

2GP58	144MHz 5/8 groundplane 3.2dBd	39.10
2GP258	144MHz 2 ×5/8 groundplane 5.7dBd	70.15
7GP58	432MHz 5/8 groundplane 3.2dBd	39.10
7GP258	432MHz 2 × 5/8 colinear 5.7dBd	59.80

HF DIPOLES

DP 01	3.5/14MHz	59.80
DP 02	3.5/7MHz	59.80
DP 03	1.8/7MHz	59.80
DP 04	1.8/3.5MHz	101.20
DP 05	14/21/28MHz	70.15
DP 06	1.8/3.5/7/14/21/28MHz	110.40

HF MULTIBAND BEAMS

THF 1E	1 ele (dipole) 14/21/28MHz	83.95
THF 2E	2 ele 14/21/28MHz	213.90
THF 3E	3 ele 14/21/28MHz	264.50
THF 5E	5 ele 14/21/28MHz	384.10
THF 6E	6 ele 14/21/28MHz	571.55
THF 7E	7 ele 14/21/28MHz	741.75
THF 8E	8 ele 14/21/28MHz	878.60
SPQ 2E	2 ele Spider Quad 14/21/28MHz	408.25
LPO 12E	12 ele Log Periodic 13-30MHz	918.85

HF GROUNDPLANE

GP 3B	14/21/28MHz	81.65
K Type	*New 3.5/7MHz + 14/21/28	261.05

SHF PRODUCTS

SHF ANTENNAS

SHF 9644	1296MHz 44 ele	123.05
SHF 9667	1296MHz 67 ele	148.35
SHF 1693	67 ele (meteosat)	167.90
SHF 2320	2300-2350MHz 67 ele	202.40

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COAXIAL CABLE: POPE H100....**80p p/metre.** RG213 (UR67)....**62p p/metre.** RG58 **28p p/metre.** New Plastic Coated Phosphor Bronze Antenna Wire **56p p/metre.**

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ARE COMMUNICATIONS

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Since our introduction of this remarkable transceiver last year, October 1987 to be precise, many of these are now in use throughout the U.K. From 160m to 10m, including the ever-popular 6m band and a General-Coverage Receiver. Price: **£929.00** including MC43S microphone.

Kenwood TS440S HF Transceiver

Now available once again from **ARE Communications** the excellent Kenwood TS440S. General Coverage Receiver 100W output between Top band and 10m. FM fitted as standard. Auto Tuning Unit optional extra. Offered at a discount price of **£1,039.00** or, with ATU **£1,199.00.**

YAESU

YAESU FT747GX "ECONOMY" HF TRANSCEIVER

An HF transceiver with built-in general coverage receive. All mode, including FM as an option, for less than the price of a 2m multimode?

Offered without am or cw filters at a super discounted price of **£579**

YAESU FT767GX HF+2m+6m+70cms

Despite being YAESU's most expensive transceiver for HF operation, it continues to outsell all other HF equipment marketed by A.R.E. All band, all mode, built-in automatic tuning unit, power supply, general coverage receiver, digital power/SWR meter, full 100w output, optional 2m/6m/70cms modules, which just plug in.

DISCOUNT PRICE: **£1,369** including Free MH1BB scanning mic.

Also available with one or all VHF modules fitted at a discounted price.

ICOM

Icom IC32E Dual Band Handie

Direct competition to the STANDARD C500, the ICOM IC32E offers excellent facilities utilising all existing ICOM accessories. Ideal for the IC2E/O2E owner. Similar specification to the C500. Frequency range: 138-174MHz (RX only) and 410-455MHz (RX only).
Price: £389

Icom IC3210E Dual Bander 2m/70cm

Easy to use, easy to look at, the new Icom IC3210E. Just compare the uncluttered front panel lay-out with other dual banders, to see how simple it is to operate. Look at these features:

* Frequency VHF: 138 to 174MHz (RX Only)†
  (Track tuned better than .3uV)
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* TX/RX 144-146/430-440MHz
* 12.5/25KHz Channel spacing
* Full dual band duplex
* Stand alone repeater operation (For Raynet)
* Pocket beep via optional ctcss
* Programmable ctcss UT40 (optional)
* Priority watch
* No duplexer required
* 20 Double spaced memory channels
* 25 Watts output on both bands

† Modified free if specified during order.
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Opening Hours Mon/Fri 9.30 to 5.30 – NOW OPEN SATURDAY MORNINGS 10–1pm

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ICOM

IC-3210E Dual Band FM Mobile

- **Full crossband duplex.**
- **20 double-spaced memory channels.**
- **Built-in duplexer**
- **4 priority watch functions.**
- **25 watts output.**
- **Programmed, memory and selected band memory scan.**
- **Variable LCD backlight intensity.**
- **Tone squelch and pocket beep functions (optional).**

If you are newly licensed or just undecided about which band to operate first, then the new ICOM IC-3210 is just the answer. This dual band FM transceiver is ideally suited for the mobile operator. Transmit on one frequency and receive on the other and you're operating full duplex. It's just like talking on the telephone.

The simple and well laid-out front panel ensures quick and easy operation of all its many functions. A great convenience when driving. Optional accessories available are the UT40 tone squelch board. HS15 + SB mobile microphone and switch box SP8 external speaker and PS45 AC power supply.

Icom (UK) Ltd.
Dept PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Seasons Greetings to you all

"75" Series Transceivers

ICOM have a winning line-up for fixed, portable and mobile operations. The deluxe "75" series of transceivers offers a new standard of excellence from VHF to UHF communications. Each compact all mode unit delivers maximum performance, reliability and ease of operation.
The "75" series transceivers feature 99 tunable memories, twin VFO's, pass band tuning, I.F. notch, noise blanker and CW break-in. The scanning modes include memory scan, mode scan, programmable scan and frequency skip.
These transceivers can be used in a variety of ways, for propagation experiments, satellite communications, moonbounce, D'xing or straight rag chewing contacts.
When high speed digital systems such as PACKET or AMTOR data communications are used then the ICOM DDS system provides a lock-up time of just 5msec.

2 Meters

ICOM's 25 watt IC-275E is a superb transceiver for contest operating and for general DX working. This prestige 144MHz multimode is also available as a IC-275H 100 watt version, which requires an external AC supply.

70cms

Enjoy 430MHz operation with the 25 watt IC-475E, or go high power using the IC-475H. An optional CT-16 Satellite Interface Unit is available for combining ICOM "75" transceivers for easy tuning.

6 Meters/10 Meters

The 10 watt IC-575 covers 28-30MHz and 50-54MHz and includes the AC supply. Join in with the recent openings to the U.S.A. with this superb transceiver. Also to be released soon is the IC-575H 50/100 watt high power version, which will operate with an external AC supply.

With the introduction of the "75" series you now have all the technical quality you'll need to enjoy VHF and UHF communications. For more detailed information on these transceivers contact your local ICOM dealer of ICOM (UK) Ltd.

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The Communicators

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Dec. 28/29/30 — 9.00 a.m.-5.00 p.m.; Dec. 31st — 9.00 a.m.-1.00 p.m.;
Jan. 1/2 — CLOSED; Jan. 3 OPEN AS USUAL

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FROM 1st JANUARY 1989 SMC NORTHERN (LEEDS) WILL BE CLOSED ON SATURDAY AFTERNOONS

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INTRODUCING THE **FT411 2m Handheld**

5W RF Output. Built in VOX

49 Memory Channels/Uses FT23R accessories

Adjustable Power Save and Automatic Power Off

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FT747GX

★ 160-10M HF TRANSCEIVERS
★ GENERAL COVERAGE RECEIVER
★ ALL MODE (FM OPTIONAL).
★ 0-100W OUTPUT (25W AM.CARR)
★ CW NARROW (500HZ) STANDARD
★ LARGE CLEAR LCD DISPLAY
★ EASE OF OPERATION.

"Well done YAESU!" P.W.

Serious about VHF/UHF?

★ Up to four band capability
★ LSB/USB, CW & FM
★ Full Duplex crossband operation
★ Memory storage of up to 230 frequencies
★ Keypad frequency entry
★ Fourteen VFO's
★ Global call channel
★ Programmable channel steps
★ Electronic keyer option
★ Remote preamplifier switching
★ TXCO high stability reference oscillator

"Overall I think the FT736R is a well organised Rig which is a pleasure to use" P.W.

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PRICE DOWN

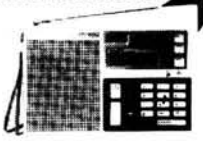
The best VHF monitor there is. That's a fact! 108-176MHz plus LW/MW/FM broadcast. Covers air, marine, PMR etc. LCD display, memories, scanning, lockout priority etc. Supplies are short but we are the UK's largest stockist, so check with us!

£227 FREE SECURICOR

SONY ICF7600DS PORTABLE COMMUNICATIONS

PRICE DOWN

Not a toy, but a serious communications receiver. 150kHz-30MHz AM/SSB plus FM76-108MHz. Digital readout, memories, clock and provision for external antenna. Listen to the DX at work! Mains or battery.



New SW-1 in stock £249

£157 FREE SECURICOR

MILITARY AIR ADAPTOR FOR SONY PRO-80

225-450MHz in 3 bands
Direct frequency readout on Sony
Xtal control stability.
5kHz steps
Battery powered
Plugs directly into PRO-80
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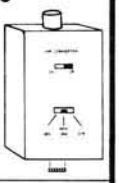


SONY ICF2001D RECEIVER SUPER PORTABLE AM/SSB/CW + AIR BAND COVERAGE

Described as "the best portable on the market" by a recent reviewer, it covers 150kHz-300MHz AM/SSC/CW plus AM VHF air band and FM broadcast. Memories scanning, etc. are all included. The SSB performance is superb and can match many base station receivers. 230/110v AC power supply included.

£299 FREE SECURICOR

OTHER SONY PRODUCTS

ICF7600DA Analogue SW receiver	£129.00
ICF-SW1S Micro short-wave receiver	£249.00
ICF-PRO80 SW/VHF receiver	£299.00
AN1 Active SW antenna	£49.00
AN3 Vertical for Air-7 receiver	£45.00
BP23 Ni-cad battery pack	£15.95
ACD4 Mains PSU/charger	£15.95
DCC127A 12v car PSU	£19.95

All our Sony stocks carry UK cards and do not have serial numbers etc. removed from boxes!

R537S AIR-BAND MONITOR 118-136MHz

This well known receiver is ideal for the serious air-band enthusiast, superb sensitivity and selectivity, this pocket size monitor is unrivaled in value for money. 2 fixed channels are possible and the squelch control ensures silent background. Complete with battery and whip.

£69.50 CARR. FREE

WIDEBAND AERIALS

Better than any pre-amp!

15dB Gain

As used by M.O.D.

CLP 5130 Beam

Illustrated above, this beam antenna covers 105-1300MHz. A forward gain of up to 13dB and a front to back ratio of 15dB provides the means of dramatically improving reception. With a VSWR better than 2:1 it can also be used for transmission up to 500 watts. Boom 6', longest EL.6'.

£89.00 plus post £3.00

CLP 5130 50MHz-1300MHz version in stock **£179.00 + £7.00 carriage**

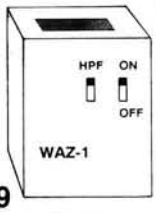
D130N Discone

The D130 antenna is the leader in discones and used by military and research establishments. What better recommendation! Covering 25-1300MHz with low VSWR, it is supplied complete with 50 ft of ultra low loss cable and N plugs.

£82.50 plus post £3.00

WIDEBAND PRE-AMP

3-1500MHz
15dB gain PL259/SO239
280MHz HP Filter
Latest front-end device
Very low noise level.
12v DC



WAZ-1 £69

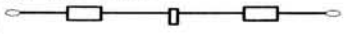
THIS MONTH'S OFFER

A Complete HF Station

£759

This month we are offering a complete HF station comprising FT747 and 30 amp AC PSU for a bargain price. With most rigs costing over £1,000 its nice to offer something a bit more realistic in price! Features include 100 watts output on all bands, Rx from 100kHz to 30MHz. 20 memories, dual vfo's wide and narrow cw filters, digital display, LSB/USB/CW/AM with squelch plus FM option. We have found it to be excellent and can thoroughly recommend it. The matching power supply is generously rated and fitted with thermal fan and full protection.

NEW MINI-DIPOLE KIT LF-8040 £29.95



A new low priced hf antenna that will fit into most gardens. The kit is complete with wire and provides a coaxial fed dipole that needs no atu. It covers 80 & 40 metres and has a total length of 70ft. Just follow the instructions and plug your coax feeder into the SO239 socket, and you are ready to go. **£29.95 plus £1.50 post.**

X500 "DOMINATOR" 2M/70cm

The new X500 from Diamond gives almost 9dB & 12dB gain on 2m/70cm. Height is 5.2m in white fibre glass with "N" socket. Cheaper than a linear! Just think, 25w on 2m = 200w erp and 400w on 70cm! Now you can really make yourself heard!

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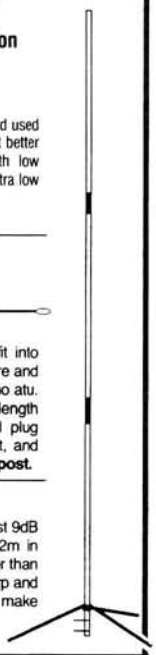

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Completely revised and updated, this publication is one that should be on every enthusiast's bookshelf. The previous edition sold 6000 copies in 18 months. This latest issue is 25% larger and has been completely re-written with a new easy-to-read layout. No other publication offers you so much information for such low cost. It provides complete details of all the services in the UK that make use of the VHF/UHF spectrum with listings from 26 to 2250MHz without gaps, and additional listings to 56GHz. Each section begins with full details of the services that use each segment of the spectrum followed by details of individual services in frequency order. Users covered include the emergency services, marine, aeronautical, land mobile etc. Many of these services use duplex frequencies and full details of the splits are included for base and mobiles. Although many of the frequencies listed cannot be monitored without a licence, all listenders should find this book a mine of information. Tremendous value!

AIRBAND FREQUENCY GUIDE

(RTTY and FAX Guide now out – see bottom of page)

The new edition of this famous guide will be available at end of August. Now running to 100 pages, it is crammed with gen that is essential reading for the airband enthusiast. Lots of editorial and pictures plus new cross reference of frequencies in alphabetical and numerical order. Order your copy today.

Price £5.95 +£1 P&P

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£6.95 + £1.00 p&p

FIFTH EDITION

This famous listing is now in its fifth edition. Completely updated for 1988 and a lot thicker. Many additional frequencies have been added and of course some have been delted where the service is known to no longer exist. Packed full of information on all that happens between 1.6 and 30MHz, you will find this fascinating reading. Covering all aspects of the shortwave service, here is just a selection of the listings included: AVIATION, BROADCAST, MARINE, EMBASSY, MILITARY, RTTY, FAX, PRESS, and much more. Not only frequencies and stations, but in many cases times of transmissions as well. This is not an American import, but a UK printed manual specially for UK listeners. If you are one of the few people that haven't purchased one of these yet, then you really don't know what you have been missing. If on the other hand you have our previous editions, we know that you will want to get the latest edition. Available end of March. Order your copy today.

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Designed for optimum performance combined with small size, the ALINCO ALR-22E reaches new heights in both technical performance and value for money. We've managed to keep the price down to a level that cannot be matched by any other manufacturer although we believe that a small increase will shortly be made to the price. What better time therefore, than now to purchase one of these super rigs. You won't see prices like this again! Technically it's superb and inside it looks very much like some of its more expensive competitors! Measuring only 5.5" × 6.5" it will fit into most places and if you ask, we will extend the frequency range to cover 140-170MHz on receive. We could bore you with the specification but frankly its just the same as all the others (apart from the price of course). We could tell you about all the various features it has, but again its not much different from the competition. Lets be honest, apart from being scome £100 cheaper than some of its competitors and having an extended receiver coverage, it really is like most other rigs. So if money is no object and you only want 144-146MHz coverage, you probably won't be interested in the ALR-22E. If on the other hand these things are important to you. why not send for the full colour brochure today.

★ 2M FM 144-146MHz
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★ 3 Watts output
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Another winner from ALINCO. A true handy transceiver with no extras to buy! Unlike its competitors, you get the nicad pack (500mAH) AC charger, and provisions for direct 12v DC charge. Measuring 168 × 61 × 30mm it's a beauty! Optional accessories include speaker-mic, mobile bracket and high power packs. Get the facts today!

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★ 25 watts FM on both bands.
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★ 21 memories & 2 "call channels".
★ Programmable scanning and priority.
★ 12.5KHz & 25KHz steps.
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QRP Pocket HF Rigs!

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These rigs are single band HF transceivers covering one of the above bands. Power output is 2 watts with VXO control for stability. Included is IRT, built-in CW key & Microphone. The unit can be powered from internal dry cells or external supplies and has connection for external mic. Ultra stable, good dynamic front end and superbly built. Join in the QRP fun wherever you are! Send for details etc.

NEW AZDEN PCS-6000

2M/70cms

£329

FM Transceiver + Airband Receive!

This transceiver is unique in the history of amateur radio. A complete airband VHF monitor plus PMR etc built into a 25 watt 2m rig. Receive coverage is from 108-180MHz, making it the widest ever! And if you want to monitor your own PMR channel you can programme any duplex split into any memory! Steps are 125/25/50kHz and 5kHz on the airband. Can easily be converted to American spec. in minutes. Now you can listen to Marine, PMR, Airband, VOLMET etc from your 2m FM box! Send for leaflet. In stock now.

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AT160 80 AND 160 METER AM/DSB/CW TRANSMITTER
This new transmitter offers both 'phone and CW on 80 and 160 Meter bands. Ideal for the club Top Band net, and general local nattering, as well as a nice sounding CW note for those longer distance contacts. There are front panel controls provided for both carrier level and RF output power (up to 10W PEP output). Broad-band circuitry eliminates the need for any tuned circuit alignment, whilst relay switched eliptical output filters are used on each band to ensure a clean signal. A PTT operated antenna relay is provided. A matching microphone amplifier, type **MA4** has been introduced to suit this TX. We have been asked time and time again "when are you going to introduce a simple 'phone rig?". Well here it is. It is not just a 'phone rig though, the CW is also rather good. We hope you like it.
AT160 Kit: £34.90 **Assembled PCB: £53.90**

MA4 MICROPHONE AMPLIFIER
The MA4 has been introduced to suit the modulation input of the new AT160 transmitter. It is designed to use a normal low or medium impedance hand mic, our CM2 desk/mobile mic kit or even an AP3 speech processor. The four stage circuit includes two stages of active low-pass filtering to help keep your transmitted signal bandwidth within tight limits. A gain control and RF filtering on the input are provided.
MA4 Kit: £5.60 **Assembled PCB: £9.90**

AA2 ACTIVE ANTENNA AMPLIFIER
The new HOWES AA2 kit enables you to build yourself a really compact HF reception antenna that can be accommodated in even the smallest QTH. Even if you have room for large antennas, you will still find this kit useful for building a rotary antenna for the lower frequency bands. Have you got a rotatable Top Band antenna? The advantage in being able to "null" QRM with a minature rotary dipole should not be discounted. The AA2 has facilities for both short single wire and dipole inputs. The antenna length can be varied to suit your requirements, but about 6 to 8 feet is a good maximum length. The PCB is designed to fit inside standard 1.5" waste water pipe, so making for easy weather proof construction if required. Direct or Coaxial powering can be used, so the unit can be located next to the receiver, or remotely on a mast, chimney etc. It is also ideal for building a telescopic antenna facility into a homebrew portable. Features include a two stage amplifier with FET input, 50 Ohm coax output and two gain settings, it covers long wave to 30MHz applications.
AA2 Kit: £7.50 **Assembled PCB: £11.50**

MBRX MARINE BAND COMMUNICATIONS RECEIVER
The new HOWES MBRX kit is designed to enable you to build a receiver covering the whole Marine Band from 1.6 to 3.95MHz, including both the 160 and 80 Meter amateur bands. Modes covered are SSB and CW, although you can also use it for RTTY, FAX etc if you have a suitable terminal.
Features include:
☆ Switched input attenuator ☆ RF stage ☆ Balanced, Direct Conversion mixer ☆ 2 stage active SSB filter ☆ Stable FET oscillator ☆ Fine tune control ☆ Fast and Slow AGC ☆ 1W audio output ☆ Optional filters, signal meter etc. are available. Requires two 365pF (or 500pF) tuning capacitors. A kit to build a real communications receiver with good facilities and performance at a sensible price.
MBRX Kit: £29.90 **Assembled PCB: £44.90**

DcRx54 HF AIR BAND COMMUNICATIONS RECEIVER
So many customers have asked us how to modify our popular DcRx amateur band receivers to cover the 5.450 to 5.750 MHz band, that we decided we would introduce a version of the kit for this application. The DcRx features a stable FET oscillator and a balanced, direct conversion mixer. Up to 1W of output is available for driving headphones or loudspeaker. This receiver is simple and easy to build, but you will be amazed at the performance! Suitable tuning capacitors are available at £1.50 each (you need two per receiver). Single band DcRx kits are also available for 160, 80, 40, 20/30 Meter amateur bands.
DcRx Kit (all versions): £15.60 **Assembled PCB: £21.50**

All **HOWES** kits come with full, clear instructions, good quality glass fibre PCB (drilled and tinned with screen printed parts locations) and all board mounted components. Delivery is normally within 7 days, and we hope to have all the new kits in stock by the time this appears in print. Help, advice and sales are only a phone call away (office hours), but please send an SAE if you would just like a catalogue, or specific product information sheets.

P&P is £1.00 per order.

73 from Dave G4KQH, Technical Manager

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FRT7700	RX ATU	59.00	(2.50)
MH1B8	Hand 600 8pin mic	21.00	(2.00)
MD1B8	Desk 600 8pin mic	79.00	(2.00)
MF1A3B	Boom mobile mic	25.00	(2.00)
YH77	Lightweight phones	19.99	(2.00)
YH55	Padded phones	19.99	(2.00)
YH1	L/weight Mobile H/set-Boom mic	28.75	(2.00)
SB1	PTT Switch Box 208/708	22.00	(2.00)
SB2	PTT Switch Box 290/790	22.00	(2.00)
SB10	PTT Switch Box 270/2700	22.00	(2.00)
FT736 **NEW**	2/70cm 25W Base Stn.	1,359.00	(—)
FT747GX	160-10 All mode TX Gen. Cov.	659.00	(—)
FT2311R	23cm FM Transceiver	475.00	(—)
FT211RH	2m 45W FM Mobile	309.00	(—)
FT212RH	New 2m 45W FM Mobile	349.00	(—)

ICOM

IC761	New Super HF Transceiver	2459.00	(—)
IC751A	HF Transceiver	1500.00	(—)
IC735	New HF Transceiver	979.00	(—)
AT100	100W ATU (751/745)	379.00	(3.50)
AT150	150W ATA (735)	329.00	(3.50)
PS55	Ext PSU (735)	192.00	(3.00)
IC505	50MHz multi-mode portable	529.00	(—)
IC290D	2m 25W M/Mode	559.00	(—)
IC28E	25W FM	359.00	(—)
IC28H	2m 45W FM	399.00	(3.00)
IC Micro	2E New Mini H/H	249.00	(3.00)
IC2E	2m The Original H/H	235.00	(3.00)
IC02E	2m H/H	279.00	(3.00)
IC275E	New 2m 25W Base Stn	1069.00	(—)
IC4E	70cm H/H	285.00	(3.00)
IC04E	70cm H/H	318.00	(3.00)
IC48E	70cm 25W FM Mobile	455.00	(3.00)
IC490	70cm 10W M/Mode	625.00	(—)
IC3200	2m/70 Dual Band FM Mobile	556.00	(—)
IC12E	23cm H/H	449.00	(3.00)
ICR71	Gen Cov RX	855.00	(—)
IC7000	VHF/UHF Scanner	989.00	(—)
AH7000	25-1300MHz Discone	82.50	(3.00)
SP3	Ext Speaker	64.00	(2.50)
CK70	DC Cable (R70/R71)	8.00	(2.00)
EX257	FM Board (R70/R71)	43.00	(2.00)
GC5	World Clock	43.00	(2.50)
AO2	Waterproof Bag all Icom H/H	14.38	(2.00)
BC35	Desk Charger	74.75	(2.50)
BP3	Battery Pack 8.4V (2/4E/02/04E)	32.20	(2.00)
BP4	Empty Battery Case (2/4E/02/04E)	9.78	(2.00)
BP5	Battery Pack 10.8V	63.25	(2.50)
BP7	Battery Pack 13.2V (02/04E only)	78.20	(2.50)
BP8	Battery Pack 8.4V	74.75	(2.50)
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DC1	DC/DC converter operate from 12V	18.40	(2.00)
FA2	2m Helical BNC	9.75	(2.00)
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HM9	Speaker/Mic	23.00	(2.50)
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HS10SA	Vox Unit HS10 (02/04E only)	26.45	(2.00)
HS10SB	PTT SW Box HS10	23.00	(2.00)
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LC3	Leatherette Case 2E/4E + BP3	9.20	(2.00)
LC11	Leatherette Case 02E/04E + BP3	9.20	(2.00)
LC14	Leatherette Case 02E/04E + BP5/7/8	9.20	(2.00)
SS1	Shoulder Strap	11.50	(2.00)
SM6	600ohm 8P Base Mic	48.00	(2.50)
SM8	1.3kμ/600μ 8P Base Mic	86.00	(2.50)
SM10	Comp/Graphic Mike	120.00	(3.00)

KENWOOD

TS940S	9 Band TX General Cov RX	1995.00	(—)
AT940	Auto/ATU	244.88	(3.00)
SP940	Ext Speaker	87.55	(3.00)
TS930S	9 Band TX General Cov RX	1695.00	(—)
AT930	Auto/ATU	206.03	(3.00)
SP930	Ext Speaker	86.23	(3.00)
TS440	9 Band TX General Cov RX	1138.81	(—)
AT440	Auto/ATU	144.82	(3.00)
PS50	H/Duty PSU	222.49	(3.00)
AT230	All Band ATU/Power Meter	208.67	(3.00)
SP230	External Speaker Unit	66.49	(3.00)
PS430	Matching Power Supply	173.78	(3.50)
SP430	Matching Speaker	40.81	(3.00)
SM220	Station Monitor	343.62	(3.50)
BS8	Band Scope Unit (830/940)	77.00	(2.50)
TL922	10/160 2kW Linear	1495.00	(7.00)
TH21	2M Mini H/H	189.00	(3.00)
TH41	70cm Mini H/H	218.00	(3.00)
TH205	2M H/H	215.56	(3.00)
TH215	2M H/H Keyboard	252.13	(3.00)
TR751	2M 25W M/M Mobile	599.00	(—)
TS711	2M 25W Base Stn **(New Low Price)**	898.00	(—)
TS811	70cm 25W Base Stn **(New Low Price)**	998.00	(—)
R2000	Gen Coverage HF/RX	599.00	(—)
VC10	118-174MHz Converter (R2000)	161.94	(2.50)
R5000	General Coverage HF/RX	875.00	(—)
VC20	118-174MHz Converter (R5000)	167.21	(2.50)
BT2	Empty Battery Case TH21/41	11.86	(2.00)
DC21	DC Power Supply TH21/41	25.00	(2.00)
EB2	Ext. Battery Case TH21/41	6.77	(2.00)
HMC1	Headset with Vox TH21/41	32.91	(2.00)
PB21	Nicad Pack TH21/41	24.36	(2.00)
BC6	Desk Charger TH21/41	99.00	(2.50)
SC8	Soft Case TH21/41	11.86	(2.00)
SMC30	Speaker/Mic TH21/4/2600	28.31	(2.00)
MC50	4P Desk Mic	46.08	(3.00)
MC60A	8P Desk Mic	88.22	(3.00)
MC80	Electric Desk Mic	53.98	(3.00)
MC85	Desk Mic Audio Level Comp	99.00	(3.00)
MC43	8P Fist Mic	22.22	(2.00)
MC35	4P Fist Mic	21.72	(2.00)
MC55	Mobile Mic (6p.o. 8p)	52.67	(3.00)
LF30	HF Low Pass Filter	32.26	(2.50)
HS6	Lightweight H/phones	24.36	(2.50)
HS5	Deluxe H/phones	37.54	(2.50)
TS140	HF 9 Band Gen. Cov. TX/RX	862.00	(—)
TW4100	2/70cm FM Dual band model **SPECIAL**	499.00	(5.00)
RZI	500-950MHz AM/FM Scanner	465.00	(6.00)

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PC1	Gen. Cov. Con.	137.40	(2.50)
VLF	Very low frequency conv.	34.90	(2.50)
FL2	Multi-mode audio filter	89.70	(2.50)
FL3	Audio filter for receivers	129.00	(2.50)
ASP/B	r.f. speech clipper for Trio	82.80	(2.50)
ASP/A	r.f. speech clipper for Yaesu	82.80	(2.50)
ASP	As above with 8 pin conn	89.70	(2.50)
D75	Manual RF speech clipper	56.35	(2.50)
D70	Morse Tutor	56.35	(2.50)
RFA	RF switched pre-amp	36.00	(2.50)
AD270-MPU	Active dipole with mains p.s.u.	51.75	(2.50)
AD370-MPU	Active dipole with mains p.s.u.	69.00	(2.50)
DC144/28	2m converter	39.67	(2.50)
ANF	Automatic notch filter	67.85	(2.50)
SRB2	Auto Woodpecker blanker	86.25	(2.50)
RFA	RF switched pre-amp	36.00	(2.50)

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Iambic Deluxe		78.09	(3.00)
Vibrokeyer Standard		63.98	(3.00)
Vibrokeyer Deluxe		78.09	(3.00)
The Original Standard		73.54	(3.00)
The Original Deluxe		82.74	(3.00)
BENCHER			
BY1	Squeeze Key, Black base	67.42	(3.00)
BY2	Squeeze Key, Chrome base	76.97	(3.00)
STARMASTER			
Dewsbury	Electronic Keyer Unit (No Paddle)	54.70	(3.00)
Dewsbury	Electronic Memory Keyer (No Paddle)	95.00	(3.00)

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HANSEN			
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FS5E	3·5-150MHz 20/200W	42.75	(2.50)

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SMCS 2N	2 way 'n' Skts Switch	23.50	(2.50)
Kenpro KP21N	2 way Switch 'n' Socket Deluxe	27.00	(2.50)
T30	30W Dummy Load	10.29	(2.50)
T100	100W Dummy load	45.00	(3.00)
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10 × 100uf 10v	35p
10 × 220uf 10v	35p
10 × 220uf 16v	35p
10 × 220uf 25v	40p
10 × 220uf 40v	45p
10 × 220uf 50v	45p
10 × 470uf 25v	35p
10 × 470uf 50v	50p
10 × 1000uf 25v	35p
POWER ELECTROLYTICS	
5 × 50uf × 50uf 200v	60p
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2 × 220uf 400v	2.00
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WRITE ON... *the page where you have your say*

Equipment Prices

Every time I read through the latest copy of *PW*, I find myself reeling back with horror at the cost of today's rigs. And I can hardly suppress a laugh when one advert states "at a price I can afford"! Whoever puts the prices on the present-day rigs must live in another world — well not in my world anyway.

Any newcomer who enters our hobby and scans the adverts will come to the conclusion that amateur radio is a rich man's hobby. Do the advertisers know that there are almost two million people unemployed and living on the breadline? Where on earth do they expect to get the customers from?

Speaking for myself, I have to make do with scrap rigs and hope they don't cost much to get going. One point in favour of this is that I gain experience as I go along. I certainly can't afford one of these new rigs, yet. Instead, I shall keep on scratching amongst my junk box. Still, I wouldn't change this hobby for the world.

T. Heslop
Durham

Despite what Mr Heslop says, the expensive, all-singing, all-dancing rigs do sell, and in surprising numbers. It never ceases to amaze me to see the number of people at rallies who will produce a fat roll of bank-notes to make their purchases, and often the briskest business is done at the rallies held in areas with the highest unemployment figures.

Having said that, I can only agree that the prices quoted must frighten off many a potential new recruit to the hobby. We really do need more publicity given to the availability of second-hand equipment and to kits, at prices which will encourage people to have a go at getting their licence. They need to know that they can try the hobby without spending a fortune on day one. — Ed.

Rallies

I am instructed by the Committee of the Telford Amateur Radio Rally Group to express our disquiet at the lack of major amateur radio traders at recent amateur radio rallies, including our own major event in September.

We were approached by many visitors to the Rally who were of the same view, and we feel it necessary to bring this opinion to the attention of the traders concerned.

While we fully understand that the overriding concern in this competitive world is to have a commercially viable operation, we would like to forward the view that perhaps amateur radio, and indeed the traders themselves, were done a disservice by this absence. One appreciates that perhaps a prospective buyer is not inclined to conclude a deal for an expensive piece of equipment in the hurly burly of a radio rally. We do however feel that such an event can be the showcase for such equipment, and the viewing and comparison of the goods available is to the advantage of all.

We would therefore enjoin those traders concerned to carefully weigh this view, which originates not only from us the organisers, but also those who they should value the most, their prospective customers, when they consider rally attendance.

Martyn Vincent G3UKV
Hon. Sec.
The Telford Rally Committee

See "Comment" this month.—Ed.

PW COMMENT

Radio Rallies

THE LETTER FROM THE TELFORD RALLY COMMITTEE, published this month, highlights a growing problem for organisers, traders and customers alike. Over the past few years, the number of rallies has steadily increased, and it has now reached the stage where, unpalatable as the fact may be, there are simply too many.

Almost every weekend from spring through to autumn there are two or three radio rallies taking place somewhere around the country. Taking a stand at any one of them involves a commitment of staff time, transport, and stock. For a small trader, this could involve serving in a shop all day Saturday, loading a van with rally stock, snatching a few hours' sleep and then getting up in the wee small hours of Sunday morning to drive to the rally, set up the stand and lay out the stock, serve customers all day long, then clear stock and stand away into a van, drive home, snatch another few hours' sleep in time to open up the shop again on Monday morning. Or if it's just too far to drive both ways safely in a day, there will be the cost of at least one night in an hotel.

Sometimes, with two popular rallies taking place on one weekend, a family firm may send the husband to one rally, the wife to another, which is likely to add an overtime bill to all the other expenses to cover back-up staff — it's not practical to man a stand single-handed.

For larger traders, the transport and overtime costs become even more significant.

Whatever the size of company, there is a limit to the number of weekends that can be devoted to rallies, without the remainder of the business, and the personal lives of the staff, suffering. Having manned the *PW/SWM* stand at 11 of the 23 events we've attended this year, I speak from experience!

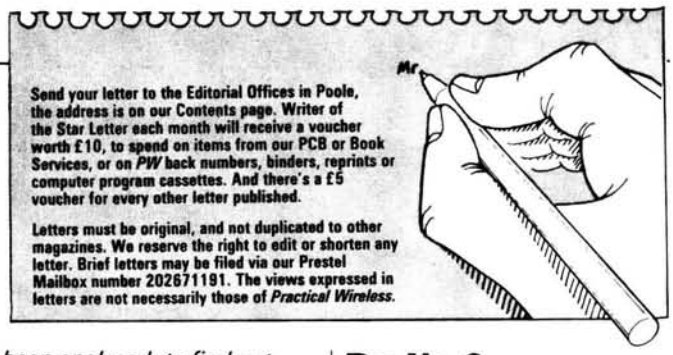
Just how much trade will actually be done at a rally by a trader will depend on the type of business he is in. For some it is a publicity exercise, where the main aim is to show their products, discuss them with visitors and give out literature in the hope that orders will come in later as a result. Antenna mast dealers are a prime example of this. Others, such as component dealers, hope mainly to take money on the day, with little follow-on business except for those who run a catalogue or advertisement mail-order service. The equipment importers and dealers come somewhere between these two extremes, with some goods sold on the day, and a few customers progressed along the road to making their mind up about buying a new rig.

Whenever it may be that the money comes in, the trader does need to make some sales to offset his costs in attending the rally. Radio amateurs will travel amazing distances to attend rallies, and if there are too many events on one day, the number of customers will obviously be less at each one. It is an unfortunate fact of life for the organising clubs that some rallies are almost certain to disappear from the calendar eventually, because they will not get the necessary level of support from traders and public. Strangely, the popularity of individual events does not always seem to be related to the attraction of the venue, ease of access and parking, standard of catering, bar and toilet facilities. We radio amateurs can be a pretty unfathomable lot!

Could it be that the annual RSGB National Convention at the Birmingham NEC will be one of the first casualties? In 1988, the Society's 75th Anniversary year, under 7 500 visitors came over three days, yet the year the show moved from London to the Midlands, there were 4000 through the doors in the first hour of the first day!

I understand that the RSGB's involvement in staging rallies and exhibitions is under detailed discussion at the present time, and it could well be that there will be some changes there in the near future.

Geoff Arnold



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RSGB Project YEAR

Having read the comments of Alan Lake G4DVW on the subject of the RSGB's "YEAR" Project, I can only whole-heartedly agree with all that he said on the matter.

Just who is it that has called for the introduction of a student or novice licence? The results of a reader survey carried out in *PW* of November 1985 showed two thirds of licence holders and nearly one third of non licence holders taking part were against a novice licence. Surely views on this important subject could not have changed significantly in three years.

It cannot be in the best interest of amateur radio to pander to the minority who want something for nothing. The only sensible way forward is to introduce an advanced exam, which could be taken by both Class A and Class B licence holders. The exam would include all the subjects that are in the RAE, but to a higher standard. On passing the advanced examination, the candidates could apply to have their licence varied to allow their station to be used by non-licensees while under the direct supervision of the licence holder. This would allow hands-on training for newcomers and give present licence holders some objective to improving their skills. Let us improve standards, not lower them.

Colin Topping GM6HGW
St. Andrews, Fife.

I understand that correspondence received at RSGB HQ is overwhelmingly in favour of the student/novice licence idea. It will be interesting to see the results of our survey in October PW *when the questionnaires have been analysed, to find out whether the views of our readers have changed since 1985.*

Incidentally, eavesdropping on a discussion among a group of amateurs at the Leicester Rally, I heard a comment which set me thinking: Was there ever a significant number of youngsters joining the hobby, or were new amateurs always predominantly from more mature age groups? And if so, what are the chances of changing that situation now, when interest in amateur radio is declining all over the world? — Ed.

Radio 2 Quality

Further to Mr Anthony Hopwood's letter in October *PW* regarding poor a.m. quality on BBC Radio 2, I too have investigated this, having suspected that my a.g.c. was too fast and was responding to the bass, causing distortion. I had also wondered whether there was a very close interfering carrier causing a beat, because the low frequency intermodulation always seemed to be at the same frequency.

Contrary to it being a BBC plot to drive listeners to f.m., for years they have been working a "con" trick by advertising better quality on f.m. but switching the Radio 2 channel to Radio 1 in the late evening. Fortunately this has been discontinued in the last few days, so I am no longer investigating the poor quality, which seems worse at night.

I would strongly recommend Mr Hopwood to change to f.m.!

Donald R. Darkes G8HRI
Leamington Spa

Not on Your Nellie!

Reading the article on units by Phil Williams in November *PW*, I was surprised to find no mention of the helen. This unit was discussed at length in the pages of the *Scientific American* many years ago. It was of course a measure of beauty, and named in honour of Helen of Troy, whose face launched a thousand ships.

Like the farad, the unit was obviously too large for practical purposes. The millihelen, such beauty as would launch a single ship, seemed more likely to find application in the modern world.

But, looking at the faces around me, I think we would be well served with picohelens, for I cannot see one that would do more than float the odd plank.

Can it be that the unit fell into disuse for lack of application? Perhaps, if someone had invented the reciprocal, the neleh (pronounced nellie, of course), for such looks as would sink a thousand ships, the idea would have caught on.

John S. Grice
Whitley Bay

Come, come, Mr Grice, that's surely a somewhat ungallant comment about the ladies of Whitley Bay. If my recollections serve me, they are as gorgeous as anywhere in the country.—Ed.

Metrication in the USA

I cannot resist throwing my two cents into the metric versus Imperial fracas (*PW* November 1988).

To all intents and purposes, conversion to the metric system here in the US is dead. One hand of the government designates metric measurements for international trade, while the other parts admit to a metric conversion failure! Only here in the US could something like this happen.

Maybe it's democracy. It could be that America just does not want to change. Far too many of my peers, and those older than me, have no interest in learning another system of measurements. In the 50's and 60's, when I was in school, a half-hearted attempt was made to teach us the metric system. I have no idea what is being taught today in school. I doubt much time is spent on the metric system.

And so it goes . . .

J. Craig Clark Jr N1ACH,
***Asst Publisher*, Ham Radio.**

The US has certainly not got a monopoly on contrary government decisions. It's recently been announced here that pints of beer and miles of road will remain in use alongside the metric system.

Meanwhile, in our schools, children are being taught to measure lengths in centimetres, despite the fact that the SI System of Units says you should use only millimetres, metres and kilometres for linear measure. So much for our educators considering the requirements of the engineering industry!—Ed.

FOR DETAILS OF PW READERS SERVICES
PLEASE SEE PAGE 19

The IC-725

Some new product information from Icom now. The IC-725 is an h.f. all band transceiver. The specification is: Frequency coverage 30kHz–33MHz (500kHz–30MHz guaranteed) on the receiver and the 1.8–28MHz bands (including the WARC bands) on the transmit side. The modes are u.s.b., l.s.b., a.m. (receive only) and c.w. with an output power of 100W.

Some of the features of the rig are a 105dB dynamic range, automatic gain control, noise blanker, 10dB receiver pre-amplifiers, 20dB receiver attenuator and r.i.t. There are three modes of scanning available: programmed, memory and selected mode memory. It also has twenty-six memory channels with channels 23 and 24 able to memorise both receive and transmit frequencies for split operation.

Optional extras available are a unit for a.m. transmitting and f.m. transmit/receive, and external p.s.u., RS232 computer interface, two 9MHz c.w. filters (500Hz and 250Hz) as well as the usual headphones, etc. For more information on this transceiver, contact:

Icom (UK) Ltd.,
Sea Street,
Herne Bay,
Kent CT6 8LD.
Tel: 0227 363859.

Can You Help?

Frank Byrne has an old oscilloscope and the transformer is burnt out, unfortunately he is unable to identify the secondary outputs. The model of the 'scope is "Heathkit" Laboratory Oscilloscope and it was made by Daystrom Gloucester. If anyone has any information about the instrument, Frank would be pleased to hear from you. You can contact him at:

15 Willington Park,
Templeague,
Dublin 12.

QTI-TNA

QTI-TNA, the Talking Newspaper for blind radio amateurs has now become established at a new base in Lancaster. The service provides cassette recordings of technical items selected from current radio magazines. These are sent to more than 120 blind amateurs worldwide.

It was started eight years ago, initially for about a dozen members, by John Feeley G4MRB and his wife Diz G6DIZ and run from their home in Sheffield. Through their enthusiasm and dedication this unique service has continued to grow.

Their efforts have been supported and encouraged, both materially and financially, by the electronics industry and the radio press. John, as Chairman, and Diz, as honorary Secretary, resigned at the AGM on July 17 for personal reasons.

QTI-TNA has now moved to Lancaster where it is being run by Harry Longley G0JKT with the help of students from the University of Lancaster.

Support from radio amateurs in the Lancaster area will be very welcome and further help with funding will be greatly appreciated. Visually handicapped persons who wish to receive the QTI-TNA recordings every fortnight may join the service by making a subscription of £3.50.

If you would like to sponsor a member, you could send a donation or a covenanted subscription. Please contact QTI-TNA through:

Harry Longley,
7 Anderson Close,
Lancaster LA1 3JE.

Third Party Traffic

The DTI have announced clarification of regulations for handling third party traffic in the UK.

"Third party traffic should be regarded under two separate headings:
—the passing of messages on behalf of other licensed radio amateurs; and
—the passing of messages on behalf of non-licensed people or organisations.
The DTI is content to accept that the passing of messages on behalf of other licensed radio amateurs (at home and abroad) does not contravene the prohibition against third party traffic to be found in the International Radio Regulations. Clause 8(1) of the licence now makes explicit provisions for this. Regulation 2733 is intended to prevent the amateur service being used for commercial (unlicensed) traffic. If UK radio amateurs were to pass messages on behalf of unlicensed people or organisations thereby providing a service, then a breach of the Telecommunications Act 1984 would take place.

Passing third party messages initiated by or intended for unlicensed persons is permitted under the terms of the amateur licence under three very limited circumstances. The first two fall under the sub-heading of, and are permissible as part of, "self-training" by the radio amateur:

—**During Special Events:** A Special Event Station is established by a licensee with the authority of a Letter of Variation administered by the RSGB on behalf of the DTI. The Variation permits the licensed amateur's station to be used by unlicensed third parties for two minute periods only and then only to discuss trivial matters of personal interest;

—**At the request of a 'User Service':** For the purpose of self-training for natural disaster planning and other exercises promoted by the User Services. (User Services are defined in the licence and consist of the British Red Cross Society, the St John Ambulance Brigade, the County or other Emergency Planning Officer or any United Kingdom police force);

—**In the event of natural disasters:** Where the established lines of communications have failed (RR510). Under these circumstances the amateur may, without reference to 'User Services', pass messages on behalf of third parties until the normal communications systems have been restored. Such messages should only relate to matters directly concerned with relief of distress and should be kept as short as possible to avoid further congestion of the airwaves.

The bands identified for this purpose are: 3.5, 7, 10.1, 14, 18.068, 21, 24.89 and 144MHz."

Mains Protection

Spikemodule is a throwaway device which protects against power line overloads. It plugs into an available socket in any IEC320/CEE22 power distribution system. It can absorb lightning induced surges up to 4500A.

Constant excessive surges in the line are controlled by the Spikemodule. If the surges reach an unacceptable level, a small panel on the component body changes colour, indicating that the unit is inoperative and requires replacing.

Operating voltage is 250V a.c., frequency 50Hz and the maximum continuous power rating is 0.6W with a maximum peak current of 4500A. The response time is 25ns.

Rendar Ltd.,
Durban Road,
South Bersted,
Bognor Regis,
West Sussex PO22 9RL.
Tel: 0243 825811.

PEP Module

Until about two years ago, the range of circuits designed by John Fielden GW4NAH were available at rallies and by mail order as ready-made and tested p.c.b.s. Now, Technical Software are producing the p.e.p. module.

The board will convert any power meter to read p.e.p. instead of average power. It is very easy to install and calibrate as well as being effective. Technical Software say that it's much cheaper than paying a lot extra for an s.w.r. meter with a built-in p.e.p. capability. If average power readings are also required, the board is easily switched out of circuit.

The board is available, ready assembled and tested with mounting kit and full instructions for installation, calibration and use for £12.00 including VAT and P&P.

Technical Software,
Fron,
Upper Llandwrog,
Caernarfon LL54 7RF.
Tel: 0286 881886.

Gutterless Cars

Many of the modern cars no longer have gutters and some owners are reluctant to use a magnetic mount. Waters & Stanton have introduced a new mobile antenna and mount that will fit most modern cars.

The MB100A mount attaches to either the hatch-back gate or the top of the door lip. It is very small and can be angled in a variety of ways to fit most requirements. The coaxial feed is by a short length of very high quality, tough, ultra thin 50Ω cable that will easily sit in the door jamb without damage. The coaxial cable then changes to a conventional thickness for connection to the transceiver. The antenna socket is TNC. The antennas come with the cable terminated in PL259. They cost £29.95. For further details, contact:

Waters & Stanton,
18–20 Main Road,
Hockley,
Essex SS5 4QS.
Tel: 0702 206835.

Catalogues

With over 500 new products, the pages increased to 550 and the print run increased to 210 000, the 1989 Maplin Catalogue is bigger than ever.

Already available is the new Maplin "Winter Collection" brochure featuring all kinds of bargains and ideas. Also available now is the new Maplin Professional Supplies Trade Catalogue.

The 1989 catalogue is available at £1.95 from either W.H. Smith newsagents, Maplin Mail Order or Maplin stores.

1989 Rallies

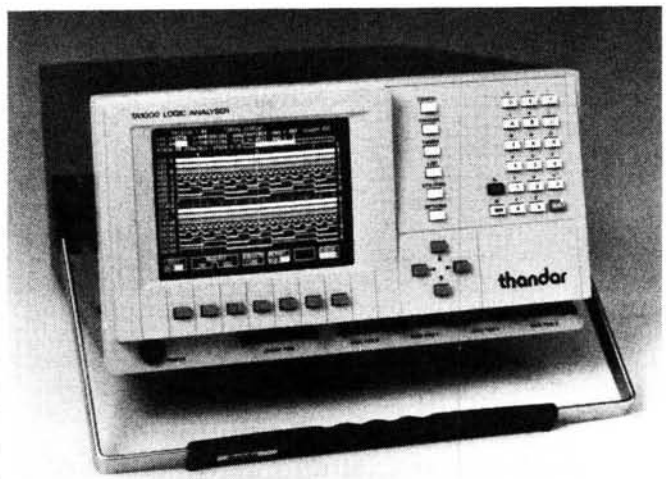
We've been sent some advance information on rallies for 1989:

January 29: The NARSA Norbreck Radio and Electronics Exhibition (formerly held at Belle Vue in Manchester) will be held in 1989 at the Norbreck Castle Exhibition Centre, Blackpool. Details can be obtained from: **Peter Denton G6CGF. Tel: 051-630 5790.**

February 26: The 2nd Taw and Torridge Rally will be held in the BAAC Halls, The Pill, Bideford in North Devon. These premises are larger than last year. The doors open at 10.30am with talk-in available on S22. There will be trade stands, a bring and buy, refreshments and a bar as well as ample parking. More details are available from: **G0AYM. Tel: 0805 23776.**

May 7: The Southend & District Mobile Rally will be held at Roach Way Youth Centre, Rochford, Essex. Doors open at 10am. More details from: **Ted G4TUO. Tel: 0702 202129.**

If you are organising a rally and would like us to publish details, send in any information as soon as possible. We *must* have at least six weeks' notice of events to be sure of being able to mention them.



Portable Logic Analyser

STC Instrument Services has introduced the low-cost Thandar TA1000 portable logic analyser. This unit offers the user optional disassemblers for most 8-bit and 16-bit microprocessors.

They are designed for field service, development and production applications. The unit is capable of capturing data 1K deep across 32 channels at up to 25MHz and can display this information in both "timing" and "list" formats.

Its range of features include multi-level triggering with restart, event count and delay facilities, high impedance (1MΩ/5pF) clock and data inputs to minimise circuit loading and three external clocks with a total of five qualifiers.

All acquisition parameters can be set up using just two menus whilst the use of soft-keys guide the operator at every stage and minimises the number of keystrokes required to achieve desired functions.

Reference data, current data, up to four further acquisitions and 16 set-ups are protected by a battery-backed c.m.o.s. RAM. For further details, contact:

STC Instrument Services,
Dewar House,
Central Road,
Harlow
Essex CM20 2TA.
Tel: 0279 641641.

Industrial Batteries

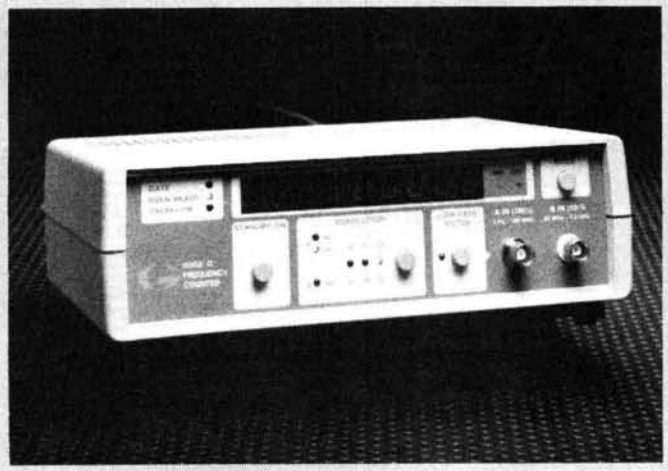
Improvements in Duracell's alkaline technology, which extend the battery life to in excess of three years, have enabled the company to address a new market of back-up emergency power. This is an area traditionally dominated by rechargeable.

There are four batteries in Duracell's new, high capacity, long-life Procell range and they are capable of providing current from a few microamps to 1 amp continuous, with the ability to deliver high pulse currents. The square 6V battery measures 110 x 68 x 68mm and has a capacity of 20Ah. It is available with either coiled spring terminals or with insulated screw terminals. The PC918 again produces 6V but its larger size provides a capacity of 40Ah. The fourth battery has a voltage of 12V and a capacity of 20Ah.

For more details on these batteries, contact:

Duracell Technical Division,
Duracell House,
Church Road,
Lowfield Heath,
Crawley,
West Sussex RH11 0PQ.
Tel: 0293 517527.

Frequency Counter



An updated version of the Model 6002D 1.3GHz frequency counter is now available from Global Specialties.

The inclusion of a phase lock loop means that low frequencies up to 10kHz can be measured to an accuracy within 0.01Hz in a time of one second. Three frequency modes are featured with period A providing measurement from 1µs to 200ms. A 10MHz ovened crystal oscillator timebase is also included to ensure temperature stability of ±0.5ppm from 10 to 40°C with an ageing stability of 1ppm per year.

Input A is able to accept signals from 5Hz to 100MHz with an impedance of 1MΩ/20pF. Input B accepts signals form 80MHz to 1.3GHz with a 50Ω impedance.

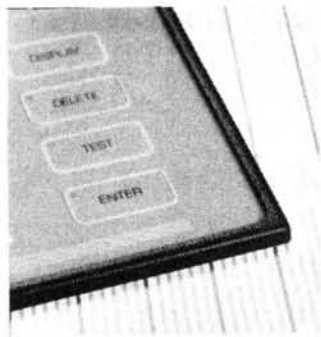
For more details on the frequency counter, contact:
Global Specialties,
2nd Floor,
2–10 St. Johns Street,
Bedford MK42 0DH.

Oscilloscopes

A new range of low-cost, high-quality oscilloscopes are now available form Tandem Technology Ltd. There are six models in the range with bandwidths of 20 and 40MHz with two or three channels, delay sweep and 1mV/div sensitivity. Also included are X/Y operation, line and TV sync separator circuit with variable hold-off to allow triggering of complex signals.

The units weigh 7.1kg and are transportable, with prices starting from £270. For further details, contact:
Tandem Technology Ltd.,
Forum,
Stirling Road,
Chichester,
W. Sussex PO19 2EN.
Tel: 0243 788703.

Edge Moulding



ITW Switchpanels have developed a new option for customers of their POSI-KEY switchpanels. The company claims to be the first to offer edge moulding which seals the edge of the switch panel making it rugged and waterproof.

The raw edges, which occur with normal membrane panels, are now hidden and protected thus improving the aesthetics and giving designers the option to bolt the finished sealed switchpanel onto the surface of equipment as opposed to having to cut out a hole for it or produce a custom housing. The plastics moulding is available in a variety of colours and can incorporate a relief of a company logo if required.

The POSI-KEY switchpanels use a small triangular dome which produces an audible "click" when pressed, thus eliminating the need for artificial bleepers or lights. The metal dome provides the actual electrical contact of the switch so there is no possibility of a "click" occurring without electrical contact being made. Being metal also means that the switch can handle larger currents than conventional flexible membranes and offer greater reliability.

For further information, contact:
ITW Switchpanels,
85 Stanley Road,
Bournemouth,
Dorset BH1 4SD.
Tel: 0202 303431.

Function Generator

Global Specialties now have introduced a new version of the 2001 function generator, known as the 2001A. This model offers continuously variable frequency from 1Hz to over 500kHz.

The new model also features a 10:1 calibrated vernier in six decade ranges, or up to 1000:1 with a ±2V sweep input. In addition to high (20V peak-to-peak) and low-level outputs for sine, square and triangle waveforms, a separate t.t.l. level squarewave is provided. This is buffered to drive thirty t.t.l. loads. The sweep input is d.c. coupled and typically has an impedance of 17.5kΩ. The sensitivity is 0–4V for a full range sweep to 100kHz and 0–1.75V above 100kHz.

The unit weighs 1.6kg with dimensions of 76 x 254 x 178mm and is made in the UK. For more information, contact:
Global Specialties,
2nd Floor,
2–10 St. Johns Street,
Bedford MK42 0DH.

Insulated Ferrules

Klippon has extended its range of insulated ferrules to include the new 0.25mm² and 0.34mm² cable sizes with an overall stripping length of 8mm.

The electrolytic copper ferrules are designed to be vibration-proof and prevent conductor damage and "whiskering". The range, which features a heat-resistant polypropylene funnel tolerant to 120°C, is available in several colours and is suitable for conductors from 0.25–35mm² (24–2a.w.g.).

Also offered are non-insulated types to DIN 46228. Further details including NATO numbers plus metric, British Imperial and American guides to conductor sizes are featured in the Klippon Cable Preparation Tool Catalogue.

For further details, contact:
Klippon,
Power Station Road,
Sheerness,
Kent ME12 3AB.
Tel: 0795 580999.

Printer Silencers

A new range of printer silencers are available from Electronic and Computer Workshop Ltd. They should reduce printer noise to below the 55dB level, the recommended maximum for an office environment.

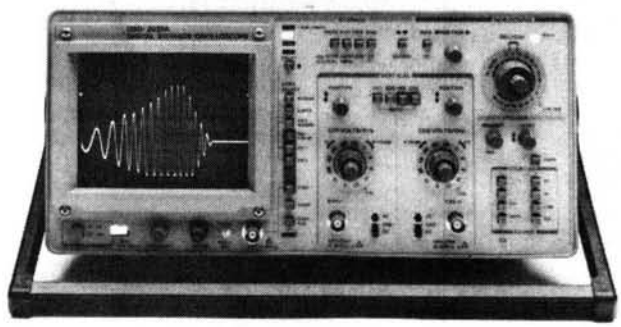
The silencers have baffles built-in as standard to reduce noise further. These allow the user to adjust the paper feed position and when closed noise leakage from the rear of the silencer is reduced. All the silencers are manufactured with 5mm thick perspex in beige melamine with brown edging. They are insulated with a highly absorbent sound deadening material and have a fully insulated base plate.

Another standard fitting is a fan unit with override switch for efficient cooling. Pneumatic arms give smooth, silent and safe closure of the cover. For further information, contact:
Electronic & Computer Workshop Ltd.,
Unit 1,
Cromwell Centre,
Stepfield, Witham,
Essex CM8 3TH.
Tel: 0376 517413.

Digital Storage 'Scope

The DSO-2020A 20MHz digital storage oscilloscope makes use of surface mount technology in its internal design.

Each channel has its own a/d converter with a maximum sampling speed of 20ms/s. The trigger level markers superimposed on either side of the digital image provide exact indication of the trigger level selected. Because of the complete trigger system such as: normal, auto, TV line, TV frame, HF rej and ext, which also works in storage mode, complex signals such as a TV test signal can be recorded with automatic line/frame selection depending on the timebase range.



Other modes available include an automatic hard copy output, "auto plot", a selectable pre/post trigger delay and a digital and analogue magnifier making traces expandable up to 50 times.

For more details on this oscilloscope, contact:
Fieldtech Heathrow Ltd., Huntavia House, 420 Bath Road, Longford, Middlesex UB7 0LL.

Biconical Antennas

The B-1000 antenna set is an easy to use antenna system for measurements from 30–1000MHz. It combines the broadband biconical antenna with an impedance transforming technique to offer unparalleled accuracy and convenience of use. The antennas are accurate enough for taking site attenuation measurements and, with automated equipment, site attenuation can be run in several minutes.

The B-1000 set consists of three antennas covering the 30–200MHz, 175–425MHz and 400–1000MHz ranges. The two higher frequency antennas are the first biconics available that operate above 200MHz. The biconic offers several advantages over the often used log-periodic antenna. It is much lighter and easier to mount.

Changing polarisations can be done with the flick of a wrist, without special mounts or counter weights. The antenna pattern is nearly identical to that of a tuned dipole at all frequencies, so correlation of measurements to standards is extremely high. The broadband characteristics of these antennas make them ideal for automated measurements. The balun construction is sturdy enough to handle 100 watts of power.

For further details, please contact:
Fieldtech Heathrow Ltd., Huntavia House, 420 Bath Road, Longford, Middlesex UB7 0LL.

OUR SERVICES

QUERIES

We will always try to help readers having difficulties with a *Practical Wireless* project, but please observe 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 International Reply Coupons for overseas readers).
4. Write to the **Editor, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** giving a clear description of your problem.
5. Only one project per letter, please.

BACK NUMBERS AND BINDERS

Limited stocks of many issues of *PW* for the past 18 years (plus a few from earlier years) are available at £1.40 each, including post and packing to addresses at home and overseas (by surface mail).

Binders, each taking one volume of *PW* are available Price £3.50 plus £1 post and packing for one binder, £2 post and packing for two or more, UK or overseas. Prices include VAT where appropriate.

CONSTRUCTION RATING

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 his own.

COMPONENTS, KITS AND PCBS

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for our more recent projects are available from **CPL Electronics,** and from **FJP Kits** (see advertisements).The **printed circuit boards** are available from our **PCB SERVICE** (see page 50 of this issue).

CLUB NEWS

If you want news of radio club activities, please send a stamped, self-addressed envelope to **Club News, "Practical Wireless", Enefco House, The Quay, Poole, Dorset BH15 1PP,** stating the county or counties you're interested in.

ORDERING

Orders for p.c.b.s, back numbers and binders, *PW* computer program cassettes and items from our Book Service, should be sent to **PW Publishing Ltd., FREEPOST, Post Sales Department, Enefco House, The Quay, Poole, Dorset BH15 1PP,** with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders **must** be drawn on a London Clearing Bank.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Poole (0202) 678558. An answering machine will accept your order out of office hours.

SUBSCRIPTIONS

Subscriptions are available at £15.50 per annum to UK addresses, £18 to Europe, and £19 elsewhere (by Accelerated Surface Post). For further details, see the announcement on page 72 of this issue.

Expedition to OV00

One of the most difficult "squares" to obtain towards a Worked All Britain (WAB) award is OV00, a tiny area of beach at the foot of 150m cliffs on the North Yorkshire coast twixt Scarborough and Whitby, where operation is possible only at low tide. Steve Bryan G1SGB retells how a stalwart band of enthusiasts activated that square in April 1988.

It was just 1200UTC (GMT) when I pulled into the farmyard of Mr and Mrs White at Bent Riggs Farm. After exchanging pleasantries, I was directed to the field which was to become our home for the next few days and where the control station would be situated during the activation of OV00. As I entered the field I noticed the very deep ruts that were sure to cause some problems for the caravans that were to arrive later. I never thought I would be the first victim as I inched forward into the field.

My motor-home progressed through the ruts and just as I thought that I had cleared the worst of them I heard an almighty bang and the van lurched sideways. Realising that if I stopped I would not be able to start again, and also that I was blocking the entrance to the field, I gunned the engine, dropped the clutch and half skidding and ploughing, lurched into the field.

A blow-out on a very sodden field is no fun and the next four and a half hours saw me crawling under the motor-home to dig a trench so as to enable me to get the trolley-jack into operation and change the wheel.

Once this task was overcome, I set about constructing the portable tower which consisted of two 6m scaffolding poles. I rigged the gin pole and fixed the guy ropes and stakes, and then decided that a cup of coffee was the order of the day.

Feeling somewhat refreshed, I started to make good the entrance to the field using stones and hardcore that was lying around the perimeter of the field. I did the best that I could and then returned to the farm to ask if the tractor could be used to compound the larger stones and thus make access easier. This was completed at 1800UTC.

As I sat in the motor-home listening to 144.375MHz, Peter G1OVA called to say that he was well on his way and would be with me in about 30 minutes. He arrived at 1845 and very quickly set up his caravan and awning, his wife June making a very welcome coffee which was my second all day. We put off erecting the antennas until next morning and whilst I was preparing my supper I worked Ken and Jean, G1VEM and G1VEN mobile, who had halted their progress to Ravenscar at Filey and informed me that they would be arriving bright and early next morning.

Friday, April 1

Early next morning it was, and even the birds were complaining of the noise as Ken G1VEM pounded on the side of what had been a very quiet and peaceful motor-home. Nothing for it but to get up, make some coffee, and then set about putting up the antennas, two 15-element Cue-Dees.

By 0900 I was calling CQ on .300 and very quickly worked ten or more stations that were keen to know how things for OV were progressing. Pat and Marilyn, G1VAE and G1VAF, arrived complete with tent and backpacks and thus the main party of OV activists was complete.

On the arrival of John G4YSS with his two sons, it was decided that we would go into OV and set up the antenna ready for the weekend's operation. It would give us an insight of what had to be overcome before we could step onto the most sought-after large square in the Worked All Britain Awards.

I can now safely say that I didn't consider the descent into OV to be unduly difficult as most of my descent was on my backside. Various trees on the way down stopped what could have been G1SGB's answer to Eddie Edwards, and I arrived on the plateau in one piece and what's more keen to continue. The others, too, had an uneventful descent and the continuous chatter of Jean was refreshing and kept all spirits high.

With everyone helping each other we reached the top of the second descent point. With John G4YSS leading the way we found the dreaded ladders that would take us down onto the foreshore (don't they have vandals in North Yorkshire? I was hoping they had been washed out into the North Sea!). Anyhow, as I stepped off the bottom of the ladder with OV just a few metres away, I tried to puzzle out how the hell I had been the first down and what had happened to our guide.

Feet firmly implanted in OV00, I looked up and up until on the far horizon I could see the top of Beast Cliff, a sight that I can recommend to anyone—surely it's the eighth wonder of the world. As Peter G1OVA with John G4YSS checked that the batteries were OK, Pat G1VAE and I set about putting together the 13-element Tonna. We then put it out of the reach of a high tide, and sat back watching the ladies paddling and collecting souvenirs from Oscar Victor.

The ascent back to camp, apart from lots of slipping and sliding, was uneventful but very tiring. Back at camp we retired for food and a very welcome hot drink.

26 ▶

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Valved Communications Receivers

The DST100 (Part 2)

This month, Chas E. Miller concludes his description of the DST100 with details of fault-finding and realignment procedures, and some suggested modifications.

Because of the intricacy of the design, fault finding on the DST100 may well appear a daunting prospect. However, as always, a calm, logical approach will win the day. In fact, the complexity may be put to use by comparing results on each of the three operating modes, a process that will eliminate or indicate certain stages. The built-in h.t. current meter will also be of assistance in this respect. The maximum normal consumption at 250V input is 110mA with the receiver operating as in mode (1). A low reading will indicate one or more faulty valves, whilst a high reading will probably point to leaky coupling or decoupling capacitors.

It will be seen from the block diagrams that some of the valves have an essential role in all modes, some do essential jobs in some modes but not in others, whilst some valves have secondary jobs which are not vital for the set to give results. To particularise:

V1, V2, V3, V5, V6, V8, V9, V12 and V13 are essential for mode (1).

V1, V2, V3, V5, V7, V12 and V13 are essential for mode (2).

V1, V2, V3, V6, V8, V9, V12 and V13 are essential for mode (3).

Thus V1, V2, V3, V12 and V13 are common to all modes, and if the set works on any of the latter these valves must be functioning correctly in themselves, although there may still be problems with the switching between modes.

If the current reading is approximately correct in mode (1) but the set is silent, first try the set in modes (2) and (3) to discover if any or neither of them is working. If so, it may be deduced from the block diagrams which valves should be checked for faults:

V5 may silence modes (1) and (2), but not (3).

V7 may silence mode (2) but not (1) or (3).

V6, V8 or V9 may silence modes (1) and (3), but not (2).

When there are signals on all modes, but no a.g.c. action, note that mode (1) will be affected by either V7 or V10, whilst mode (2) will be affected by only V7 and mode (3) by only V10. The latter will affect b.f.o. operation in modes (1) and (3).

If none of the modes gives results, use the infallible technique of working back from the output stage to discover just where the signals disappear. If V12 and V13 can be cleared, the other common stages (V1, V2 and V3) should be tested.

Attention should be paid both to the wafer switches and the relay used to change modes, the contacts being cleaned with a proper agent.

Checking A.G.C. Action

Set the band switch to any except G, r.f. and i.f. sensitivity to maximum, selectivity to "2", b.f.o. and noise limiter off, a.g.c. on, and the tone control to maximum bass. Connect an output meter to the 4000Ω output sockets and inject an appropriate modulated r.f. signal of 1μV to the 75Ω antenna sockets. Adjust the audio gain to give a meter reading equivalent to 50mW output.

Increase the signal input in steps up to 100mV—an increase of 100dB. The output should not vary by more than 10dB at any time if the a.g.c. is working correctly. If this is not so, it is suggested that the first line of investigation should be the a.g.c. line decoupling capacitors.

Checking I.F. Alignment

The 110kHz i.f. should be tested initially, with a wobbulator and oscilloscope. The f.m. signal of 110kHz ±3kHz should be injected into the hexode grid of V6 with the receiver in mode (3). The 'scope should be connected to the switch side of C20A. Place the selectivity switch in position "5". Ignoring for the moment the question of sensitivity, a symmetrical pattern should be obtained on the 'scope if the alignment is correct. Any error should first be tackled by adjustment of L26 (see Fig. 1.3). Only if this fails to give the correct pattern, or if the i.f. sensitivity is clearly well down, should the complete 110kHz realignment process be undertaken, as follows.

Set the band switch to any position save G, i.f. sensitivity and audio gain to maximum, selectivity to "Sharp", tone to maximum bass and the b.f.o., a.g.c., noise limiter and r.f. regeneration to off.

Connect an output meter to the 4000Ω output sockets and the generator input to the grid of V8. Use the lowest signal level compatible with a significant output meter reading. Adjust VC6H, VC6G, VC6K and VC6J in that order for maximum output.

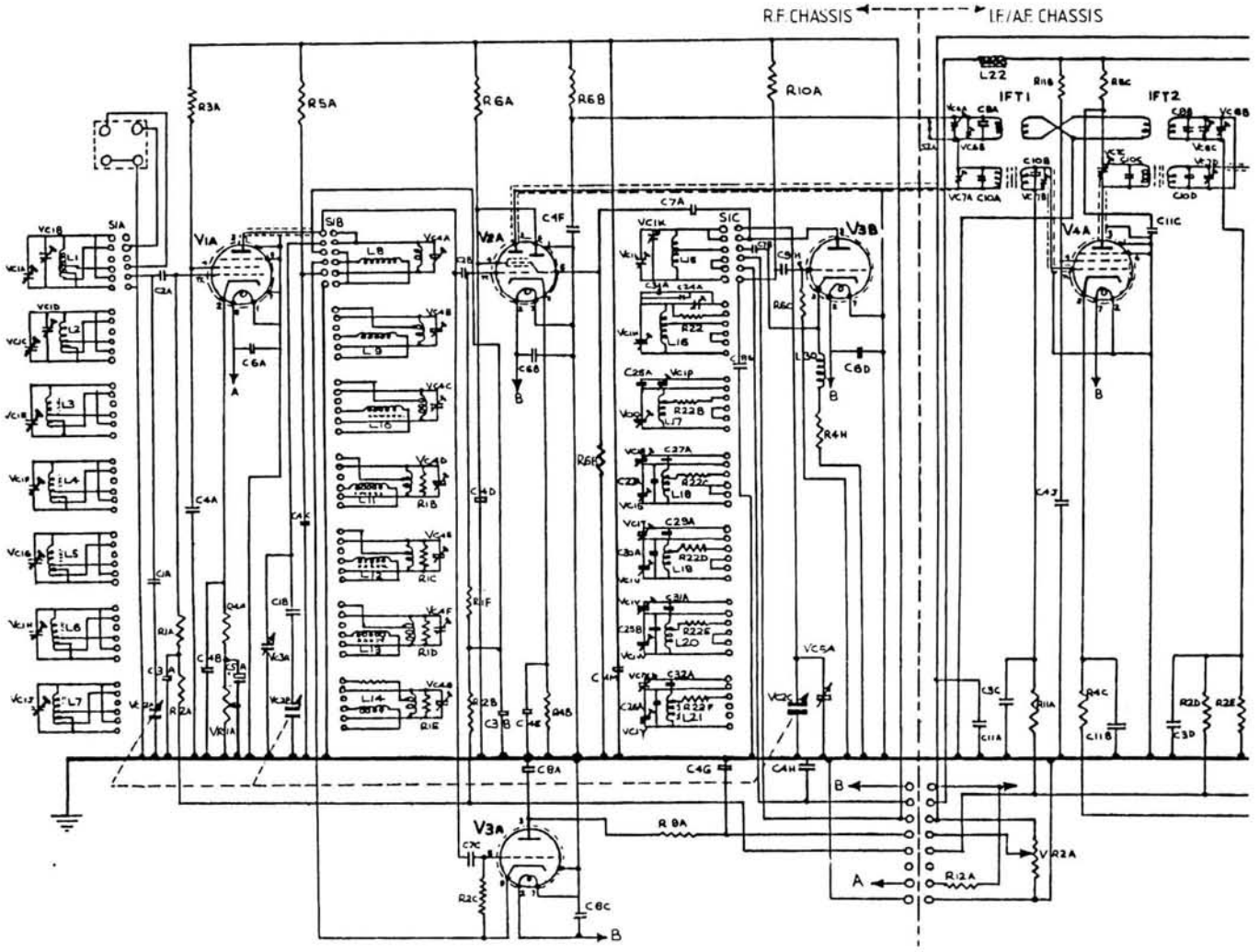
Set the i.f. regeneration control to zero and transfer the signal input to the hexode grid of V6. Adjust VC6H, VC6G, VC6F and VC6E in that order for maximum output. Then re-adjust all the trimmers in the order VC6M, VC6E, VC6L, VC6F, VC6K, VC6G, VC6J and VC6H, repeating until no further improvement is possible.

Reset the band switch to G and transfer the signal input to the hexode grid of V2. Adjust the two-section trimmers VC6C/D and VC6A/B for maximum output. Aim to have the total capacity of each set of two sections as near as possible shared equally between them. This gives the greatest mechanical stability.

2MHz I.F. Alignment

Set the receiver controls and connect the output meter as given above for the initial 110kHz alignment. Set the selectivity to "Broad" and inject the signal into the grid of V5. Adjust VC7D, VC7C, VC7F and VC7E in that order for maximum output. Set selectivity to "Sharp" and adjust VC1Z for maximum output.

Transfer the input to the hexode grid of V2 and adjust VC7B, VC7A, VC7D and VC7C in that order for maximum, then re-check VC1Z. Return the selec-



Component List

Fixed Capacitors

C1	2nF	C13	200pF	C25	300pF
C2	200pF	C14	8µF	C26	30pF
C3	40nF	C15	2nF	C27	180pF
C4	0.1µF	C16	350pF	C28	50pF
C5	25µF	C17	500pF	C29	100pF
C6	5nF	C18	300pF	C30	120pF
C7	100pF	C19	250pF	C31	85pF
C8	10nF	C20	25nF	C32	200pF
C9	600pF	C21	50µF	C33	45pF
C10	100pF	C22	32µF	C34	20pF
C11	0.1µF	C23	500pF	C35	5nF
C12	100pF	C24	560pF		

Fixed Resistors

R1	0.25MΩ	R9	10kΩ	R17	390Ω
R2	0.5MΩ	R10	15kΩ	R18	560Ω
R3	5kΩ	R11	100kΩ	R19	4kΩ
R4	200Ω	R12	3.5Ω	R20	25kΩ
R5	3kΩ	R13	25kΩ	R21	5kΩ
R6	50kΩ	R14	40kΩ	R22	1kΩ
R7	25Ω	R15	12.5Ω	R23	3kΩ
R8	50Ω	R16	300Ω	R24	270Ω

Variable Resistors

VR1	5kΩ	VR3	2kΩ	VR5	0.5MΩ
VR2	50kΩ	VR4	50Ω	VR6	0.5MΩ

Inductors

L1–L7	Antenna coils, bands A–G
L8–L14	R.F. coils, bands A–G
L15–L21	Oscillator coils, bands A–G
L22	Relay winding (contacts are S2)
L23	2MHz filter choke
L24	Filter choke (heater)
L25	Oscillator coil (2nd mixer)
L26	Selectivity loading coil
L27	110kHz filter choke
L28	B.F.O. coil
L29	H.T. smoothing choke

Variable Capacitors

VC1	3–30pF trimmer
VC2	430pF 3-section gang
VC3	20pF trimmer
VC4	2–8pF trimmer
VC5	1–2pF trimmer
VC6	220pF trimmer
VC7	50pF trimmer
VC8	100pF trimmer

Valves

V1	CV21/VP41
V2,V6	ARTH2/ECH35
V3,V4,V9	6J5G
V5,V8	ARP34/EF39
V7	6B8G
V10	6R7G
V11	6H6G
V12	6Q7G
V13	6V6G

tivity to "Broad" and re-check VC7F and VC7E.

R.F. Alignment

Note that the alignment frequencies for Mark II receivers differ from those used for Marks III and III*. Note also that by a regrettable oversight, the designations allocated to the antenna and oscillator trimmers do not correspond directly to the frequency ranges of the sets. Whilst the r.f. coupling coil trimmers VC4A to VC4G are arranged logically to operate on Bands A to G in that order, the antenna trimmers (annotated VC1 with suffixes from A to J, with the exception of I) do not follow the pattern.

Trimmers VC1A and VC1B both operate on band A, and VC1C and VC1D on band B. VC1E, –F, –G, –H and –J operate on bands C to G respectively. The same sort of disorder is found on the oscillator trimmers and padders, designated VC1K to YC1Y. VC1K and VC1L operate on band A, and then in order of bands are –M and –N, –Q and –P, –R and –S, –T and –U, –V and –W, –X and –Y. In each case the letter lower in alphabetical order corresponds to the lower frequency (padding) adjustment for each band, and the higher letter to the higher frequency (trimming) adjustment.

The specified adjustment frequencies are:

For Mark II receivers:

Band A: 13MHz and 28MHz
Band B: 5.15MHz and 11.12MHz
Band C: 2.07MHz and 4.48MHz
Band D: 827kHz and 1810kHz
Band E: 331kHz and 720kHz
Band F: 132.8kHz and 289kHz
Band G: 53.5kHz and 116kHz

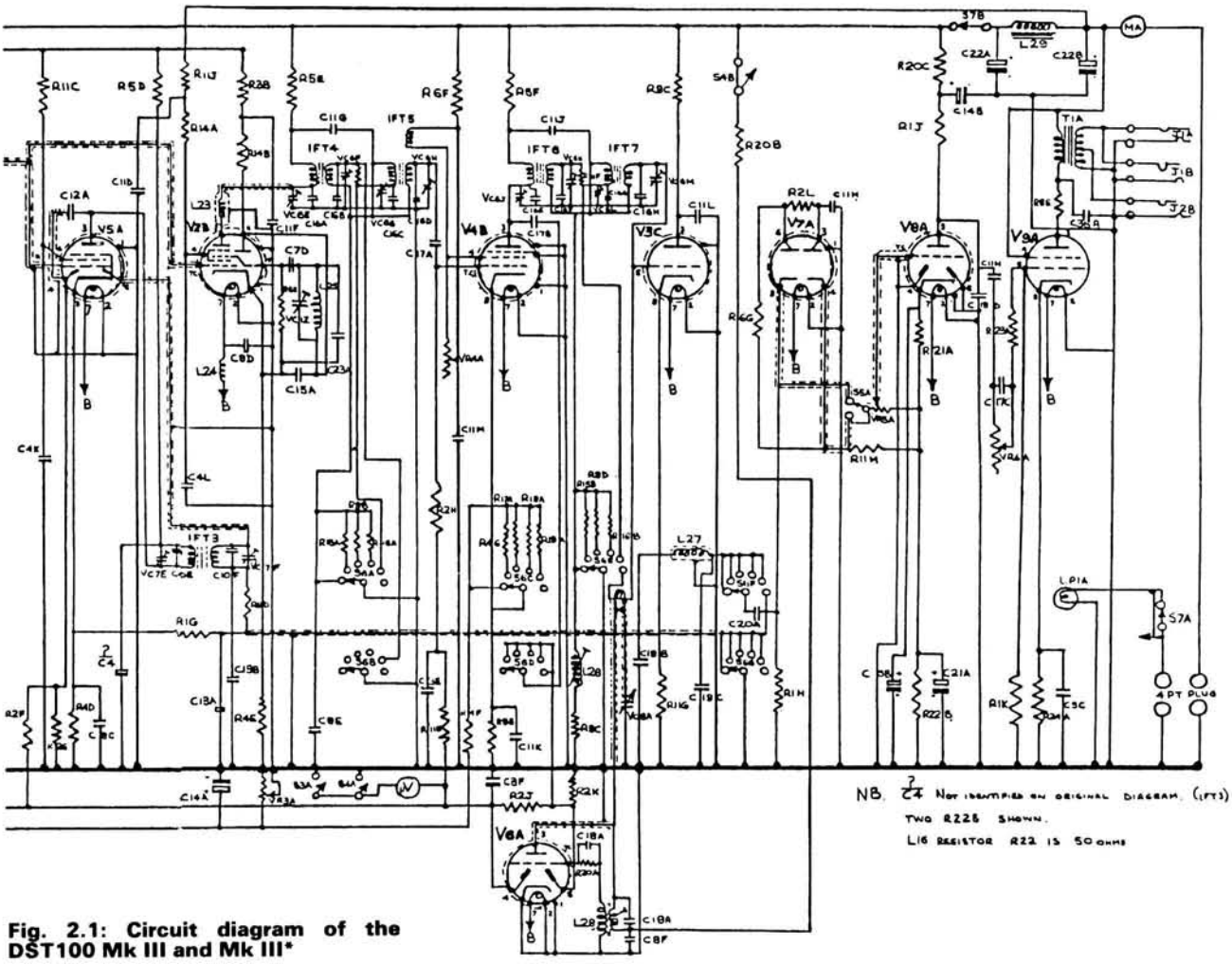


Fig. 2.1: Circuit diagram of the DST100 Mk III and Mk III*

For Mark III and III* receivers:

Band A: 12MHz and 30MHz
Band B: 4.8MHz and 12MHz
Band C: 1.9MHz and 4.8MHz
Band D: 780kHz and 1800kHz
Band E: 310kHz and 780kHz
Band F: 126kHz and 300kHz
Band G: 50kHz and 126kHz

To Modify or Not?

As is well-known, the writer's own preference is that any receiver should be kept as closely as possible to its original specification, unless this is so unsuitable for present-day use as to make modification essential. When a DST100 receiver is to be used as first intended, i.e., for headphone reception of c.w. and speech transmissions, no change is required, but should it be desired to use the undoubted high performance of this set for DX reception of entertainment material, certain alterations to the specification become desirable.

1. The Output Transformer. For c.w./speech reception on a loudspeaker it will probably be sufficient to connect a high-impedance unit (or a low-impedance with a matching transformer) into the existing 4000Ω or 600Ω sockets. For music reception it would be better to install an alternative output transformer to match correctly the 6V6G to the loudspeaker to be used. The optimum load for the valve is 5kΩ, so for a 4Ω loudspeaker the transformer should have a ratio of 35:1, and for an 8Ω 'speaker, 25:1. The primary winding should be able to pass at least 50mA d.c.

2. The I.F. Alignment. The rated bandwidth on selectivity position "5" being only 2kHz, music will be reproduced with a considerable loss of upper register. The "Broad" setting (12-25kHz) would of course give excellent high-note reception, but without the double-superhet facility. The best way around this problem appears to be deliberately to flatten the i.f. response on "5" by suitable adjustment of the 110kHz i.f. transformers and L26, employing the wobbulator and oscilloscope. A deviation of ±9kHz is suggested for initial experiment.

Another Modification

The usefulness of the h.t. current meter might be increased enormously if it were to be re-wired to monitor each individual valve as described in the writer's previous article in this magazine, entitled "A Versatile Valve Monitor/S-meter" (*PW* May 1986). Briefly, the principle is to insert a resistor in the h.t. feed to each valve anode with a value that will in each case drop a predetermined voltage when the current is at its optimum. The voltage may be chosen as 0.5V and the meter fitted with a suitable series resistor to give it a full-scale deflection of 1V. The meter is switched across any of the h.t. resistors as required, when it will display a half-scale reading if the valve is drawing its correct anode current. There is no need for any arbitrary scale markings other than (as suggested in the article) a small coloured section to indicate upper and lower limits of tolerance.

For example, the 6V6G output valve has a rated anode current of 45mA with 250V h.t. and no signal applied. Thus the h.t. series resistor would have a value of 11Ω to drop 0.5V (approx.). The 6Q7G a.f. amplifier is rated to draw only 1mA, so its series resistor would be of 500Ω. For further details, the reader is referred to the original article; if not to hand, copies of the May 1986 *PW* are available from the editorial offices, price £1.40 including postage and packing. ***PW***

WATCH OUT FOR THE NEXT IN THIS SERIES

Henry G0EMS and Martin G4YCD arrived in the afternoon, and once they were settled into the motor-home they were quickly prompted into using the radio as GB1OVA. Most of the afternoon was taken up passing information to interested parties on how to get to Ravenscar or what frequency we would be on and at what time.

On returning to camp from a brief sojourn in the local hostelry, we found that Jess G4YXV had arrived complete with kitchen sink and a very well stocked cocktail cabinet. The latter had been badly bruised by the time we all turned in. True to WAB, G1OVA and XYL plus G1VEM with G1VEN had been out in two mobiles giving away the rarer of North Yorkshire Squares to anyone who happened to be around.

Saturday, April 2

Another early rise for us all as the sound of G4YXV's generator broke the dawn silence, punctuated with obscenities in very broad Yorkshire dialect, obviously Peter G1OVA. We all dressed and prepared for Day One of our activity.

Some confusion reigned briefly as the h.f. team could not decide when they were going to start, so without further delays the v.h.f. group made their departure and OV00 on 144MHz was on. The team consisted of G1OVA, his XYL, G1VAE, G1VAF, G1VEM, G0EMS and G4YCD, but as they reached the top of Beast Cliff it was realised that a vital piece of equipment was missing and so Jean G1VEN set off in hot pursuit with the offending part and ended up doing yet another descent into OV. I must say that the courage of Jean was unflinching as she made that second descent wearing only casual footwear, and she was certainly not dressed for the occasion. WABbers remember her as you enter OV00 in your record books.

Band conditions were not too favourable and contacts that day were very few and far between. The best of the eight contacts made was Byron G6HCV in Staffordshire.

We did experience minor problems with discharged NiCads but Peter was well prepared and soon had a new set in their place and continued to operate. Equipment in OV consisted of a Yaesu FT-290R providing 2.5W to a Microwave Modules solid-state linear which fed 100W p.e.p. to a 13-element portable Tonna at 4.5m above sea level.

Square OV00 at low tide, showing temporary antenna mast

The v.h.f. group all returned safely and the rest of the day was spent playing radio and checking the equipment for the following day's activity. Sunday was to be the "Big Day", as everyone that was interested would be listening and hopefully band conditions would be better.

Sunday, April 3

No snags today, everyone was up and about and true to the times we had given out the v.h.f. party was ready for the off. Then the clouds opened up and we were engulfed in a very heavy downfall. We all looked to the sky, muttering prayers up to the great WABber. He obviously heard us as the rain ceased, but it was decided that the original route might be too treacherous and an alternative route was planned, though this meant that the journey into OV would take longer than usual. As leader of the activating party Peter G1OVA made the decision that safety was paramount and time could not be helped. I agreed and began to instruct the net that a delay was inevitable.

The new route took about an hour longer, but the group were very quick to set up operations and within a few minutes of reaching OV they were working the first contact of the day. Things were very slow at first due to poor band conditions, then suddenly as if the bubble around OV burst, r.f. started to make its way further and further south and I was amazed to hear G8MFV in Kent exchanging 5/5 reports. In all, 31 contacts were confirmed, with several others only attaining one half of their report exchanges. Even the low-IQ station that tried in vain to block signals could not suppress the cheers that echoed round North Yorkshire when Maurice G1NVB exchanged 5/9 both ways. This was slightly amusing as Maurice had called in several times but each call failed to be confirmed from OV so he asked me how long the party would be in the square. Jokingly Martin G4YCD said "Only another ten minutes" at which Maurice pleaded with them to hang on as he was fast approaching the coastline, determined to claim OV. Whilst all this was going on I was listening to a news flash on TV: the radar at Fylingdales had reported a UFO approaching Scarborough faster than the speed of light. Could it be???

Well satisfied with our efforts, and after four hours of operating, the v.h.f. party prepared to depart and so OV was again beaten. John G4YSS operated successfully on 14MHz.

I can only say that we all enjoyed working GB1OVA and were very pleased with the outcome. We regret that not everyone who called us managed a contact, but taking into account the poor band conditions we are sure that the next trip into OV with better conditions will benefit all keen WAB enthusiasts. ***PW***

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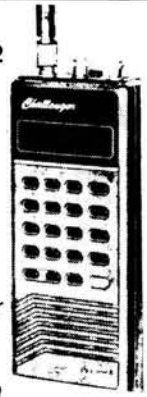

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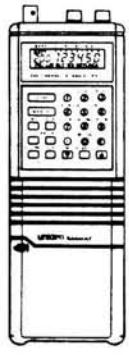

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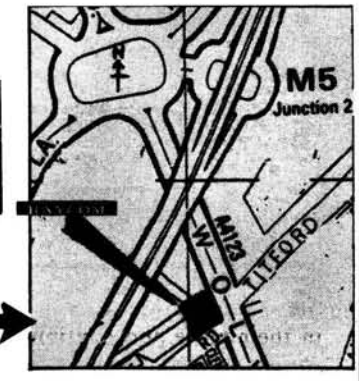

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Reading & Understanding Circuit Diagrams

(with a bit of theory thrown in)

Here, in Part 10, R. F. Fautley turns his attention away from receivers and towards transmitters

There are three main sections to a transmitter, and these are:
(i) a generator
(ii) a drive unit
(iii) an amplifier
These are the main parts and each of them can appear in different forms.

Generator

There are two categories of generator, the Morse (c.w.) generator and the telephony generator. Most modern transceivers are equipped with facilities to generate both types of signals, but we will look at them separately to simplify the circuit diagrams.

The simplest transmitter for the beginner who wants to get on the air for the lowest cost consists of a Morse generator and an r.f. power amplifier.

There are even two types of Morse generator, the fixed frequency type and the variable frequency.

Let's deal with the simplest first, the fixed frequency generator, leaving the variable frequency version to be described later when we deal with the more complicated telephony transmitters. Of course, a variable frequency type can be used with either Morse or telephony transmitters.

The Fixed Frequency Generator

Basically, it is just one of the oscillators formerly described in Part 4. As it is only required to operate at a single frequency, a crystal oscillator (see Fig. 4.9) would be the usual choice. Why choose the crystal oscillator? If you remember, this type, because of the very high *Q* value of the crystal as a tuned circuit, has much greater frequency stability than the ordinary *LC* (inductor capacitor) type oscillator.

As several of the amateur bands are harmonically related, a single oscillator can be used to generate signals having frequencies in several bands. For example, if the crystal oscillator has a fundamental frequency of 3.505MHz, signals could be produced at 7.010, 10.515, 14.020, 17.525, 21.030, 24.535, 28.040, 31.545MHz, etc. For the mathematicians:

If the crystal oscillator fundamental frequency is f_0, then the other frequencies obtainable are:

$$n \times f_0$$

where n is any positive integer (whole number). For example, $2 \times f_0$, $3 \times f_0$, $4 \times f_0$, etc. Not all of the available frequencies in the example fall within the amateur bands, but several of them do, viz.

7.010, 14.020, 21.030 and 28.040MHz.

So, with just one crystal, operation is possible in five amateur bands! But how do we get these other frequencies from the crystal oscillator? The simple answer is that they are already present in the output of the 3.505MHz oscillator in our example. They make up the **harmonic distortion** present in the oscillator signal.

Harmonic distortion? Look at Fig. 10.1 and compare the solid line to the dashed line representing a sinewave. The solid line curve is most definitely **not** a sinewave! It is, however, a possible shape for the output of an oscillator and comprises several signals having different frequencies and amplitudes.

The frequencies of these signals are not random, but are **exact multiples** of the **fundamental** crystal oscillator frequency as shown in the mathematical bit previously. The proof of this (for those so disposed) can be shown by "Fourier Analysis" of the solid waveform of Fig. 10.1, or for that matter any other periodic waveform.

A "periodic waveform" is one in which the complete waveform shape is repeated **exactly** over and over again, each cycle taking **exactly** the same time period. Most waveforms fall into this category.

The **result** of this Fourier Analysis is the only bit we're really interested in, and it shows that:

Periodic waveforms, of any shape, are made up of a fundamental frequency signal together with other signals which are exact multiples of the fundamental frequency.

The amplitudes of the different signal components vary with the actual shape of the waveform. Multiples of the fundamental frequency are called harmonics. Twice the frequency is called the second harmonic, three times is called the third, and so on.

Let's get back to the fixed frequency Morse (c.w.) generator. The level of any of the harmonic signals will be very much lower than that at the fundamental frequency of 3.505MHz. Even so, by using "frequency multiplier" stages the amplitudes of the harmonic signals can be raised to levels suitable for driving a low power amplifier.

Frequency Multiplier

Such a stage is shown in Fig. 10.2. It is simply a common emitter amplifier with its input circuit L1 and C2 tuned to one frequency f_0 (say the fundamental frequency of a crystal oscillator) and its output circuit L2 and C4 tuned to twice ($2 \times f_0$) the oscillator frequency. Capacitor C1 provides d.c. isolation from any previous stage and is large enough to have negligible attenuation at the input signal frequency f_0.

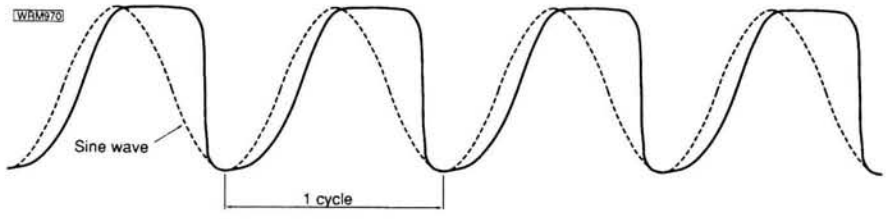

Fig. 10.1: A distorted waveform

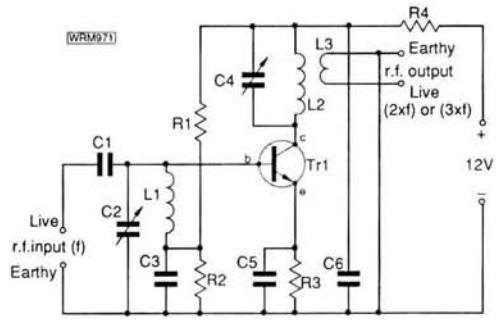

Fig. 10.2: A frequency multiplier

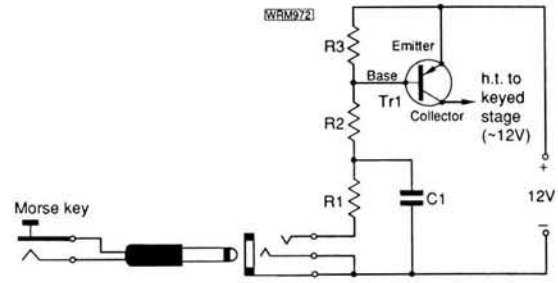

Fig. 10.3: The keying and shaping circuit

Bias and collector current are set by R1, R2 and R3 to enhance the amplitude of distortion products (just the opposite to what is normally required of an amplifier!) and so increase the level of the harmonic signals. This bias will normally be set to produce a very small standing (or quiescent) current so that only the **positive peaks** of the input signal produce collector current. The effect is a bit like the operation of a rectifier! Capacitor C5 provides a low impedance path for r.f. signals and so prevents negative feedback as we previously discussed under Audio Frequency Amplifiers in Part 8.

Why don't we want any negative feedback? One reason is that it reduces the **gain** of the stage, but the principle reason is that it reduces the amount of **harmonic distortion** produced by the stage. Now the **distortion** is the only bit of the output signal we really want in a frequency multiplier, so we can do without negative feedback!

If negative feedback reduces distortion, wouldn't positive feedback increase it and make the stage a more efficient multiplier? Perhaps, but it is much more likely to simply make the stage oscillate. Remember? Positive feedback (output signal fed back to input **in phase** with the input signal) and a gain of unity or above at some frequency is all that's necessary to make a stage oscillate.

Inductor L3 provides a low impedance r.f. output from the stage and R4 and C6 prevent r.f. signals reaching the d.c. supply.

Keying Circuit

A Morse transmitter has to be capable of being switched on and off in step with the operation of the Morse key, so that the radiated dots and dashes coincide exactly with the period of time that the key is held in the "down" (or transmit) position. This can be achieved by interrupting the operation of one or more of the transmitter stages whilst the key in the "up" position.

The generator (oscillator) stage, frequency multiplier (if there is one) or a transistor power amplifier can be keyed by the circuit shown in Fig. 10.3. The h.t. to the stage to be keyed is taken from the collector of the *pnp* type transistor Tr1 instead of the transmitter h.t. line. It should be noted that it is not recommended that the oscillator stage be keyed, as other problems —such as chirp (frequency drifting slightly during the rise and fall of transmitter power after operating the Morse key) are likely unless special measures to prevent it are taken. These fall outside the scope of this series.

Initially, with the Morse key in the "up" position, the base of Tr1 is at the same potential as its emitter and the transistor is cut-off (as no current flows through the resistor chain R1, R2 and R3 there is no voltage drop across R3). With no collector current flowing, the transistor acts as an open switch and h.t. is removed from the keyed stage. When the Morse key is depressed, the potential at the base of Tr1 becomes negative with respect to its emitter and the transistor tends to conduct so raising its collector near to the h.t. voltage. Thus the keyed stage is connected to the supply voltage allowing it to operate.

Why go to all this bother with a transistor? Why not just connect the Morse key between the transmitter h.t. supply and the supply to the keyed stage? This would key the transmitter quite well **except** rather excessive sidebands would be radiated. These are "key clicks".

Key clicks are caused when the transmitter radiated power starts and stops very rapidly as the Morse key is operated. This results in the radiated c.w. signals being rectangular pulses having nearly square edges, as shown in Fig. 10.4.

When analysed (using Fourier again!) these waveforms can be shown to contain a number of harmonics of the fundamental keying pulses. For example, a radiated signal consisting of a continuous stream of dots would look like the waveform shown in Fig. 10.5. A keying speed of 12 w.p.m. would produce Morse dots having a duration of about 100ms, or 0.1s. One complete cycle would consist of one "on" period and one "off" period making a total of 200ms or 1/5 of a second. Thus there would be five complete "dot-and-space" periods in one second. So the envelope in Fig. 10.5 would have a fundamental frequency of 5Hz.

The radiated **spectrum** consists of a fundamental carrier frequency with 5Hz sidebands plus other sidebands spaced symmetrically about the carrier at 10, 15, 20, 25Hz and so on. The number of these sidebands (and their amplitudes) is determined by the steepness of the leading and trailing edges of the c.w. signal.

If the waveform is very square-edged, the number and amplitude of the sidebands remote from the carrier will be much greater than if the waveform had slower rise and fall times. Also the sidebands of the odd harmonics of the 5Hz keying frequency, viz: 15, 25, 35Hz, etc., would be greater in amplitude than those of the even harmonics, 10, 20, 30Hz, etc. Again Fourier provides the maths! These remote sidebands can easily cause interference to adjacent channel signals and can be heard as distinct "clicks" or "thumps"

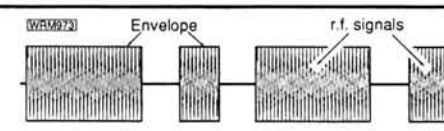

Fig. 10.4: A "square-edged" Morse letter "C"

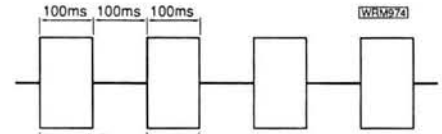

Fig. 10.5: Dots at 12 w.p.m. (or 5Hz) with no shaping

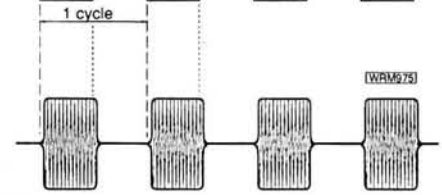

Fig. 10.6: The shaped envelope for Morse dots

by anyone listening near the transmission frequency.

So, very square pulses are undesirable. How then can we increase the rise and fall times of the Morse dots (and also, of course, of the dashes) to minimise the intensity of the key clicks? What we have to do is provide some form of circuit which will allow the r.f. power to increase **slowly** from zero at the instant the key is depressed until it finally reaches maximum. This time should not be greater than about a quarter of the duration of a Morse dot and so should really be tailored to the sending speed. If it were to be too long, the transmitter might not even reach maximum power while transmitting a dot, especially at high sending speeds.

That would take care of the **rise-time**. To reduce the **fall-time** it's necessary to introduce another time delay between the instant of "key-up" and the fall of the radiated power to zero.

Sounds difficult, but a circuit to do both can be simple. Look at Fig. 10.3. With the key in the "up" position, no current flows through resistors R1, R2 and R3, and C1 is in a fully charged state. Thus the base and emitter of transistor Tr1 are both at the same potential and the transistor is cut-off. With Tr1 open circuit, no h.t. is available to the keyed stage and no signal is transmitted.

At the instant the Morse key is depressed, resistor R1 is connected to the h.t. negative line and current **starts** to flow through R1, R2 and R3. This results in the transistor base-to-emitter potential starting to increase from zero. However, it doesn't increase sufficiently to enable the collector current to start to flow immediately because capacitor C1 is initially fully charged. It acts like a battery and tends to hold the transistor base close to its emitter potential **until it discharges through resistor R1**.

Since a capacitor takes **time** to discharge, Tr1 base becomes negative with respect to its emitter only comparatively slowly until the transistor, also slowly, starts to conduct. In this way, the keyed stage also slowly receives an increasing h.t. supply, resulting in a slow rise of radiated signal. With C1 discharged, the output r.f. signal stays at maximum power until the key is released.

The time taken for this slow rise of output signal is controlled by the values of C1 and R1. Increasing the value, increases the time.

That's how the **rise-time** can be controlled, but how about the **fall-time**? Another time delay is necessary to prevent the r.f. output falling very rapidly at the end of each Morse element. Releasing the key removes R1 from the negative supply line and the base of Tr1 tends to rise. However, as C1 is discharged it acts as a dead short at the instant of key up, holding the base potential down until C1 slowly charges via R2. As it slowly charges, the transistor base voltage also rises slowly until Tr1 collector current starts to fall. The base continues to rise until finally its potential approaches that of the emitter, cutting the transistor off. No collector current flows and the collector potential falls to near zero removing h.t. from the keyed stage. No h.t. means no r.f. output either, so the duration of the Morse element ends.

An awful lot of description for a simple timing circuit of only three components! It does mean (I hope) that you now know how Morse dots and dashes can be transmitted with sloping leading and trailing edges, so preventing unwanted key clicks or thumps! A typical keyed Morse signal, having an acceptable envelope shape, is shown in Fig. 10.6. The rise and fall times would be suitable for a sending speed of around 12 w.p.m.

The dots in Fig. 10.5 correspond to the signal produced at the Morse key, and those in Fig. 10.6 to the radiated signal. They have been drawn to the same time scale to show how the radiated signal builds up immediately **after** the key is depressed, and slowly falls to zero **after** the key has been released.

Usually the timing components of Fig. 10.3 would have design values suitable for providing acceptable shaping at most amateur sending speeds.

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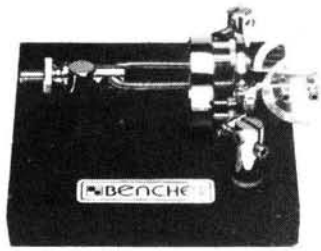

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Access

Kitchen Konstruktion

The cost of a good screened box often outweighs the price of the components used for the project to be housed. In No. 9 of his occasional series Richard Q Marris G2BZQ reveals the lost art of building projects in biscuit tins.

One thing that becomes apparent to constructors and experimenters alike, is that the cost of screened enclosures often exceed the price of the circuitry they house. This is particularly true if the project box is bought mail order, taking into account post and minimum order charges, the price can be alarming. There is an answer to this costly problem and it probably lies in your local supermarket or kitchen. We are of course talking about the humble biscuit tin. They are usually made from tin plated steel on to which earth connections can easily be soldered. Some, unfortunately, are made from strange alloys or heavily lacquered, in which case solder tags, nuts and bolts would have to be used.

The author built his very first short wave receiver in a biscuit tin; two valves, h.t. and l.t. batteries, all no bigger than 12 × 12 × 8 inches, yet it received the world.

Biscuit tins come in all shapes and sizes but there are other tins that cannot be ignored. Things like toffees, powdered milk, golden syrup and instant coffee all come in tins. The older type of tins often found in attics and sheds had printed paper labels, whereas the more recent type are painted. Although the gauge of steel used in the more recent tins is much lighter, they don't present so much of a problem when being painted. A quick rub down with a clean cloth and some methylated spirits and the thing is ready for a coat of aerosol spray paint. Most d.i.y. motorist shops sell a nice selection of colours.

Cutting and Drilling

When drilling small round holes always use the sharpest twist drills and remember to start the job with a small diameter pilot hole. Also place a solid block of wood under the material during the drilling operation. After the hole has been drilled the reverse side should be de-burred with a sharp countersunk bit or a large diameter twist drill. Never apply too much pressure to the drilling machine, or when the drill passes through the material it will make a jagged hole. Large diameter round holes are best made with Q-Max type hole punches. These are available in reasonably priced sets from companies like Cirkit Holdings and Maplin Electronic Supplies.

Square holes on the other hand require a different approach. There are basically two techniques for cutting square or odd shaped holes. The first method involves using a sharp cold chisel. Start by marking out the hole to be cut, this can be done in soft pencil or Magic Marker pen. Then place a small plate of mild steel, size to suit job (approx. 4mm thick), under the area to be removed. Next place the cold chisel along the marked line, give the chisel a sharp blow with a hammer, repeat this operation around the entire line. Once this is completed the central square of waste material should fall away.

Please bear in mind that this operation should be carried out on a solid surface e.g., a concrete garage floor.

The second method of making square holes is to chain-drill a small slot parallel to each marked line. Then using a pair of household shears cut out the shape required.

Please remember that this kind of material, once cut, produces some razor sharp edges. So it may be best to wear a thick pair of hide gardening gloves when working this material.

Ideas

To give you a few ideas for the type of cases that can be made from biscuit tins see Fig. 1. The feet of the cases shown are made from small lengths of dowel fixed with a couple of woodscrews.

It is strange that by the time the tin has been sprayed and fitted with knobs, switches, sockets and feet, etc., it loses its original identity, the end result looking a neat and professional job. There are lots of projects that could be built in these types of enclosures, e.g.. crystal calibrators, QRP transceiver projects, a.t.u.s, filters and dummy loads. It is advisable with projects that are likely to generate heat to paint the exterior of the tin matt black. **PW**

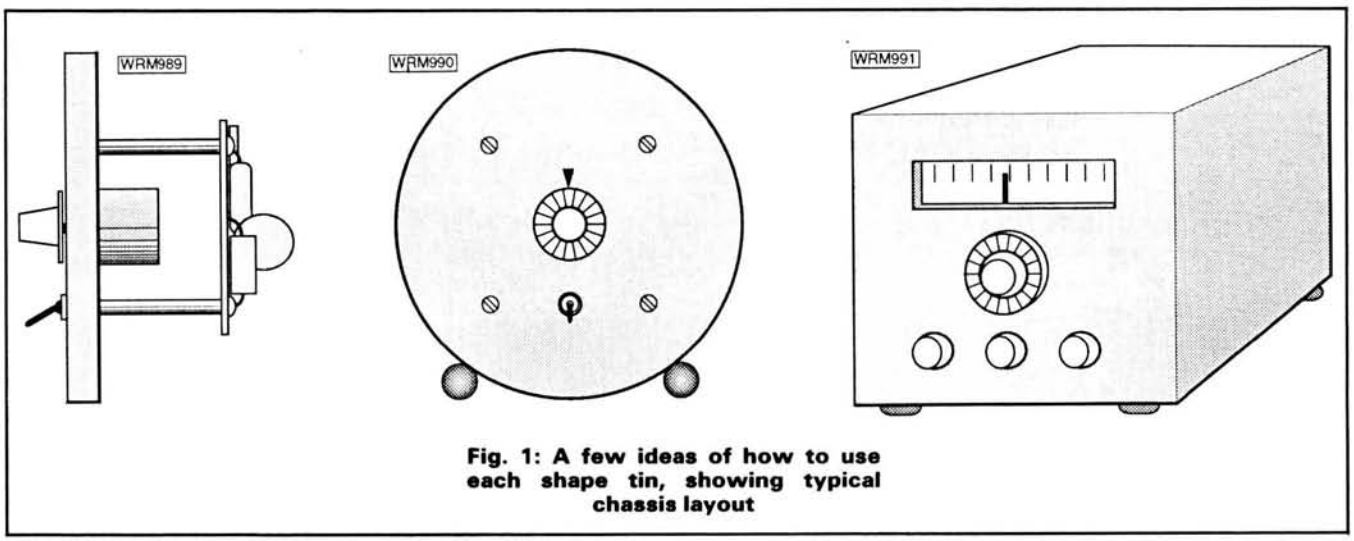


Fig. 1: A few ideas of how to use each shape tin, showing typical chassis layout

Crystal Locked DC to AC Power Converter

At PW we are often sent thumbnail sketches of ideas that our readers have had in the course of their experiments. While they're not exactly articles ready for publication, they do contain some useful circuits and infromation, and therefore they deserve some attention. A neat idea recently appeared from M. J. York G1BKI, for an experimental design of synchronous mains inverter. Here it is, with some useful background information added.

You would have thought that the mains anywhere syndrome was long gone, what with the demise of the thermionic valve and the advent of the switch-mode multi-voltage p.s.u. There are though, some occasions, like field days and club picnics, when some bright spark will want to use that old reel-to-reel tape deck for log keeping or to supply music for the outside festivities. Yes, even these days people still want to use tape decks and record players, unfortunately both of these pieces of equipment call for a frequency stable mains supply.

There are basically two kinds of d.c. to a.c. power converters. One is a free running power oscillator (Fig. 1), the frequency of which is set by the load on the oscillator and the electrical characteristics of the output transformer T1. This kind of converter is known as an asynchronous type because it is not locked to any frequency standard. Asynchronous converters work well and are reasonably easy to build, but they're no good for running equipment that needs 50Hz a.c. as a frequency standard.

Synchronous Type

The second class of power converter, the synchronous type, is the subject of this constructional article. It is possible to sub-divide synchronous power converters into two further groups, those with sinusoidal output wave-forms and those with squarewave outputs. The converter shown in Fig. 2 is the latter type, for good reason, as the circuitry involved in building a frequency locked sinusoidal power converter is well beyond the scope of this article. A sinusoidal mains power converter is really only a low frequency, high power, high fidelity amplifier and at best is only 45 percent efficient.

Efficiency is the watchword with a d.c. to a.c. power converter, as you will appreciate when you consider that in an unattainable 100 percent efficient converter, to produce 1A at 240V takes 20 times that current at the 12V input.

Practical Design

The converter shown in Fig. 2 cuts a nice compromise between simplicity and efficiency, it has a 50Hz squarewave output, with short term frequency stability better than the mains. The heart of the converter is an SGS-Thompson low power M706BI 50Hz c.m.o.s. timebase i.c. This 8-pin d.i.l. package has an on-chip high frequency oscillator permitting direct connection of a suitable external reference crystal. Also on board the i.c. are 16 bistables wired in series. When used with a 3.7268MHz crystal they give a 50Hz complementary squarewave output capable of driving to either c.m.o.s. or low power Schottky and t.t.l. levels

This means the device is ideally suited to directly driving two *n*-channel logic level power f.e.t.s, as shown in Fig. 2. However, the M706BI is only capable of sourcing enough current to switch two single f.e.t.s. As some user's power requirements may exceed the ratings of two single power f.e.t.s, it may be necessary to wire two or more f.e.t.s in parallel. In this case the outputs of the M706BI will need buffering, so the final design (Fig. 3) incorporates a t.t.l. 7407 (IC2) buffer between IC1 (M706BI) and the output devices.

Construction

The construction of the converter is relatively straightforward as most of the components are p.c.b. mounted.

Some careful attention should be paid to the mechanical construction of the unit, particularly if a physically large transformer is to be used.

Depending on the amount of power required from the converter, adequate heat sinking for Tr1 and Tr2 must be provided.

The following formula was used to work out the heatsink necessary for one RPF15N06L power f.e.t., running under the conditions expected in a 60W converter.

To calculate power dissipation in the devices:

Current through one device = 8A
Drain/Source ON resistance = 0.14Ω
Volts drop across device = 8 × 0.14 = 1.12V
∴ Power dissipated in device = 8 × 1.12 = 10.10W.

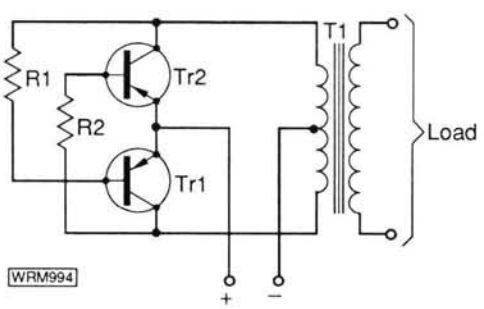


Fig. 1: Basic asynchronous d.c. to a.c. converter circuit

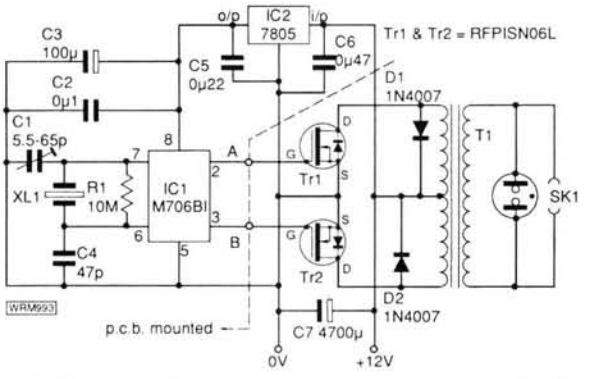


Fig. 2: Basic synchronous d.c. to a.c. converter circuit. The gates of Tr1 and Tr2 are connected to points A and B shown in Fig. 4. Resistors R2 and R3 together with IC3 need not be used.

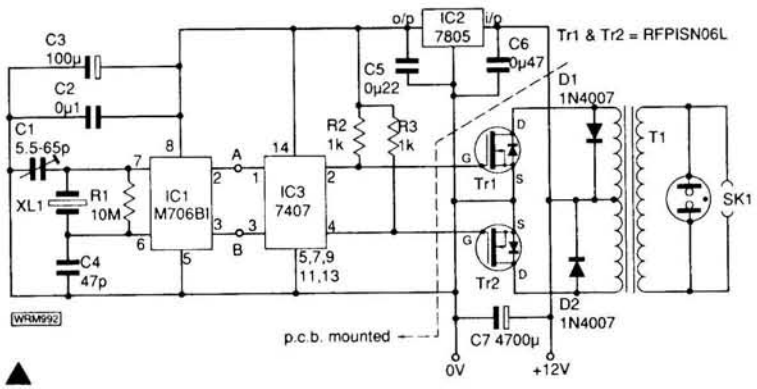


Fig. 3: Final circuit design for high power synchronous d.c. to a.c. converter

Maximum power rating for each device 60W.
Maximum junction temperature 150°C.

Heat sink size,

where,
T = temperature d = dissipation R_{th} = thermal resistance
j = junction a = ambient c = case s = sink

$$°C/W = \frac{TjMax°C - Ta°C}{dW} - (R_{th}\ j\ to\ c + R_{th}\ c\ to\ s)$$

$$9.96°C/W = \frac{150°C - 25°C}{10.10W} - (2.083 = 0.3)$$

Therefore a suitable heatsink would be an Electromail (RS 403-061) 3.0°C/W type; giving an approximate on-sink ambient temperature of 60°C.

Another point to bear in mind is that large converters of this type will need a lot of power. This means all d.c. supply wiring should be made in a suitably large gauge of wire and all soldered joints should be both mechanically and electrically sound.

Transformer

With all experimental designs there is an element of "suck it and see" involved and this design is no exception. Most of the transformers tried with this circuit have been ones salvaged from scrap equipment. However, as a rough guide most of them were in the region of 100VA to 200VA with 220-250V primaries and had 9-0-9V secondaries.

Some of the transformers tried needed a high wattage resistor in series with 12V supply rail, so as not to exceed the current rating of f.e.t.s and to keep the converter's output on the right side of 250V. If a high current 12-0-12V transformer can be found with a generous overwind on the primary this may also be used. It may also be possible to use a transformer sold by Maplin Electronics Supplies Ltd[2], its stock number is XG29G. See their latest catalogue for details.

Results

The power converter is capable of driving a wide variety of loads but much will depend on the type of transformer used. The original design was used to power electric shavers, old valved equipment and record turntables which had mains synchronised motors. One type of load that this type of converter may find difficult to drive, are those with a very heavy start current i.e. large electric motors. ***PW***

Caution: This project produces a mains voltage and every effort must be made to insulate all live joints carrying such voltages, by means of sleeving. In addition to the hazard that the mains potential represents, also remember the high current available from automotive supplies. A short circuit across such sources can cause severe burns and ultimately the destruction of the source, which could lead to the explosive venting of corrosive materials.

SHOPPING LIST

Resistors
0.25W 2% Carbon film

1kΩ	2	R2,3
10MΩ	1	R1

Capacitors
Sub-miniature, ceramic plate

47pF	1	C4

Monolithic ceramic

0.1µF	1	C2
0.22µF	1	C5
0.47µF	1	C6

Miniature foil trimmer

5.5–65pF	1	C1

Electrolytic 16V single-ended, p.c.b. type

100µF	1	C3
4700µF	1	C7

Semiconductors
Diodes

1N4007	2	D1,2

Field effect transistors

RFP15N06L	2	Tr1,2[1]

Integrated circuits

M706BI	1	IC1[1]
7407	1	IC3
7805	1	IC2

Miscellaneous
Transformer see text; TO-220AB device mounting and insulation kits 2; p.c.b.; heatsinks (RS 403-061)[1]; XL1 3.2768MHz (RS 307-777)[1]; suitable mains output socket; panel mounted mains voltage neon indicator; metal enclosure; heavy gauge connecting wire; insulating sleeving; strain relief cable leadouts; nuts, bolts and washers etc.

[1] Electromail
PO Box 33
Corby
Northants NN17 9EL
Tel: 0536 204555

[2] Maplin Electronic Supplies
PO Box 3
Rayleigh
Essex SS6 8LR
Tel: 0702 552911

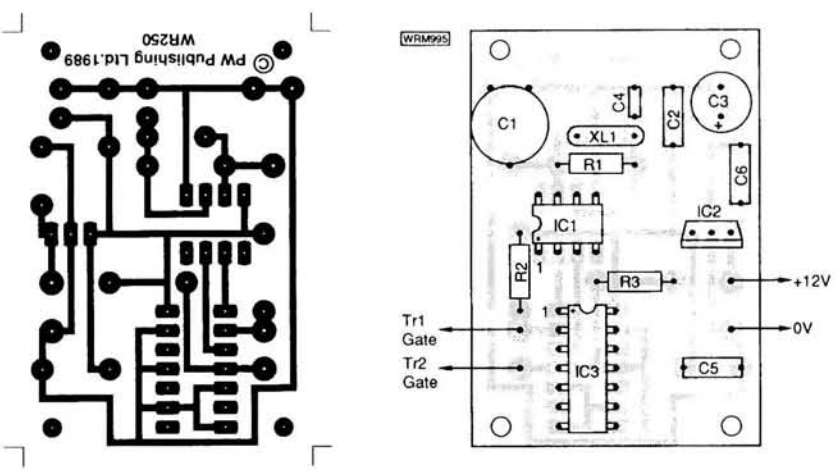


Fig. 4: Single sided track pattern and component placement for both basic and high power synchronous converters

The G2BCX

Antenna Clinic

Session 1

In the course of a year, antenna specialist F. C. Judd G2BCX receives many queries from radio enthusiasts, both about his own designs and about antennas in general. These come not only from various parts of the British Isles, but also from as far afield as Australia, New Zealand, Indonesia, Sri Lanka and several European countries.

Often, several people will ask a very similar question, highlighting a point that may be widely misunderstood. This series aims to explain some of these.

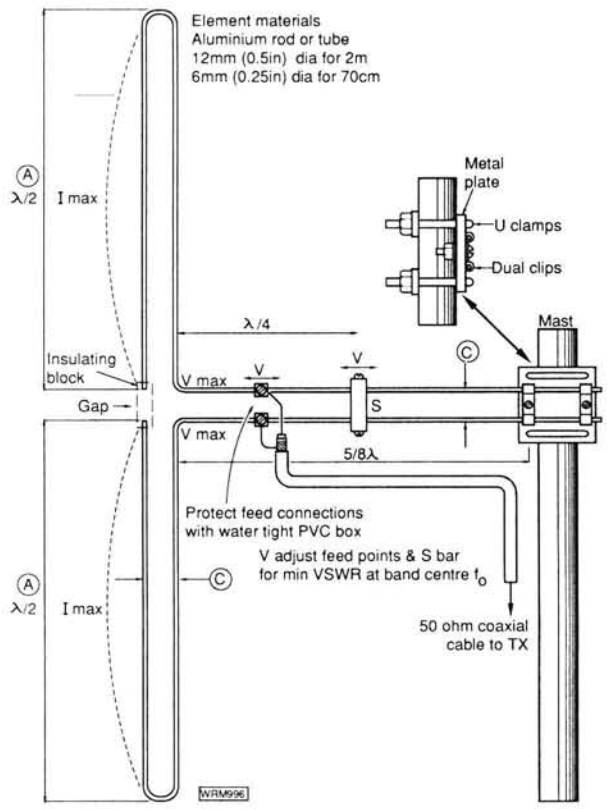
Q "The 2m 'Slim Jim' is a very popular antenna here in Sri Lanka, but I would like to know if its radiating section could be made longer?"

A It was assumed that this reader had one of two things in mind. That (a) greater radiation could be obtained, or (b) making the half-wave section longer would enable the antenna to be operated on a lower frequency. The answer in each case is a very definite **not possible.**

If a little more directivity gain was required, a 2-element collinear based on the "Slim Jim" could be constructed as shown, giving a gain of 3dBd (dB relative to a dipole). Full construction details are given in the *PW* publication *Out of Thin Air*. Dimensions for a "Slim Jim"-style 2-element collinear for 144MHz (2m) and 430MHz (70cm) are given in the Table. For any vertical collinear with two close-spaced elements, the directivity gain is not very great.

If, as (b), the requirement was operation at a lower (or higher) frequency, then the major dimensions for the 144MHz version could be scaled up (or down) using the frequency ratio as the scaling factor. This was the subject of a previous article in *PW* (July/August 1987)* but will be dealt with later in connection with queries about this procedure from other readers.

* Copies of these issues available from PW Post Sales, price, £1.40 each including post and packing.



Table

Sections	430MHz (70cm)	144MHz (2m)
(A) Half-wave elements	324mm (12¾in)	960mm (37¾in)
(B) Total stub length	390mm (15⅜in)	1168mm (46in)
(C) Elements and stub section spacing centre to centre	19mm (¾in)	25mm (1in)
Tolerances: (A) For 70cm: ±3mm (⅛in). For 2m: ±6mm (¼in) (B) Must be as exact as possible (C) For 70cm and 2m: ±3mm (⅛in)		

Q "I recently constructed the 2-element Ring-Beam for the 2m band, which works very well even using only 1.2 watts. I would like to add elements, possibly four or five. What would be the spacing required, the reduction in size of the elements and the approximate dB gain?"

A What this reader really wanted to do was to add a number of "ring directors" to obtain greater directivity gain. In the first place, the 2-element Ring-Beam for the 144MHz band was specially designed as a compact antenna with the highest directivity gain that could be obtained with just the two elements (8.2dBd for a beam width of 71° at the −3dB points). Full constructional details for the Ring-Beam were published in *PW* September 1983, and are reprinted in the *PW* publication *Wires and Waves*.

Although it would be possible to obtain a higher forward gain with more director rings, it would take weeks of work, not only to calculate for and construct a new design, but also to check the desired performance parameters and carry out test trials. It is not just a simple case of adding a few directors as might be supposed.

Q "I have tried to 'scale down' an antenna designed for 27MHz CB to make it operate on the 2m band, but it did not seem to work. Perhaps you could advise me if this would be a good idea or not."

A It would be better to construct (or buy) an antenna specifically designed for the 144MHz band.

Q "I have been given a Tonna 9-element antenna of which the main element is of half-inch tubing but most of the other elements, which are only of ⅛in rod, are broken. I have sufficient 5/16 in diameter tubing to replace these but will it make any big difference if I do this?"

A Whilst the antenna would probably function with your tubing as directors, its performance might be changed. The designer may have used thin rod for a specific purpose: to make the antenna lighter in weight and reduce windage, or in connection with resonance and current phasing.

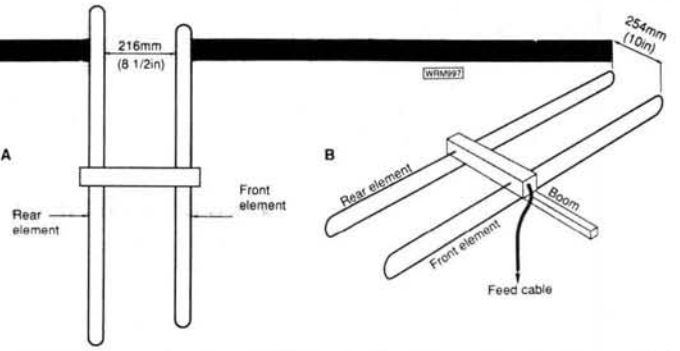
If the larger diameter tube is used to replace the broken directors (to the original lengths) and an acceptable v.s.w.r. obtained, thus indicating that matching is satisfactory, then only measurement can reveal if maximum forward gain, beamwidth at −3dB points, front-to-back ratio of radiation, etc., are each as the original, or acceptably close to it.

Q "In the 2m 12-element ZL-Special, should the folded dipole driven elements be assembled flat to the boom (see drawing (a) or upright, at right angles to the boom drawing (b)?"

A This confusion arises from diagrams published some years ago. In the original assembly diagram for the 2m 2-element ZL the elements were shown as being flat as in (a), although this was for convenience of construction.

For the 5, 7 or 12-element versions it is more convenient to have the elements upright as in (b). The lengths of the folded driven elements are:

Rear element—978mm (38.5in)
Fron element—927mm (36.5in)
Spacing—see diagrams.

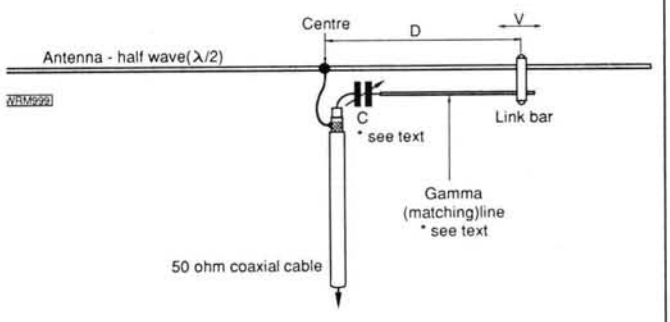


Q "What is the optimum angle of vertical radiation for DX working?"

A For a maximum single "hop" distance (about 4650km) with propagation via the F region, radiation should be at an angle tangential to the surface of the earth. Few radio amateurs could put up antennas to operate on all the h.f. bands in order to meet the above requirement. First, the choice of antennas for h.f. (and v.h.f.) bands depends on available space, local planning requirements and possibly having to overcome the XYL's determination not to have the garden looking like a professional radio communications establishment. Secondly, the angle of maximum vertical radiation is determined entirely by the type of antenna, its height above ground in wavelength(s) at the operational frequency, and the nature of the ground beneath it. Optimum radiation angle for the higher h.f. bands would be around 20°.

Q "Can you provide information concerning the use of a "gamma" match for 2m antennas?"

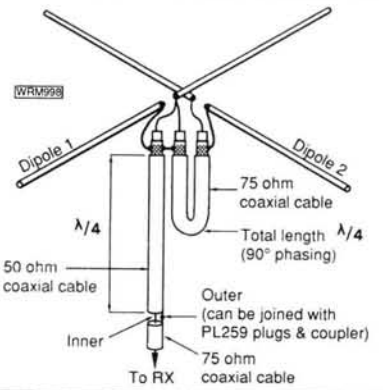
A The gamma system is commonly used for matching a half-wave radiator used either as an individual antenna, or as the driven element in a beam antenna, with 50 or 75 ohm coaxial cable. The arrangement is shown in the drawing. The variable capacitor is used to tune out the reactance of the matching section. Both the capacitor and the point of connection between the matching or gamma line and the driven element are adjusted for minimum v.s.w.r. at band centre frequency. As the r.f. voltage at the point of feed is low, a small air-spaced capacitor may be used. For 145MHz (centre of the 2m band) the amount of capacitance required will be around 25pF, so a capacitor with a maximum value between 40 and 50pF will provide sufficient range for adjustment. The gamma line is 102mm (4in) in length and may be aluminium rod about one third of the diameter of the driven element. The spacing between the element and the line is about 19mm (0.75in). The shorting bar or clip must have screws for locking it to the gamma line and element when adjustment for minimum v.s.w.r. has been completed. For further information see the ARRL *Antenna Book*.



Q "I have a 10m multi-mode and would like to receive satellites on 29MHz. The only place I have for the antenna is in the roof space. I need the measurements for the construction of a crossed dipole for this band."

A First, a single dipole for 29MHz will be 150 x K/fMHz which, with K as 0.95, will be around 4.94 metres (16.22ft). The square space required to accommodate the two crossed elements will be about 4 x 4m (13 x 13ft), with a little over 1.5m (5ft) clear beneath the antenna for the phasing line and main feed cable to run downward away from the antenna elements.

The ends of each element should be well clear of other conductors, for example water pipes and electrical wiring. The general arrangement, phasing loop and feed cable connection, etc., are shown in the drawing. For further information see the RSGB *VHF/UHF Manual* or the ARRL *Antenna Book*.



Q "What is the optimum beamwidth for DX working and are there antennas with controllable beamwidth?"

A There is no "optimum beamwidth". Beamwidth depends entirely on the antenna used, which may have more than one main lobe. In any case beamwidth is determined by directivity gain of the main lobe, or lobes. This subject has been dealt with extensively in past issues of *PW*, and in the *PW* publication *Wires and Waves*.

There seems to be little point in having variable beamwidth antennas for amateur radio h.f. communication, although it would be possible of course.

Q "I constructed your 12-element ZL Beam for 2m operation which proved very successful in the contest. For this year I constructed two of these beams and coupled them together to obtain more gain. Even with the antennas spaced 3 metres apart the system did not work."

A Unfortunately this reader, writing from Spain, gave no details of how the two antennas were coupled in order to obtain correct matching and phasing. No doubt this was done wrongly, and the spacing between the two antennas need not have been more than 1.5 wavelength, whether stacked or bayed. This particular topic was covered in Part 9 of "Antennas", an article first published in *PW* October 1983, and reprinted in *Wires and Waves*. It contained all the requisite information and diagrams for stacking and baying two identical beam antennas.

Loughton Photographic Limited, Southend Sony Centre, 11 South Church Road, Southend-on-Sea, Essex SS1 2NJ.

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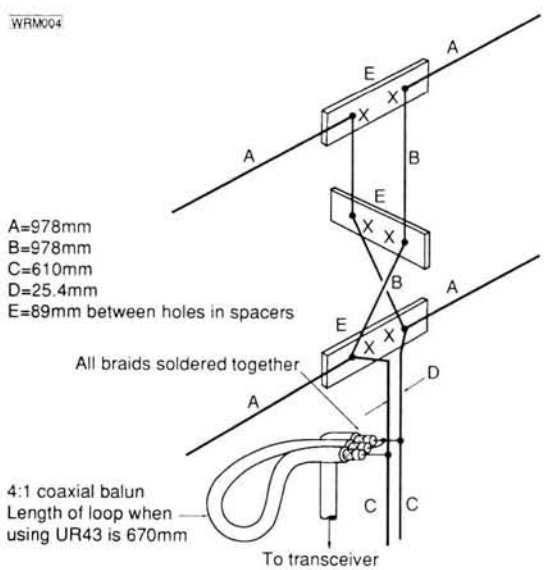
ERRORS & UPDATES

Practically Yours, December 1988

Apologies to Glen Ross and any readers who were misled by the drawing of the "Lazy-H" antenna. The "Lazy H" is not an end-fire array, but is a broadside design, as shown here. Our thanks to Frank Rose G2FHV for pointing this out.



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Have Canon AE1 prog. camera with 50mm, 28-80mm, 70-200mm lenses, plus ×2 converter and dedicated flash. All in mint condition and housed in alloy case, worth £550. Would exchange for Yaesu FRG-9600 receiver in mint condition. Mr. D. Dutton. Tel: 0283 218120. *E851*

Have Jaybeam 10XY 144MHz beam. Would exchange for MBM88/70. Bruce Edwards G3WCE. Tel: Norwich 53331. Please NO calls before 7pm, as this is daytime business number. *E857*

Devious Deeds in the Wireless Business

Stan Crabtree tells us of the undercurrents surrounding the early days of radio

With the first wireless signal bridging the Atlantic in December 1901 it was understandable that the cable companies would be dismayed. They had watched the experiments of Marconi since the first signs of progress in the last years of the nineteenth century, first with disdain then with alarm; as wireless range increased, so did the apprehension of the telegraph organisations. Even to the uninitiated it was obvious that wireless telegraphy on a commercial basis could seriously affect the revenue of the landline cable operators.

It is therefore not surprising that when Marconi announced the news of signals being received at Signal Point, Newfoundland, the Anglo American Telegraph Company reacted swiftly. In the first batch of congratulatory messages to the Italian inventor came a curt letter from the solicitors representing Anglo American. It stated that they held the monopoly for telegraph operation throughout Newfoundland and implicitly forbade further violation, with the threat of legal action if the request was ignored.

Marconi was surprised and frustrated. He had particularly wanted to continue with tests in order to copy signals on an ink recorder. Reception of the now legendary "S" had been achieved on a telephone earpiece; there was no corroborative evidence to substantiate his claim—although only a few sceptics doubted his word. However, he decided not to challenge the issue and was subsequently pleased to be offered a new site in Nova Scotia, together with a grant from the Canadian Government of £16000. The only problem was that the new station would be a further 530km away from Poldhu, his station in Cornwall.

The situation developed into a "cold war" between the cable firms and the Marconi Company. Early in 1902 the Eastern Telegraph Company commenced a form of industrial espionage against their future rivals. They originated an undefined contract with a certain gentleman called Neville Maskelyne and apparently gave him a free hand to mastermind operations against the Marconi organisation.

A 50m mast was erected on a site near the cricket field of Eastern Telegraph's training station at Porthcurno, near Penzance. This was some 29km distant from Marconi's transmitter at Poldhu. Receiving apparatus was installed in a two-room wooden hut. Subsequently, the clandestine operators were able to record signals from Poldhu and the Lloyd's station at the Lizard, as well as traffic from some of the North Atlantic liners fitted with wireless equipment; this monitoring was authorised at board level. With its use the company was able to keep a check on Marconi operations and have first-hand information on any new developments. The receiving equipment was referred to as the "Brown Chemical Radioscope". (Whether or not this was an early invention of S G Brown is not clear.) Ironically, the existence of this spy station was apparently known to Marconi from the time of its installation. The first message recorded was one directed to "the unknown station" from Poldhu. It confirmed that the newly erected antenna had been observed but queried if the station had equipment capable of receiving their signals.

Maskelyne seems to have had something of a phobia about Marconi and his progress. Over a period of time he did his utmost to try and disprove the existence of wireless telegraphy. Neville Maskelyne, senior was a famous illusionist and advocate of magic; his son, too, had abilities as a conjuror and appeared to regard the whole concept of wireless as a giant confidence trick.

Possibly to disprove Marconi's claim of confidentiality, Maskelyne's first operation was to publish telegrams he "overheard" passing from Poldhu to the *Carlo Alberto* en route to Italy. There was no Wireless Telegraphy Act at this time and therefore, theoretically, no breach of secrecy was taking place. A Marconi Company senior executive, presumably non-technical, denied that the published messages were authentic and accused Maskelyne of forgery. This was rather foolish as all who understood the system realised that monitoring of signals was possible. The result was most embarrassing for the wireless company. An indignant Maskelyne strongly refuted the allegation and demanded an apology from Marconi himself. This he did not get and Marconi chose to ignore the whole issue.

Perhaps the most audacious attempt at disrupting the Marconi image occurred in June, 1903, at a lecture given at the Royal Institution by Professor Ambrose Fleming. Although the "tuning" of circuits was now introduced in all Marconi equipment, many observers were still sceptical; they questioned the claimed absence of interference from nearby stations and the amount of secrecy that was available in single-channel transmissions. Fleming had been appointed Scientific Adviser to the Marconi Company in a part-time

Guglielmo Marconi 1874–1937

courtesy of the Marconi Co. Ltd

capacity and was to give a demonstration to an audience of dignitaries. A receiving package had been installed on a table at the corner of the stage with an assistant standing by. At the end of the address this was to provide a working example of his lecture by receiving wireless signals from Poldhu and Chelmsford on two separate coherers simultaneously.

The lecture started on time and the professor was soon deep into his subject. Shortly before he began summing up he was distracted by relay movement from the table. Turning, he saw the look of astonishment on the face of his helper, who was reading the paper tape from one of the ink recorders. The audience waited expectantly, but Fleming was confused as this was not the scheduled time for the demonstration signals.

Collecting himself and smiling, he asked his audience to excuse him for a moment. Walking over to the table he glanced enquiringly at his assistant as he took the tape from him. He frowned when he made out the first word —"Rats". He was further upset when he read the rest of the text "There was a young man from Italy, who diddled the public so prettily". Fleming breathed heavily. The only explanation he could think of was that the Poldhu operator must be drunk: his timing was wrong and he was certainly not using the planned test message. After a few more facetious offerings, this time from Shakespeare, the ink recorder stopped. Somewhat disconcerted, Fleming returned to the stage and continued with a resumé of the points he had made earlier. In the background, his assistant was stuffing the telegraph tape into his pockets.

A few minutes later one of the receiving systems again became active, followed rapidly by the second. Fleming quickly walked over and checked the output with a sigh of relief. Smiling again, he raised his arms and invited his audience to join him on the stage. The group slowly filed on to the platform and examined the tapes that now showed the pre-arranged test and greetings text transmitted from Poldhu and Chelmsford.

Although the episode ended satisfactorily, Professor Fleming was outraged. He burst into print with a letter to *The Times* stating that he had been a "victim of scientific hooliganism" and that the perpetrator (whoever he was) had made a "cowardly and concealed attempt to spoil the demonstration".

Two days later *The Times* published a letter from Neville Maskelyne in which he confessed to instigating the interruption. Aided by Dr Horace Manders he had interpolated other messages to disprove the claimed fidelity of the Marconi system. He stated that he could have wrecked the demonstration but refrained from doing so. Operating from his father's "Home of Mystery" at the Egyptian Theatre in Piccadilly, Maskelyne had keyed the offending text to undermine the lecturer's theme—progress in the elimination of interference from signals on an adjacent wavelength.

Londoners were by now famililar with Maskelyne's antics and most sympathised with Fleming, who was a much respected figure in the scientific arena. Even if it had been successful this act would hardly have deceived the knowledgeable. It is feasible that Maskelyne already knew, or would have been able to discover, the intended wavelength of operation. There was nothing to prevent him from operating on this same wavelength—not an adjacent one. For maximum effect it was a question of timing: it would have been more devastating if his transmission had been made simultaneously with the authentic signal, and perhaps this was his intention. In overlapping, the combined signals would have been unintelligible. No earphones were in use to discriminate between the two transmissions—simply the standard output of a relay and ink recorder. In fact, the authentic transmissions took place successfully without interruption, but Maskelyne was delighted in the publicity his operation had caused.

Another undercover operation is recorded, effected by one of Marconi's North American rivals. Reginald A Fessenden, a Canadian, was interested in producing radio telephony and had had some measure of success in this field as far back as 1902. He knew that for good quality voice transmission, continuous waves were essential. His method of providing this was from a 50kHz alternator source and he had successfully broadcast music on Christmas Eve, 1906. He can thus be forgiven for resenting the publicity given to Marconi's North Atlantic service when it opened in October, 1907. Marconi used a disc discharger type of spark transmitter that produced a musical note; he considered this to be true c.w.

The amount of traffic passed by the new service was restricted due to the overloading of the landlines from the North American station at Goose Bay in Nova Scotia and Clifden on the west coast of Ireland. At least, this was the excuse given by the Marconi Company for the delays. However, using his own equipment, Fessenden set up a receiving station to monitor the American side. He subsequently alleged that the weak link in the chain was the radio path and that the Marconi service was to blame. There were no official regulations in force at that time and he was legally able to conduct this operation and make known his findings. The Marconi Company had said that their new equipment was operated at 20 w.p.m. but Fessenden asserted that the effective rate was a mere 3 w.p.m., brought about by operators having to repeat messages—sometimes as often as six times—before an acknowledgement was received. He made this allegation as public as possible by writing a letter to *The Electrician*, the foremost technical periodical of the day covering communications. **PW**

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A History of the Marconi Company, W J Baker, Methuen (1970)

Guglielmo Marconi, 1874–1937, Keith Geddes, HMSO (1974)

Girdle Round the Earth, Hugh Barty-King, Heinemann (1979)

Electrical Times, London, 18 June 1903.

SWAP SPOT

Have Trio 9R59DS in good condition. Would exchange for Commodore 64 computer. Tel: Norwich 0603 39925. *E874*

Have Hewlett Packard "Thinkjet" printer (new). Would exchange for a 934MHz pre-amplifier or scanning receiver or 3-element 28MHz beam. Brian. Tel: 0280 814961. *E876*

Have 20 wax phonograph cylinders, two inch two minute type. Also AEA PK64 with HFM64 modem fitted with new HDLC software update for Packet, AMTOR, RTTY, c.w., in addition to accelerator plus disk drive for C64. Would exchange for amateur radio. G3IJL. Tel: 01-749 1454. *E878*

Have Emidicta model 2400E/12 (recorder), amplifier 10W output has 12V d.c. input. Also Marconiphone 248 cabinet only, plus Eddystone 358X receiver cabinet. Would exchange for Eddystone loudspeaker, Eddystone "S" meter or any military wireless equipment. Humphriss. Tel: 0926 400876. *E881*

Have Icom 290D 144MHz multimode 5-25W transceiver with 200W Microwave Modules linear amplifier, 3W-10W or 25W input. Would exchange for top of the range h.f. to v.h.f. receiver. Bob. Tel: 0786 811857. *E889*

Have Sony ICF-7600D h.f. receiver with a.m., s.s.b. and c.w. modes, plus Band II f.m., memories and scanning. All in very good condition with antenna, case and books. Would exchange for any 144MHz f.m. gear, hand portable or mobile in good condition. Anything considered. Robert. Tel: 0745 38197. *E901*

Have good Eddystone 640, also laboratory variable p.s.u. 0-50V stabilised 2A. Plus Vintage Zetavox automatic radio. In addition to the following valves, KT66's, EF86's, GZ39's. Would exchange for w.h.y? Also wanted EF54's and EF39's. Goods to callers only, no post. Del G0DLN. Tel: 01-657 0716. *E904*

The "Fe-ONE" Experimental Compact Transmitting Antenna

The ferrite rod antenna has been with us for many years as a vital component in portable long and medium wave receivers. So, logically enough, Richard Q Marris G2BZQ decided to try one on transmit; read on, you'll be surprised at the outcome.

Experiments at the author's QTH with standard ferrite rods have produced external receiving antennas for 1.8MHz and even up to 3.5MHz. Successful results up to 30MHz have been achieved using special composite materials, imported into this country from overseas.

Following on, it had always seemed an excellent idea to the author, if for instance, a 205mm ferrite rod could be used for an indoor/portable transmitting antenna. A logical enough thought! After all, if an antenna works efficiently on receive, why not on transmit? Maybe the following discussion and experiments will present some answers to this heavily loaded question.

First of all the author decided to read up as much information as he could find, on the subject of using ferrite cores in compact transmitting antennas. However, although the research was extensive very little or no information was found, in either text books or manufacturers' literature. Why? It was already known that such techniques were being used commercially, for transmission purposes in the high frequency bands. So in order to establish this technique in the field of amateur radio it was necessary to carry out a few experiments.

Experiments

The following examples to be described are just two chosen by the author from the many experiments carried out.

The first antenna to be tried was a hybrid design, part wire and part ferrite rod inductance.

The antenna, as shown in Fig. 1, consisted of 7.32m of wire slung up across the room and fed with a suitable 3.5MHz *LC* type a.t.u. The far end of the antenna was terminated in an inductor, which consisted of a 100mm × 9.5mm F14 grade ferrite rod, close wound with 43 turns of 7/0.2mm pvc covered wire. The wire used had an outside diameter of 1.2mm and was rated at 1.4A at 1kV r.m.s.; quite adequate for low power use.

With 10/15 watts of c.w. the antenna loaded well and was tried out with a couple of quick QSOs. However, a field strength measurement revealed that the wire section was radiating most if not all the power. It must be remembered that the ferrite cored section of the antenna formed a large electrical part of the antenna's overall length.

Next, staying with the same wire and rod type as in the first experiment, a second antenna was built, Fig. 2. This time the design used only a 205mm piece of ferrite rod with three quarters of its length covered with winding. A small 225mm length of wire was left to connect the inductor to the a.t.u.

This antenna loaded well, but as the field strength meter indicated, there was little in the way of radiated signal from the rod. However, the coil got warmer and warmer even with 10W of c.w., obviously the antenna was radiating power in heat quite well. With the TX power turned down to around 1W it was possible to ascertain that the core was generating the heat and not the wire. Presumably the core was saturating.

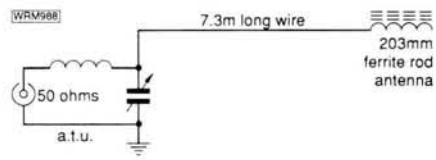

Fig. 1: The hybrid antenna

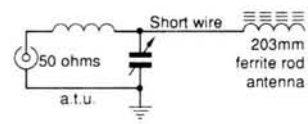

Fig. 2: The unsuccessful all ferrite antenna

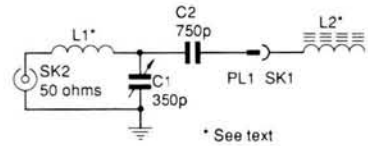

Fig. 3: The "Fe-ONE" experimental compact antenna

Different Material

After this and other experiments, a protracted search was undertaken, contacting many manufacturers and suppliers, both here and abroad. Samples of many different materials where obtained; some grades were better than others. One type of core material proved more promising than all the rest. This was a composite nickel zinc material, imported from the USA and supplied in a 13mm dia × 190mm long rod, (described by Amidon* as type code R61-050-750, 7.5in × 0.5in dia rod). After several more experiments a prototype "The Fe-ONE" was made up, Fig. 3. The simple construction allows for both vertical and horizontal mounting alongside an a.t.u., thus facilitating table top operation with the author's 15W 3.5MHz c.w. rig. Conveniently the new core material seems quite happy up to about 16W, above which the material starts to saturate.

With the 190mm long antenna on receiver in the vertical position, on receive the device seemed to pick up a quite unacceptable amount of local man-made interference and was therefore unusable. However, in the horizontal position the antenna became directional and it was then possible to null out any local noise sources and peak the wanted signal.

Results

Several QSOs were made to the east with the best being RST559 from Hamburg (approximately 725km). After this a random CQ call brought forth a reply from an amateur in Sweden, some 1448km away. In fact quite a few other stations were worked around northern Europe all with reasonable reports.

It must be stressed however, that by no means could these tests be construed as definitive. The antenna was air-tested in the early morning on

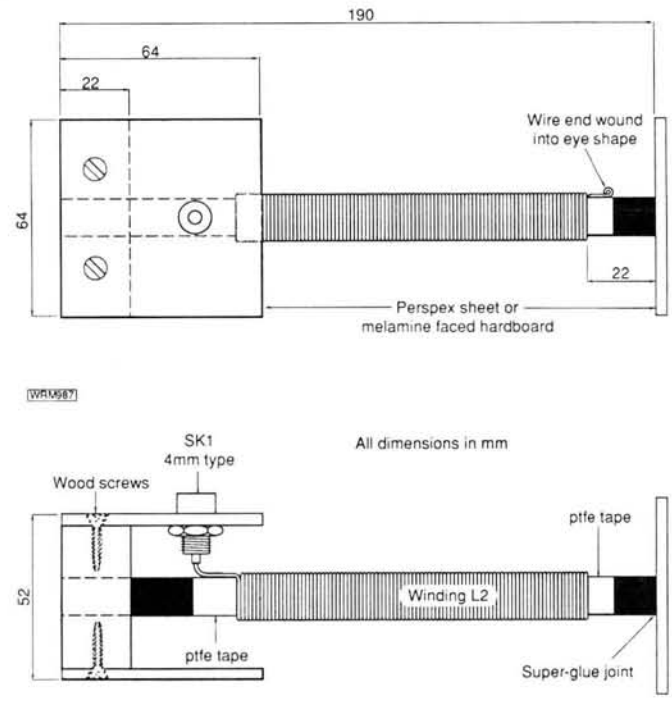

Fig. 4: Constructional diagram of the "Fe-One antenna

3.5MHz during the summer when conditions were particularly poor, even with a normal antenna. These conditions proved no good at all for chasing DX, not that the author is into such things, due to noise and the lack of amateur signals on the band. However, it proved ideal for testing antennas.

The experiments had proved what had been suspected, that a short composite material rod antenna, could produce useful results on transmit as well as receive. The search for and careful selection of core material had been an all important factor.

The "Fe-ONE" was intended as a possible prototype for a low power indoor or portable antenna on 3.5MHz. Hopefully there may be those amongst you who may feel that there is room for improvement for for further experimentation. You're probably right, so have a go.

Antenna Construction

Constructional details for the basic prototype antenna plus a.t.u. are given in Fig. 3 and Fig. 4. Although the design is simple and easy to build, great care must be taken in its assembly, as there are troublesome high voltage nodes present on the antenna.

As shown in Fig. 4. the ferrite rod is mounted in a hole drilled in the centre of a wooden block. Secured to the block, with countersunk wood screws, are two squares of Perspex or melamine-faced hardboard, one of the squares has a 4mm chassis socket mounted through it. This is the antenna termination point. The top of the rod has a square of the same material Superglued to its end. This is to allow the antenna to be laid horizontally on any flat surface.

Except for the 22mm section inserted into the block, the entire surface of the ferrite rod is wrapped in half overlapping turns of ptfe tape. This tape is available from most good plumber's merchants and d.i.y. stores. This type of tape has no adhesive properties, so the ends must be held in place with normal pvc tape.

The wire used for the winding is 16 a.w.g. (American Wire Gauge) "Thermoleze" insulated copper. Amidon in California supplied this product which is rated to withstand 2kV at 180°C.

The winding is started 22mm from the top of the rod, the wire being terminated in a "curled eye". This is to eliminate the risk of the sharp wire-end piercing the ptfe insulation tape. After the top point of the winding is secured in place with normal pvc tape, close-wind 91 turns tightly down the length of the rod. Next secure the bottom of the winding as previously described; this end of the winding being bent up and soldered to the back of SK1.

The A.T.U.

The a.t.u. consists of a 350pF air-spaced variable capacitor C1 and inductor L1 housed in a small metal enclosure. Inductor L1 is 34 turns of 16s.w.g. enamelled copper wire, close-wound on to length of 32mm dia plastics tubing.

Due to the high Q of L2, the resonant tuning point on the a.t.u. is very sharp and provision should be made to fit a slow-motion drive to C1. The output of the a.t.u. is taken through a high voltage working, 750pF fixed capacitor C2. From here a 300mm insulated flying lead, fitted with a 4mm plug, is used to connect the a.t.u. to the antenna L2 via SK1. It should be noted that where the lead leaves the case of the a.t.u. an insulating grommet must be fitted.

The input of the a.t.u. is made via a 50Ω coaxial connector SK2. A short length of RG58 coaxial cable was used to connect the a.t.u. to the pi-output network of the author's transceiver. The earth connection of the a.t.u. was conveniently terminated at a handy metal water pipe. This could have also been an external earth stake but this was a little impractical as the author lives in a flat.

Operation

In operation the "Fe-ONE" experimental compact antenna proved to be a very obliging little antenna, when mounted horizontally. It covers the whole of the 3.5MHz band with some to spare either end. On receive it acted as a very effective low noise antenna, particularly as the antenna has directional properties. On transmit it was found that the position of C1 was critical due to the high-Q nature of the the antenna. This problem is not great and can be eased by carefully tuning the antenna for maximum signal on receive, before a final tweak while on transmit. With a little practice this operating technique can be used to great advantage.

Caution: When antennas of this type are not resonant, some very high levels of v.s.w.r. are presented to the transmitter's output stage. Please be sure that your equipment is capable of withstanding this kind of treatment before proceeding with any of the experiments.

The maximum permissible input power to the "Fe-ONE" is 15W. Even with this low power level it is important to keep the antenna away from animals and children, plus flammable furnishings. Skin contact with high r.f. voltages, like those presented on any transmitting antenna, can cause lasting internal scarring.

With the antenna driven with 15W c.w., the author found that there seemed little in the way of TVI. No claims are made as to the ultimate QRB possible with antenna, beyond the fact that it has produced results. The author also claims no originality for the experiments in this field of antenna study. However, the curious thing is that very little information on this technology has been published, particularly on amateur circles. In the meantime, there are plans for sequels to the "Fe-ONE" with different electrical and physical configurations and materials. ***PW***

* Amidon Associates, 12033 Otsego Street, North Hollywood, California 91607, USA.
Ferrite-rod type R61-050-750 7.5in × 0.5in dia. Nickel-Zinc material.
Thermoleze Insulated 16 a.w.g. Wire, rated 2kV at 180°C.

Crops and Coils Part 5

War Years

A vast increase in home produced food was vital for our survival as Hitler tried to starve us into submission, so large areas of grassland were ploughed up for food crops. New technology was introduced and government advisers visited farms. Tractors were essential and large numbers were imported from the USA under the "Lease-Lend" agreement. Meanwhile, the famous Fordsons were rolling off the assembly lines at Dagenham, George Pickworth tells the story.

I was already a skilled tractor driver and frequently worked throughout the daylight hours during the school holidays. During the Christmas period, the tractor was re-fuelled and serviced while it was still dark. Even when back at school, weekends were spent working on the farm and servicing machinery. Furthermore, I occasionally took the odd days off from school to help with urgent work. This was not unusual for farm boys.

Somehow I found time to make a small portable medium wave receiver to take with me when working alone with the tractor, but its magneto ignition system caused so much interference that I could not use it while the engine was running. Nonetheless, being able to listen to the news and music during lunch breaks gave me some contact with the outside world while sheltering under a hedgerow against the biting wind. Tractors did not have cabs then.

Before the war, the BBC did not start transmitting programmes until 10am to avoid competition with the morning newspapers. Now, broadcasting began with the early morning news, but only the regional medium wave transmitters operated as there was only one programme.

One Programme

This simplified the construction of my portable radio because there was no need for a tuning control. Instead, its two r.f. stages and the detector were tuned individually by small trimmer condensers. Many pre-war domestic radios had similar "pre-set" tuning, but used a bank of switches to bring other condensers into the circuit to receive different stations. Sophisticated receivers used normal ganged tuning condensers operated by an electric motor.

Pentode valves were used for r.f. and detector stages, but as listening was on headphones, a small triode valve was used for the output stage. I had discovered that although the valves were designed for use with 2 volt accumulators they would work satisfactorily with a single 1.5 volt dry cell. Four 9 volt bias batteries in series provided the h.t.

Portable radios usually had a frame antenna wound around a wooden case, but this design was too directional for use on my cycle, so it was designed to operate with a capacitance type antenna similar to those used by car radios. Incidentally, car radios were prohibited during the early part of the war but there was no mention of bicycle radios.

My favourite evening programmes included *Monday Night at Eight* and *ITMA* and then, after the 9pm news, often dead tired, I would retire to bed and listen to the big dance bands on a pair of headphones. "Lord Haw Haw" was active at news time so announcers developed a technique of speaking with hardly any pauses. This made it difficult for "Haw Haw" to be heard. Nonetheless to be able to break into the BBC so effectively was a remarkable technical achievement by the Germans.

Moving Near Town

The pressure of running the farm under war conditions became too much for grandmother. The farm was sold and we moved to a big house on the outskirts of town which was fortunately within walking distance of school. Although I badly missed the farm, there was plenty of space to keep poultry and grow vegetables and I no longer had the long ride to school. Notwithstanding that the war precluded any idea of obtaining an amateur transmitting licence, there was plenty of space for antennas.

I had already made friends with the local radio shopkeepers and living near town enabled me to see more of them. They were most helpful in giving technical advice and providing components. Young people were far less isolated from the "real" world than they are today. Moreover, they encouraged me with my experiments and I was tempted to become a radio engineer. Unfortunately, their r.f. signal generators had been confiscated because the authorities feared that messages could be sent to enemy aircraft by simply connecting an r.f. generator to an antenna. This made repairs extremely difficult.

Fig. 5.1: Lunch break—Christmas holidays 1941

School holidays were still spent driving a tractor on contract work for other farmers, but they also needed electric lights to be installed in the barns and cow sheds. In addition, electric motors were rapidly replacing hand labour and the ubiquitous stationary petrol engines, so installing lights and wiring up electric motors was a pleasant change from driving a tractor across windswept fields.

Communications Type Receiver

Browsing through a pre-war Premier Radio Catalogue, I saw a Hallicrafters "Sky Buddy" costing about £10 advertised along with other wonderful receivers such as the "Sky Champion" costing rather more and the ultimate Hammarlund "Super Pro". I had earnt enough money to buy a "Sky Buddy" during the Christmas holidays and being a skilled poacher, could sell pheasants with no questions asked for about £1 each.

The problem was that all communications receivers had been "called up" to monitor enemy broadcasts so if I

was to have a receiver of communications standards, I would have to construct one myself. But this time it would be an "all-mains" receiver and I would use the best valves available.

Before the war, some radio companies had agreements with valve makers to design valves with bases specifically for that particular company so that only their valves would fit. Indeed, there were so many different valve shapes and configurations that the situation was becoming chaotic.

It took the war to resolve the situation by giving valves a CV (common valve) number. On the other hand, the Americans had rationalised valves by giving each type a definite code such as 6V6, 6J7, etc. So no matter who made the valve, those with the same type numbers were interchangeable.

International octal based valves were becoming popular and were used in all my later receivers. Many were brought into the country under the "Lease-Lend" arrangement. Even then, British equivalents still carried the maker's own particular reference code. But there was another pitfall for the unwary, a British octal valve holder was slightly different and would not accept international octal valves. I discovered this to my disgust after wiring several of these into my receiver. I think it was called a Mazda octal.

The first job was to rig up an antenna and with the help of my friend and a gentleman from the Electricity department who had extension ladders, we hoisted a Hertzian antenna about 46m long. The centre was secured to the house gable and an open balanced feeder using Eddystone transposition blocks led directly to my "radio room". The ends were supported by a pair of large trees. A pair of variable condensers in series with feeders, made a simple matching device.

I still used the battery receiver which had tuning coils designed for balanced or unbalanced antennas with a wide range of impedances, so little improvement was achieved by tuning the antenna system. The same applied when these coils were used with the new all-mains receiver.

However, the great advantage of the Hertzian antenna was that it required no earth lead. Long earth leads were always a problem when using Marconi antennas with receivers in an upstairs room.

Mains earth could be a source of noise and were avoided wherever possible. Safety depended largely on using the equipment on wooden tables and floors, and of course, the isolation provided by the power supply unit transformer. Even the chassis of my Eddystone 680X communications receiver was not connected to the mains earth, but I did modify it when overseas.

Power Supply Unit

It was decided that it would be wise to build a substantial power supply unit that could be used to supply power to a whole range of other equipment. Mains valves differed from battery valves, where the filament was the cathode, by having a separate cathode surrounding but electrically isolated from the filament. This greatly simplified biasing systems but the penalty was that it took some little time for the valves to reach operating temperature. With these valves, the filament was generally called the heater.

Experimenters favoured a separate p.s.u. as this minimised mains hum and isolated the receiver from heat generated by the rectifier valve. As it was common practice to leave the heaters permanently switched on with the receiver in the standby, or "transmit" state, the mains switch was on the p.s.u., while that on the receiver was in the h.t. line.

This arrangement maintained the receiver at a stable temperature and it became operational immediately the h.t. was applied. Furthermore, it was bad for the valves if the h.t. was applied before they reached their correct temperature. By leaving the heaters permanently switched on, this problem was avoided.

I considered that building a superheterodyne would be too ambitious at that stage, so I decided to build another regenerative receiver as I had much experience with these. The simplest approach would have been to replace the valves in the battery receiver with octal valves but whereas the caps of battery valves were the anodes, the caps of mains octal r.f. pentodes were the grids. This allowed much more efficient layout as the valves could be located with the caps close to the tuning condensers. The r.f. choke and regeneration condenser could then be located underneath the chassis. To take full advantage of the octal valves, I decided to build a completely new receiver.

Powerful Output Stage

I planned to use the audio section with my record player so decided to fit a 6L6 output driven by a small triode. The output from the triode was also to be used to drive the headphones. However, as the 6L6 dissipated more than 10 watts and could be used to make a powerful self-excited transmitter, it was only available on special application and a detailed form had to be completed.

Most ordinary radio parts were readily available from the local radio shops and I was fortunate to obtain the Eddystone components from a local shopkeeper who had them in stock since before the war. Eddystone components were very scarce, but a good selection of other makes of amateur short wave components were still available from specialist radio shops. However, sheet aluminium was virtually unobtainable and some firms used zinc. For screening and metal cabinets I used perforated zinc of the kind used for meat safes.

The new receiver featured ganged r.f. and detector tuning condensers and alignment was maintained by means of a small trimmer controlled from the panel. Otherwise operation was the same as with the battery receiver. The main difference however, was that this receiver had an untuned r.f. stage between the tuned r.f. stage and the detector.

The result was a 2V2 receiver, using a total of 5 octal valves, plus the rectifier, and probably represented the ultimate in regenerative receivers. When listening on a pair of headphones late at night to stations on the other side of the world, I was so fascinated by the glow of the valves that I was reluctant to put it into its wooden cabinet. There was something almost mystical about valves.

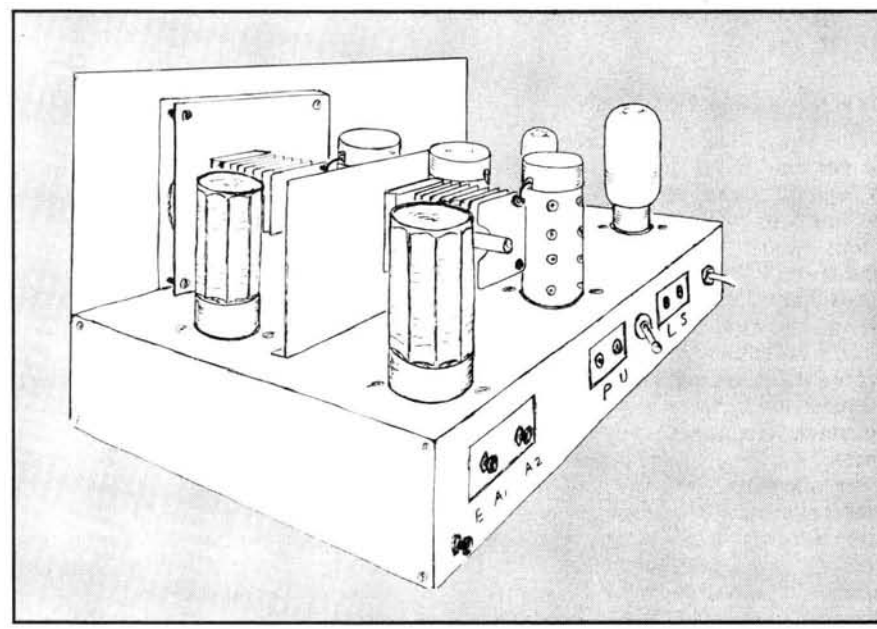

Fig. 5.2: The 2V2 All-mains short wave receiver

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A004	"Colne" 3.5/14MHz RX (RF Amp)	Apr 85	3.10
A005	"Colne" (VFO)	Apr 85	3.10
WR198	"Colne" (Product Det/Audio)	May 85	3.90
WR197	"Colne" (Oscill/Converter)	Jun 85	3.90
WAD302	Battery Charger Controller	Jun 85	3.00
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WR201	Add-on BFO	Aug 85	2.50
WR202	Economy UHF Pre-scaler	Sep 85	3.70
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WR203	Simple Capacitance Meter	Oct 85	2.80
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WR208	RF Speech Processor	Mar 86	4.10
WR209	Simple Audio Oscillator	Mar 86	4.30
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WR230–2 set	"Axe" Signal Tracer	May 87	9.20
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WR234	Side-tone Oscillator	Jun 87	2.70
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WR236	"Blenheim" VHF Converter	Sep 87	4.50
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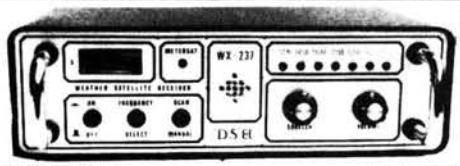

WX-237
WX-337

Receiving weather satellites is a very interesting affair. Every evening you can see the weatherman presenting an overview of the weather conditions using pictures which have been sent to earth by means of weather satellites.

These pictures supply extensive information to professional weather bureaus, weather amateurs or others who are interested in the weather. Receiving these pictures at home is relatively simple!

All you need is a weather satellite receiver and a special converter which is needed to transform the received signals into a picture that can be shown on a video monitor.

Photo Acoustics Ltd supplies both types of equipment. Below you will find the specifications of the WX-237 (or WX-337) weather satelite receiver which has exceptionally good qualifications. It is capable of receiving all polar orbiting weather satellites and can also receive the geostationary weather satellite "Meteosat 2" if an appropriate converter from 1.7GHz to 137MHz is used. For this purpose the WX-237 (or WX-337) has a separate antenna connector.

SPECIFICATIONS

- Seven(!) crystal-stable receiving frequencies: 137.15/137.30/137.40/137.50/137.62/137.77 and 137.85MHz.
- Very sensitive: 0.28uV at 12dB sinad
- IF bandwidth: 50kHz (−6dB)
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- Squelch control
- Volume control
- Manual frequency selection of Scan
- Frequency lockout, by means of internal switches
- Double superheterodyne principle
- Separate antenna socket for a Meteosat-converter
- 220 volt AC supply (!)

Recommended sales price WX-237:

£250.00 P&P £4.00

● WEATHER SATELLITES ● FACSIMILE ● SSTV

"SLOWFAX 2" The SLOWFAX 2 is a multi-function converter for the detection of *weather satellite, facsimile* and *slow scan television* signals.

This unique converter is capable of transforming all these narrow band picture signals into high resolution pictures on your video monitor. SLOWFAX 2 combines a high quality level with a relatively low price.

At present the reception of *weather satellite* pictures is very popular. Many weather satellites orbit around the earth or are located in a fixed position above the earth in the geostationary belt. At regular intervals they send fascinating weather photographs to earth.

Facsimile reception on short or long wave will supply you with a large range of different kinds of interesting pictures like press photo's (many times much better quality than in the newspapers), weather satellite pictures and weather charts.

Slow scan television (SSTV) is a hobby of thousands of enthusiastic radio amateurs all over the world. It is a kind of slow picture transmission via standard audio speech channels. A complete picture can be sent within 8 second (or longer).

You will notice that the SLOWFAX 2 can certainly compete with similar equipment that sometimes is double the price. In brief: equipment that should be found in every radio amateurs or Short Wave listeners shack!

SPECIFICATIONS

General

- 4 picture memories, each 256 × 256 pixels or 1 high resolution memory 512 × 512 pixels
- 32 grey scales
- Scan possibility of 2 or 4 memories in 2 speeds
- Video-output (75ohms, 1volt)
- 2 low frequency inputs (Tape or Receiver)
- Sizes: 25cm × 8cm × 20cm (1xhxw)
- Weight: 2.9kg
- Microprocessor controlled: 4 kbyte software
- 74 IC's, 6 transistors, 22 diodes

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- Decoding of all weather satellites: NOAA, Meteor, Meteosat, Cosmos etc.
- 2 drum speeds: 120rpm and 240rpm
- Automatic or manual synchronisation
- 2 scanning directions (scrolling)
- Sync-tone detector for 300, 450, 832, 840 and 1040Hz
- Contrast and brightness control
- *Optional:* colour generator!!!

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- All drum speeds: 45, 48, 60, 90, 120, 180 and 240rpm
- IOC's: 144, 264, 267, 288, 352 and 576 (approximated)
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- Scanning direction can be changed afterwards!
- Automatically scrolling
- Crystal stable drumspeed reference oscillator!

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- Also possibility of 4 pictures simultaneous on screen
- Width control

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Icom IC-3210E 2m/70cms Dual Band mobile transceiver, 25W on both bands, Full Duplex capability. Complete with *FREE DUAL BAND ANTENNA* **£499.00 (10.00)**

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Icom IC-781 All mode general coverage, 99 memories, 150W. Includes internal ATU, PSU & CRT display. The most complete HF transceiver on the market. Complete with *FREE PK232 7 MODE TERMINAL UNIT*, allowing the reception of *FAX, PACKET, AMTOR, RTTY, CW, ASCII and NAVTEX* and transmit all of the above modes except NAVTEX. (Please note PK232 has to be used with a suitable computer) **£4500.00 (10.00)**

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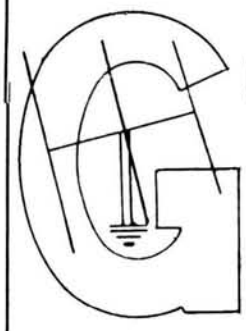

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On The Air
On The HF Bands

Reports to Paul Essery GW3KFE
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So, here we are again, starting to write this in the first week back on GMT. An interesting point is that I am only able to get on for a few minutes each morning around 0800; while BST was still with us I was finding 14MHz going well to VK and ZL most mornings but 21MHz dead. Immediately the clocks went back, 21MHz was found to be open on this path most mornings and showing signs that the opening was almost on the way out before I went QRT to head for the salt-mine. Either way, what a pleasure to operate in the mornings, rather than in the QRM-ridden evening sessions!

Conditions, of course, have been variable from day to day; some days superb signals to the Antipodes, on others not so hot, but one or two were always noticed. In addition, a couple of 4X stations were raised off the back of the beam—and a quick swing of the beam was very effective in shifting the crop of birds sitting on the driven element too.

Events

By the time this gets to you, the Vietnam expedition by HA5MY and others has been confirmed by Ferenc, says *The DX Bulletin*—October 23 to November 28, with callsigns mentioned as possibly 3W8DX and 3W8CW. This one is No. 1 on the European Most Wanted List, and No. 5 world-wide, the last known activity from 3W/XV having been around 1973! (Since writing the last few words, they have in fact appeared and are going well. It also now appears the operation is to be extended into December).

Another one past by the time you read this will have been DJ6SI, Baldur's Niger operation with the call 5UV386; this oddball is a commercial call, but may count for DXCC if the licence specifically mentions amateur radio. QSL Baldur direct only (he doesn't reply via the Bureau): Baldur Drobnica DJ6SI, Zedernweg 6, d-5010, Bergheim, West Germany. Again, as I write this one has been reported operational.

G4LJF will be on from Antigua as V21LJ about the time this reaches you; QSL Ian direct to his home QTH for contacts but, s.w.l.s only QSL to G0BTY.

That Yemen operation by the Lynx DX Group has, I hear, been cancelled, due to visa problems, but no word from EA9IE.

VK0GC is back on Macquarie Is. for another year; QSL via VK9NS.

Activity from Revilla Gigedo under the call XF4C is promised between December 15-20, 1.8MHz to 28MHz, s.s.b., c.w., RTTY and maybe packet too. QSL this one to XE1BEF, Box 231, Colima, Mexico.

Turning now to *DX News Sheet* I note that the activity of EK9AO was by UA9MA who was accompanying a raft boat and cycle expedition down the River Ob by a group of Russian and Minnesota children.

From December 23, stations in Oman will have their calls altered: A41AA-ZZ local Omani stations: A42AA-ZZ reserved; A43AA-ZZ special events; A45AA-ZZ reciprocal/visitors and A47AA-ZZ Club stations.

Low band operators will be interested to read that RA0AD/JT5 will be active for a couple of years, emphasising the l.f. bands.

Contests

The results of the 1988 Top Band CQ WW 160 contest first. Not a single G station in the winning listings, either phone or c.w.; but on the c.w. side, G4BYG/A, G3XTT and G4OBK put in respectable scores; on phone G0FDX operated by G4OBK was the only score mentioned; among the multi-op entries the lone c.w. entry from G was G3FVA. Congratulations to all.

The ARRL Ten Metre contest is on for the 48 hours 0001 December 10 to 2359 December 11. Operate any 36 of the 48 hours. Same station may be worked once on c.w., and again on s.s.b. for QSO points; classes of entry are single op, mixed mode, or c.w. or s.s.b. only. Multi-op stations single transmitter multi-mode only. UK stations given RS(T) plus a serial number from 001, W/VE stations send RS(T) plus their state or province. Scoring: s.s.b. contacts two points apiece, c.w. four apiece. Novice/Technician c.w. contacts eight points each. The multiplier is the US States (50 plus the District of Columbia), Canadian areas (VE1-8, VO1, VO2, VY1), DXCC countries worked and ITU Regions (1,2 and 3). Final score is the total QSO points times the sum of the US States, Canadian areas, DX countries and ITU regions worked per mode. Mailing deadline is January 13 to: ARRL Ten Metre Contest, 225 Main Street, Newington, CT 06111. The entry must include indication of a multiplier only the first time it is worked, a dupe sheet if you have 500 or more QSOs and the usual disqualification criteria will be observed.

On the negative side, some phoneys —3Y2AV on 21MHz on October 23 giving his QTH as Bouvet, and a doubtful 3V8GZ. In addition, HV1AC on 28MHz, calling for QSLs via Box 5, The Vatican and HV0PW asking for cards to I0WDX both have the distinctive sound of Vatican Slim.

The 1.8MHz Band

G3BDQ (Guestling) and **G2HKU** (Sheppey) both mention the band; G3HKU used s.s.b. for his regular ON7BW contact, plus c.w. to LZ0C and UA1AGO. G3BDQ had just the one contact on c.w. with UA9UBN/UA9K for a rare Oblast.

The 3.5MHz Band

G3BDQ offers his one contact—s.s.b. with VE1ANJ. **G0HGA** (Stevenage) notes that she now is active on all bands from 3.5 to 28MHz, on c.w. Although Angela has tried s.s.b. on h.f., she is as she puts it, uneasy on s.s.b. On 3.5MHz (80m) there were, of course, a string of inter-G contacts during the day, plus DJ8CZ, GW4ANK, DL0KED, DK0HSC, Y62QH, DF4KV, HA8LKH, DL6ZBA, ON7EL, DL6MAA, PA0SOL, ON5UK, LA3X, LA1IE, DL0ER, OK2BWJ, OK1KKH, OZ1IKW and DJ0PJ.

GM3JDR (Wick) looked at the band and found 4K1A. SP5DRH/JW, both on c.w.

At **G4XDJ** (Billingham) s.s.b. was used for G4ANL, while c.w. yielded G3ACR, OZ4JU and G0COG.

Another one to report just a single QSO was **G3NOF** (Yeovil) who made it on s.s.b. to NP4A.

The 7MHz Band

An unusually large number of reporters on this band this month. G0HGA reports all QRP on c.w., OK3CSA, SP6SO, ON5MF, G2DPY, I6BQE, LA1AAA, ON4WD and G0/K6OU.

Now to **G0ISW** (Ruislip) who found GM0AOY (Orkney) and GD0JBL.

G0JFM (Brixham) is at the Tor Haven Hotel in Brixham, from where he worked 7S5BE.

Just a single s.s.b. contact for G3NOF on this band, namely CY9DXX.

A longer list comes from G4XDJ, who mentions his s.s.b. with OY5J, GM3WFJ, SM6LJU, SM5GBF, plus c.w. contacts with G4ITL, W3BVC, WA2NRC, SM3FCI, W9TK, W1YT/4, OY1J, SM5ABW, LA1IE, OH2IE, SM7KIL and ON4CW/M.

It was s.s.b. almost all the way for G3BDQ, who used his mic to raise HX1HWB, RL7PEO, UI8LAD, UM8MK, RW9OWW/UI6C, RA9UDB, many UA9s, 4U1ITU, OH0/DL2ZDN, OX3SG, JA0BCO, JA1VKV, JG1QLY, JA2BAY, JA4JBZ, JA4NVV, JA5CJZ, JA7EAI and JA8NFV, while c.w. accounted for 9Q5DX, JA5RH, SN10JP for the Pope's visit to Poland and 3A8A.

The preferred mode at G2HKU was c.w., where the rollcall included W2MUZ, VE1ADJ and ZL4HB.

Our other long list for this band came from GM3JDR. It included a host of JAs, plus W7EJ, K7DZ, UL7IT, VQ9QM, 4K1A, YN3CC, VK3FC, 9Q5UN, JY2BB, KT7G, N6KD, KD7SO, AC7A, KJ7O, VK7GB, W7AMP, W7FU, W7KSK, W7UAB, W6IRF, KM7B, VE6UX, WD5IRF, VE7CC, KL7AJ, FY7AN, VE4IM, KH6IJ, VE7BDI and lots of smaller fry.

New Bands

Most people seem to have ignored them; however I did hear from GM3JDR. Don managed a string of JAs plus DU3BAA, VQ9QM, UV9OK, UW9TB, ZS5BH, ZS6DM, UV9CY on 10MHz c.w., plus on 24MHz, all W call areas, VE1 to 7, FM5WD, PY6WT, VK4AAG, VK3AJJ, C30FLO, ZS6AVM, ZS6DM, ZL1AH (20IOZ), FT5ZB, FR5ES, 4X1TQ and VQ9QM.

Turning to G0HGA, Angie says she uses the bands, and proves it by citing her c.w. contacts: on 10MHz PA3EVV, on 18MHz YU4TR and IK6BAK, and on 24MHz W3SP who didn't come back to a call, W4DA who obliged by coming back to a CQ and LA5QC.

The 14MHz Band

G2HKU's c.w. managed ZS5LW, PY2IBS, WA5VBE, W0KZV, VE3AR, VE7FNP on Vancouver Island, K2OZ and VE7BJO.

It was s.s.b. all the way for G3BDQ, with UA0BWL on Dickson Island, SJ9WL, VP9KN, JG1OUT and TF3ZM.

It seems to have been mostly c.w. for G4XDJ, who mentions K6SQL, PY7IK, VK3YT, ZL3AAM, VK6ZE, WA1HMW,

VE1TI, VE1IC, KB8OF, VO1HP, VE2GKH, BV2DA, JN1OXN, plus s.s.b. to OH3GZ/OH0, W1IDP, plus EUs on both modes.

G3NOF's list contains s.s.b. contacts with AX2HD, C30EAF, C30LFJ, CO3JA, CP1BN, CU2AT/CU6, CY0DXX, EK0AL, FG/PA0CRA/FS, FK8FU, FP5DF, FP/AG9A, FR4FA/J, FY5EM, HD8DZ, JR6CSY, JY9LC, KG4CL, KH6DQ, OH2WI/OH6, PZ2AC, RZ1OWA, SO7DNO, SP2DRH/JW, SU1FN, T5GG, UA0GCA, UZ9UZZ/RWOY, V44KAR, V47NXX, many VKs, VQ9XF, XE1ALH, YI1BGD, ZB2IP, ZL2AAN, 3A/IK2ECN, 3B9FR, 4C2PQ (=XE), 4F1RGA (=DU), 7P8DX and 9M2HB.

G0JFM (Brixham) offers his s.s.b. contacts with K1AR/TI2, C30LFM and VE8RCS.

Turning to the letter from G0ISW, we find Phil working VU2RX, VU2XYL, KH6IJ, IM0YUJ, all s.s.b., plus packet to TR8AHO and A4XZK.

The 21MHz Band

Many people seem to prefer this band over all the others. G0HGA was restricted to five watts to the 28MHz vertical. OH1NTS, UA3PFP, OK2BNZ (a G-QRP Club member) and HA5KF were all raised.

G0ISW was on s.s.b. and made contacts with RV9UP, UZ9CWW, UZ9CXU, KD8PR, G0FWX/MM (Mediterranean), W1FBA, 9Y4GR, OD5VT, K3EOT, VE2AJD and A4XRS.

G0JFM mentions VE7DGI as his solitary QSO on the band.

Turning to G3NOF, Don offers A35PP, A92BE, BY4SZ, BY5QA, BY5RA, BY8AC, BY9GA, CE0ICD, CX4ABY, CY9DXX, D44BC, DU1DWD, DU9CV/6, FG/PA0CRA/FS, FP5DF, FR4FA/J, FY5EM, G3UML/J6L, HC2AI/HD4, HC2CG/HD4, HD8DZ, HH7PV, HL1IUA, lots of JAs, KC4AAC, KD7P/NH2, KW7J (Montana), NC7K (Nevada), OD5VT, ON7IP/DU9, P4OR, RA0AIL, S6HF/MM off Singapore, S79MX, TF5BW, TZ0MAR, UI8AAY, UZ9UZZ/RW0Y for Zone 23, UW0LAP (Zone 19), V85GA, V85MK/OD5, VE7DGI, VP8BRT, VU2SMN, VU2WAP, ZD8RP, 3B9FR, 3C1JPF, 3D2MP, 4F1RGA, 4U1VIC, 7P8DP, 8Q7MT, 9N1RN and 9V1WP.

For G4XDJ there were s.s.b. contacts to KP4IX, various Ws, VU2SMN, ZL1AMO, KE7X/M, T77C, VU2WAP, plus c.w. to ZL1AMO, PY2OJD, VU2BK, LB9MC, W7ITN, JA1AN, JR0KSZ, VE3HBF, PY3LI, LU5DO, KC8QW, KB2CLZ/4/M and various other lesser fry Ws.

From G3BDQ, s.s.b. went out to CZ4SK—a special one-day prefix for Canada, EL8BS, VU2QQ, V47NXX for an all-time new one, KH6WU, TG9MBS, AP2P, HK6IID, DU1YP, VE7s, JY2DX and AL7FG.

G2HKU stuck to c.w., which was used to work PY2OJD, KD0IL and TU4CO.

The list from **G0JBA** (Sittingbourne) contains KU2W/M/VE1 on Prince Edward Island, WJ5X, W7CFL, all on a wire dipole and fifty watts, and all s.s.b.

Final contribution on this band comes from GM3JDR who mentions all W call areas, VE1-7, JA1-0, UV0BB, UL8PZA, ZL1TN UA0MO, UA0FGN, UZ0ZC, UA0ZW, RZ0OWH, UC1OWA/RB9M, ZL1BEK, UA0CIN, UZ0BWB, ZL2TX, UA0AGC, UA0OHN, HL88KBS, U0JE, U7FA, BY1SK, BT1DZZ, 6K24SO, and HK3HY, while on s.s.b. HL88AZC, VK2KLU, VK2PEN, VK3NNR, all JA call areas, HL88APQ, UA0SME, VK2VBL, HL88BTF and HL5BHI were all booked.

The 28MHz Band

Going well as this is being written. 4N2D busily calling CQ Contest and needing at least three minutes close attention before one can decipher the call—why, oh why, did someone have to invent the speech processor as a means of reducing intelligibility?

Turning to the letter from Brian G4XDJ we find that on 28MHz (10m) his FT-200 and low power (5-50 watts, usually around the ten watts mark) produced c.w. contacts with LU1AOJ, VE1ASJ, KA1HXK, PY2RRG, JA1OJZ, JA6PA, UM8NC, PP1RR, JA9CWJ, KA2DIV, VE3JPP; on the s.s.b. front, VO1QS, KA5UMK, KB4WBY, KB4SRB, J87CD, W0UVP and WA5HPJ; RTTY was also used and raised N4OBU and K1HBX.

Not much activity from G2HKU however, c.w. yielded DK6AS/SV5, LU1AO and KJ0B.

Next G0JBA who reckoned this to have been the best month on 28MHz since he started; s.s.b. accounted for A22RA, AG7A, N6RVR, KB6ZL, W0QNW, WB1EAD, N5EIN, K4XS, KA3TMH, K8IZS, KB2ASM, CE6EDZ, CE3BFZ, CU3AY, CZ1YX (a Canadian special), DK0ED/P, DU9RG, FH5EG (Mayotte), G4RSE/P, GM4AGG/P, JA7BSK, JA7OWD, JH1AJT, LU6ETB, LU2DFR, PY5EG, UL8PWU, UJ8SBW, VO1SA, 5B4ES, plus, of course, smaller fry and the usual crop of gotaways.

A brief note from G3BDQ indicates that antenna experiments are proving of interest; a two-element fixed beam aimed on the USA up in the loft, and a 20m doublet fed with open-wire line to fill in the gaps in coverage given by the grounded longwire. On 28MHz s.s.b., John managed KP4DKE, Z21CR, VS6BL, UL7FCN, YB3CN, YC0HML, YC0SQT, NX7K, FM/HB0CQK and 6W1PM.

G3NOF noted some unusual openings; KH6s over the long path across EU around 1130, ZLs around 2300, and so on. East Coast Ws were noted 1300-2300 and South Americans peaked around 2000. Asians were noted around 1130Z to 1200 on short path. The VK-FT-FH-FR prefixes were noted 0730-1100Z while Africans popped up at various times, as did short-skip. Nonetheless, Don doesn't think we are up to the best of the previous cycles. Contacts on s.s.b. were made with CX1TE, FT2XE, FT5ZB, FH5EG, FR5DL, FR5EL, HD8DZ, HH2Z, HK0HEU, HS0B, KD8RP/TF, KG4CL, NH6HF, NH6JC, P4OR, PY5YL, T5GG, TN4NW, V21AR, VE3OSN/VP9, VP8BRT (S. Orkney), YC2EMK, YB0AX/O, YK1AO, ZL4LZ, 5K3B and 8R1J.

Now to the YLs: **G0DVE** (Wimborne) has a TS-530 plus a converted half-wave CB vertical. Apart from many USA stations, Shirley mentions YB8AX/0, JH1AST, HL88WP, HL88IKL, ZL3AFT, ZL1, HJ, JH1LBR, 9K2OW, G4DUW/DU1, DU9RG, VP8VK, HK3MAE, 4M5T, YC0OMO, YC0FEX and D44BC, all worked from home. ZS6WRS was raised from the mobile rig, while between Badbury Rings and Wimborne—the rig in this case an FT-707 plus G-Whip. As for the Gotaways, they included BY5RA, H44, J52US, BY8AC, 9N1RN, VU2SVS and VP5/G0AZT.

Our second YL contributor is G0HGA, who reports a degree of TVI. We start with the QRO c.w. contacts: UL7BW, JS6WDG, JH1TZS, JH1LBR, DK6AS/SV5, WA4GAX, W3MOY, HL88XP (QSL via HL1XP), SP1DRS/JW, HZ1HZ, N4IBF, UL7FP, JA4DZ, RA9JW, N3RG, K4JYS, WM5K, JA7MF, JH2RMU, UW6AL, UZ9YXL, W4VGL, N2DAN/4, N4XR, W1PL, W6BVM, JH1DTC, UA0LEF, VK6HD K4CQ, UA9CM, JA6PA, VK2BPN, VS6WD who called Angie but was weak and disappeared, W3KPV, K2CBN, LU4ED, UG6GRA, N2IF, K5XK, VE1BNN, W4IF, JA1GHB, W2GFF/M and WA1IDP/CU2. Then we turn to the five watts QRP and find (again c.w.) that we have VQ9QM, many EU Russians, UW0AJ, W3ARK, WB2Q, RA9UPS, UO4UWA, WA1IDP/CU2, SV1AIP, YO4PX, LA4NFA, SV1TP, EO8IZN, SV4AAQ, YO8RL, LZ1V, W8GZX, K9VSO, KD5GY and UB4LAT.

Next we turn to **GM4ELV** (Glasgow) who is a five watt merchant too; Dale mentions J87CD, ZD8MAC, 5B4XA, J52US, CE3BFZ, ZP5Y, CE6EZ, LU1HE, EL8E (QSL to GM4LDU), UL7OB, EA8YK, LU4L, PY5EG, UJ8JCM, FT5ZB (QSL via F6ESH), Z21JE, K2EWB, N4SVA, HK6BER, KJ4GA, VE2LFL, AA5AS, N5LFT, KA5ZRG, VK2NYA, CE6NOT, EA9AX, K4XS, RW0AW, TA1E/2, OY9JD, K1GUP, VK5JDL, ZL4IG and VO1SO. As Dale remarks, most of the good DX was probably about while he was on holiday!

A report now from G0JFM who found 28MHz well and truly open. Steve found TA3C, T50DX, W8VYZ on a.m., CZ3BTQ, CZ1ASJ, 9H3EH; apart from the W8 the rest were all s.s.b.

Next we have G01SW who corrected my reading of his call as G0ISN—sorry, everyone. On 28MHz he worked IK2BTI, FE6BXQ, EA5FCO, EA4EP, SP7NJX, TK4HC, UA4LEW/U3Q and UB3IWA both the latter on five watts. Antennas, either G5RV or trapped vertical, and for the QRP using the Racal rig, the set's 2m whip.

A note from further afield now; **ZL1CCS** is at Waikino, North Island and writes to report on 28MHz as seen from ZL. Europeans appear between 1800-2000UTC, over the long path; IS0PBS, EA1-2-3-5-6-7-8, YU2HCD, 4X4FR early in the month, plus CR4NH, CT3DZ, HA5IQ, SV1YH, HB9FR, YO2BLN, later in the month. On the last day of August G4NEX and G0IAS. On most days they had W opeings, to W1-2-3-4 in the mornings, and the Western Reaches in the afternoon, around 0100UTC. VKs and JAs most afternoons, with the odd surprise, by way of for example, KX6BU, FT5ZB, ZL5BKM (Scott Base, Antarctica), TR8SA, UM8MIG, 5W1GT, 9M2ZA, YB5QZ, HS0A, 4S7/DF9FA, KH3/KB5ENR and T77T, heard under a VK pile-up. Regular openings were also noted to HK0HEU, P43HM, YN3EO, LU, PY, CE, HI, CO2 while the QSO of the month was with 5Z4BP. Incidentally, John is on most mornings around 1800-1930UTC beaming long path to Europe, with 100 watts and a 6-element monobander.

And, talking of the Antipodes, it was nice to hear from **John VK2AU** again, noting that, by the time you read this, he will be 5W1GS from Samoa—and one has to admit the view of the beach on John's QSL card is most reviving on a day when we have just had the first severe frost of the autumn!

Finally on 28MHz, GM3JDR (Wick) who managed all W call areas, plus all JA call areas, HR3JJR and HK40ZE; c.w. yielded all W areas, VE1-7, all JA call areas, VK4SS, VS6WB, UA0LAY, PY2ADN, YV5AE, VS6DO, EK8IZN, UZ0SWU/UA8T, UA0YM, UA0YO, RV0YF, RI8OA, RJ2/UA9FF and YB0BAQ.

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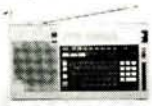

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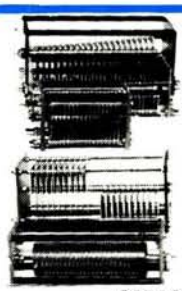

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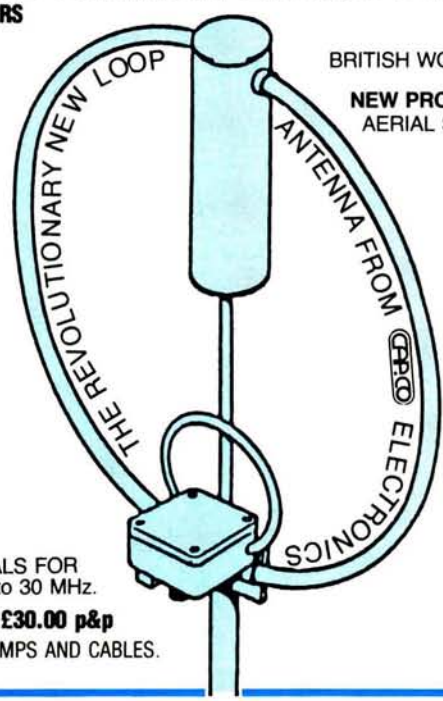

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A couple of oddments remain. The WAB Winter Activity Award will run from December 1 to February 28. The Award is based on points, with 250 for the initial certificate. One point is collected for the first contact with each country, WAB area, District, and for the first contact with a WAB bookholder. Thus the maximum number of points for a contact is four—despite some amateurs having many copies of the WAB book. Cost of the Award is £2 plus two first class stamps. More details obtainable from B. Morris G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.

The next three deadlines are: Dec 22, Jan 25 and Feb 27

The very final one is a note from G3TTC just before his move to Warwick; Keith has written a program for his BBC micro which accepts the QSO details and then writes the log and prepares two labels which can be stuck to the back of the QSL to give: 1. The specific QSO details, report each way, gear in use etc., plus 2. a general one which gives personal details of G3TTC and of the QTH in use—in this case the holiday operation from S79KO. Keith will shortly be settled in Warwick, and hopes that once he is in he will be able to get up a decent lot of antennas.

VHF Up

Reports to Norman Fitch G3FPK
40 Eskdale Gardens, Purley, Surrey CR2 1EZ

A heavy postbag this time following the end of the postal disruption. High solar flux levels at times have brought some excellent F-layer propagation on 50MHz. Auroral and good tropo events are also covered. The Squares Table has been omitted to leave space for fuller coverage of all these events and to catch up with last month's backlog.

Awards News

Congratulations to **John Hoban G0EVT** from Stanley, near Wakefield (ZN23b) who was elected to membership of the 144MHz QTH Squares Century Club on 11 October 1988. His certificate number is 87 and he has 107 squares confirmed from 177 worked. 89 were worked on tropo, two by meteor scatter, four in Auroras and 12 by Sporadic-E. 98 QSOs were on s.s.b., seven on c.w. and two were mixed mode. The QTH is about 50m a.s.l. with a good take-off between north-east and south but terrible between west and NE.

John's station comprises a Trio TS-780 with external a.l.c. power control and used "barefoot" till the end of 1986. For the next year he used a modified Pye amplifier with a QQV07-50 valve at 75W, the present amplifier being a converted ex-military unit with two 4CX250Bs. This latter, with power supply, cost about £150. The antenna is a 14-ele Yagi by Cushcraft at 10m a.g.l. fed through Pope H-100 cable.

Future plans are for a 12m lattice tower and a pair of bayed 14-ele Yagis. He also operates on 430MHz and is building a station for 50MHz.

Next to **John Quarmby G3XDY** (SFK) 144MHz QTHCC member No. 32 who was awarded his "150" sticker on Sept 30. 14 QSOs were on tropo, the rest via Ar. 16 were on c.w. and nine on s.s.b. The Ar contacts included UQs in LR and MQ, a UP in MO and RA3LE (QO). His confirmed total is now 154.

John Cornall G6IJM (LNH) was awarded his "125" sticker for certificate No. 85 on Oct 22. He now has 128 confirmed on 144MHz out of 157 worked. He selects EA6FB (AY), EA7BHO (YX) and IS0QDV (EZ) all worked via Es in the summer of 1988 and EA8BML (SN) at 3036km on tropo on Sept 9 as the best DX.

The 1989 Tables

The annual table covering five bands which was introduced in January 1988 has proved quite popular. I intend to run it in the same form in 1989 but hope there may be more entries for the 1.3GHz band.

For the benefit of new contributors I have prepared a sheet listing all 104 British Isles counties with their code letters as used in this feature. The list also includes the countries likely to be workable on v.h.f. There are explanatory notes about the table and if any reader would like copies send an s.a.e. to the Purley address. But please send *two extra* loose 14p stamps to cover printing costs.

The c.w. ladder will be retained as it does seem to encourage activity, but more support for the 430MHz band would be welcome. The on-going squares table will continue in its present form. Some readers have suggested that 50MHz be included but that would mean leaving out 1.3GHz which I am loath to do.

Another Polar Expedition

Laurence Howell GM4DMA (GRN) has sent details of another unsupported attempt to walk to the North Pole from the Canadian mainland. As in 1988, the expedition leader will be Sir Ranulph Fiennes and Laurence will be the base commander on Ward Hunt Island (FR23WB) which is 725km from the geographic pole.

Laurence's wife **Morag GM1ILL** will be in charge of communications. Mike Stroud will be the team's doctor and Captain Oliver Shepard the UK liaison officer. Departure date is Feb 20 with arrival on the island on March 3, their third visit. The projected return date to the UK is May 16.

A comprehensive amateur radio station will be established using their own and other equipment loaned or donated by well known companies. They will be QRV on all nine h.f. bands and on 50 and 144MHz.

No advance skeds can be taken since priority will be given to commerical traffic, but the stations will be on all day. 50.110MHz will be used for Auroral-E and F-layer contacts to Europe and North America and 144.123MHz for any kind of propagation including m.s. Past experience suggests 1800-2300UTC as the best period for Auroral-E.

Antennas will be a 4-ele Yagi on 50MHz and two 5-over-5 Yagis on 144MHz. A 200W amplifier will be used on 144MHz. Any reader wanting further information may telephone Laurence during the working day on Aberdeen (0224) 576155 extension 274.

Annual c.w. ladder

Station	Band (MHz) 50	70	144	430	Points
G4ZEC	—	—	617	—	617
PA3FAQ	—	—	199	—	199
G0HGA	—	—	198	—	198
G4OUT	—	—	191	—	191
G4WHZ	21	—	157	—	178
G0HLT	13	—	161	—	174
G4AGQ	—	37	121	12	170
G4VOZ	29	93	—	18	140
G0HEE	—	—	111	—	111
G4ARI	—	29	80	—	109
G0DJA	11	—	69	—	80
G4ZVS	—	—	80	—	80
G2DHV	10	37	24	2	73
G3FPK	—	—	64	—	64
GW4HBK	21	33	—	—	54
G0GKN	—	—	52	—	52
G1SMD	21	—	15	—	36
G6DIF	2	—	30	—	32
GU4HUY	—	—	22	—	22
G1DOX	3	5	—	—	8

Number of different stations worked since January 1.

Meteor Shower Data

The last recognised shower of the year is the Ursids which should be best on December 22. The RA/DEC figures are 217/76° so the radiant is always above our horizon. The ZHR is about 15 reflexions per hour.

My computer suggests the following reflexion efficiencies: NE/SW better than 50 per cent 0900-2400; E/W better than 70 per cent throughout; NW/SE better than 50 per cent 1700-0800. The N/S paths are much poorer with nulls at 0900 and 2100. Around 0300 and 1400 there are "peaks" at about 40 per cent.

The Quadrantids shower, with a ZHR of at least 100, can be a very useful one on January 3-4. It is much more "peaky" than the Ursids, though. The data for the usual directions are: NE/SW around 1400 with a lesser peak around 0600 and nulls at 0100 and 0900; E/W a broad average 50 per cent period 1400-0300 with nulls at 0600 and 1100; NW/SE good peak around 0300, a lesser one around 1100 and nulls at 0800 and 1600; N/S two good peaks around 0400 and 1300 with nulls at 0900 and 2100.

Repeater Notes

The September 1988 issue of the Kent Repeater Group's Newsletter has arrived. It contains news about the eight repeaters for which it is responsible. The latest one is another packet digipeater GB7CK at Charing Hill near Ashford and which came on stream on Oct 16. The site is the GB3CK one.

I note that the perennial topic of non-paying repeater users is aired, i.e. those who habitually use relays built, installed, maintained and paid for by a club, yet who never join or contribute to running costs. Unfortunately these freeloaders are a fact of life generally, another amateur radio example being those who use—and abuse—satellites.

The secretary of the KRG is Kelvin Fay G0AMZ and I assume he is the person to contact about joining. His address was not given on the Committee page of the Newsletter so presumably he is QTHR.

Beacon News

The Malta 50MHz beacon 9H1SIX has been moved to a new site about 215m a.s.l. It runs 7.5W and the antenna is a five-eighths wave ground plane. This information from Hal Lund's ZS6WB Oct 6 issue of his excellent fortnightly publication *ZS VHF News*.

Hal also mentioned VS6BL reporting that the 50MHz and 28MHz Hong Kong beacons were being relocated. The Greek 50MHz beacon SV1SIX was expected to be licensed soon according to SV1DH via G3JVL.

The 50MHz Band

Some exciting things have been happening on this band particularly when the solar flux has been high. What is now being worked reads more like 28MHz than a v.h.f. band.

For some time **Geoff Brown GJ4ICD** has been sending copious notes covering 28/50MHz happenings on a daily basis. I have also received a nine page summary from **Mike Walters G3JVL** (HPH) containing a wealth of fascinating news up to Oct 20. The following details of current or pending activity are taken from these sources and from ZS6WB's notes.

Indonesian amateurs have been QRV for five years and activity is good. YB3CN has a new Icom IC-575 and a beam was enroute from Australia. FR5DN on Réunion Is. has an operating permit but no equipment, although FR5EL has been worked from Israel. 9Q5NW in Zaire was still awaiting a Heath SB-110 from the USA. 5H1HK is QRV from Zanzibar Is.

5B4OG has been active on c.w. from Cyprus. The SMIRK group is sending equipment to J52US in Guinea-Bissau. CO2KK is QRV on a.m. on 50.110MHz from Cuba. Old timer Z21JO has no gear but is keen to activate the band from Zimbabwe.

SZ2DH, alias SV1DH (Athens), is the only licensed Greek station now. SVs worked last summer were only temporary permit holders. However, it seems the SVs will all get the band soon. SV0FE will be moving to VS6 soon.

Next for some real DX reports starting with the first England/Argentina QSOs on Sept 8. G3JVL was in QSO with LU7DZ (GF05GK) on 28.885MHz when **Tim Kirby G4VXE** (GLR) broke in to say he was copying LU7DZ's keyer on 50.11MHz. Eduardo's first contact was at 2023 with G1PAM (SPE), followed by G4GLT (LEC), G3CCH (HBS), G4VXE, G4AFJ (LEC), G4UXC (HWR), G3ZYY (CNL) and lastly at 2054 G6IFN (LEC).

The LU7DZ/G3CCH contact over a distance of 11 289km undoubtedly established a new 50MHz DX record from the British Isles. But the way the band is behaving it may already have been exceeded.

The reports seem to suggest that, after the first contact with G1PAM, only stations within a very narrow corridor, perhaps only 40-50 kilometres wide, were able to hear LU7DZ. Eduardo reported that LU9AEA, who lives very near him, could not hear anything of the Gs. I wonder if this phenomenon has been observed on 28MHz? However, LU7DZ runs 800W to four 19-ele Yagis which must make a difference in weak signal conditions.

Etienne Swart ZS6CE (KG34) telephoned on Oct 6 to say that on Sept 21 he made the first ZS6/SV QSO on f.m. with SV1DO. RS59 reports were exchanged. The same day he worked 9H1BT via F2-

Annual v.h.f./u.h.f. table
January to December 1988

Station	50MHz Counties	50MHz Countries	70MHz Counties	70MHz Countries	144MHz Counties	144MHz Countries	430MHz Counties	430MHz Countries	1296MHz Counties	1296MHz Countries	Total Points
G1KDF	39	17	—	—	92	22	66	12	35	7	290
G6HKM	46	15	—	—	78	28	52	19	29	15	282
G4XEN	47	14	36	5	72	34	51	15	—	—	274
G1SWH	59	20	—	—	94	20	55	9	—	—	257
G8LHT	18	8	33	5	67	32	48	17	6	2	236
G1LSB	37	12	—	—	71	25	55	19	—	—	219
G4SEU	35	13	67	9	48	11	29	4	—	—	216
GOIMG	47	14	36	6	47	12	23	5	—	—	190
G4DEZ	33	16	—	—	30	16	27	6	34	10	172
GM0EWX	57	15	—	—	58	24	7	3	—	—	164
G6MXL	20	9	19	4	42	19	19	9	9	3	153
G1IMM	35	11	—	—	56	12	31	7	—	—	152
G0EHV	—	—	50	7	68	23	—	—	—	—	148
GW6VZW	45	16	—	—	68	17	—	—	—	—	146
G4V0Z	27	14	58	8	—	—	29	8	—	—	144
G1EZF	—	—	30	5	76	33	—	—	—	—	144
G4YCD	12	9	—	—	84	30	—	—	—	—	135
ON1CAK	—	—	—	—	71	33	16	9	—	—	129
ON1CDQ	—	—	—	—	63	33	9	9	—	—	114
G4ARI	—	—	33	4	60	13	—	—	—	—	110
G8XTJ	33	5	—	—	58	14	—	—	—	—	110
G4ZEC	—	—	—	—	76	29	—	—	—	—	105
GW4FRX	—	—	—	—	71	30	—	—	—	—	101
G7ANV	—	—	—	—	75	26	—	—	—	—	101
G3FPK	—	—	—	—	78	22	—	—	—	—	100
GI4OWA	19	17	—	—	48	16	—	—	—	—	100
GJ6TMM	23	12	—	—	36	14	7	5	—	—	97
GM0HBK	26	8	—	—	46	15	—	—	—	—	95
G8PYP	20	9	2	1	41	13	6	2	—	—	94
G6MGL	19	10	—	—	49	10	—	—	4	2	94
GW4HBK	22	18	43	6	—	—	1	1	—	—	91
G1SMD	21	17	—	—	25	18	—	—	—	—	81
G4AGQ	—	—	15	2	38	8	12	4	—	—	79
G1D0X	16	2	19	2	22	5	5	2	2	1	76
G2DHV	5	1	22	2	28	6	7	2	—	—	73
G1CE1	—	—	—	—	59	12	—	—	—	—	71
G4WHZ	6	4	—	—	33	19	—	—	6	2	70
G4WND	—	—	60	7	—	—	—	—	—	—	67
G3EKP	12	3	16	4	7	4	5	1	—	—	52
GM0J0L	—	—	—	—	30	10	—	—	—	—	40
G4ZVS	—	—	—	—	34	5	—	—	—	—	39
G0HGA	—	—	—	—	30	5	—	—	—	—	35
G0HDZ	—	—	—	—	30	5	—	—	—	—	35
GU4HUY	—	—	—	—	23	10	—	—	—	—	33
GM1ZVJ	4	3	—	—	14	7	—	—	—	—	28
G8PNN	—	—	20	3	—	—	—	—	—	—	23

layer, Paul being an "end stop" signal. Paul then went QRP down to 100mW and Etienne to 300mW and both were S6. The ZS stations monitor 50.11MHz all the time. ZS6CE is no longer on packet radio due to equipment failures.

For the record, here is a brief summary of other paths worked: From Sept 25 9H to LU, PY and CX usually between 2000 and 2400UTC. Oct 8 9H1BT worked 50 JAs over the *long path* which must be around 30 000km. (Note that Malta and Tokyo are at virtually the same latitude). Oct 10 Fs worked JAs over the long path but none heard at GJ4ICD or in Malta.

On Oct 10 ZS3AT (JG87) copied beacon GB3NGI at 1818 for a few minutes but 28MHz was dead. On Oct 16 VP8PTG (Falklands) made his first-ever DX QSO to K1FJM in Florida at 2238UTC. The next day 9H1CG worked VP8PTG during a good opening to LU. This was a first-ever VP8 QSO into Europe.

On Oct 18, the geomagnetic A index reached a sub-storm level of 25 units. This brought the first 9H to FT-Z QSOs the stations being 9H1s BT, CG and FL and the Amsterdam Is. stations FT3ZC and FT5ZB. The same day the band opened to South Africa from GI and GM. GM3WOJ (IO77) worked ZS6WB (KG44) and ZS6LN (KG46) at 1045 and GI8YDZ and two other GIs worked ZS3E (JG89).

The GB3NHQ beacon was copied weakly on Oct 18 at 1835 by CX4HS (GF17) 350km north of Montevideo. Alberto called "CQ G" but only worked CT1DTQ (ex-DK3RV) in IM58. FR5EL has also heard GB3NHQ.

The foregoing will give a broad picture of what is happening on 50MHz on a global scale. Opinions appear to be divided about this kind of coverage. While some readers only want to read about what has been worked from the British Isles, others seem to be fascinated by events further afield.

The band certainly seems to have a lot more in common with the 28MHz h.f. band than with the v.h.f bands above 70MHz. I would like your views on this topic. Is there too much 50MHz news? Do you want to read about an opening from, say South America to Hawaii? Please let me know so that I can try to please the majority.

Now the news from the British Isles starting with **Charles Coughlan EI5FK** (CRK) who got his 50MHz permit in September. He wrote, "CU all on Aurora." **Philip Lancaster GOISW** (LDN) runs 10W to a 5-ele Yagi by Tonna. Under the heading "50MHz" he lists QSOs with D, HB and I stations which I assume must be cross-band ones.

Steve Nicholls G0JFM (DVN) is another new contributor. In an Ar on Oct 10 he reports an s.s.b. QSO with GM6COX which I think might have been GM8COX. **Alistair Southby G1HMN** (SRY) worked his first ZSs on Sept 27 from 1120–1210 being 6WB and 4TX/P6 in KG44 and 6XJ (KG33) to bring his total to nine countries.

Adrian Gee G1IMM (CBE) has been "semi-QRT" due to interference problems. However he hopes these may be alleviated if he raises his antennas to 9m, this dependent on getting planning permission for a lattice tower. Recent new countries were GU, GW and OH.

Bill Law G2ANT (LDN) is very active on the band and worked the ZSs on Sept 27. On Oct 8 he made QSOs with ZS3AT and ZS3E on c.w. and ZS6XJ on s.s.b. between 1451 and 1620. **Martyn Jones**

G4TIF (WKS) worked ZS4TX (KG22), his first ZS, on Oct 8 and got ZS3AT the next day. In a weak Ar on the 10th GM8MBP (IO87) was the only one worked.

Ken Osborne G4IGO (SOM) suggests that G4XEN heard the Jersey beacon on July 31 by Es and not tropo because such propagation was "very common" at the time with inter-G QSOs as close as 200km taking place. He asks all readers to send him reports of all Es stations worked and heard on 50 and 144MHz on July 31 and of all Band I TV and Band II BC stations heard as he wants to research this event. His QTH is now: 7 Winchester Cottages, Seavington-St.-Michael, Somerset TA19 0QJ and not as in the Call Book.

Ken worked ZS3AT at 1727 on Sept 27 and heard ZS3E's keyer from 1850 and again on Oct 2. ZS3AT was also worked on the 5th. In the Oct 6 Ar at 1835 GM0EWX (HLD) and GI8YDZ (ATM) were contacted at QTE 010° with beacons GB3NGI and GB3RMK heard. ZS3, ZS4 and ZS6 stations were worked between 1436 and 1739 on the 8th with ZS3 and ZS6 the next day. At 1514 on the 9th PA3DOL (JO33) was copied via back scatter F-layer. On the 10th in the second phase of the Ar from 2003 Ken worked Gs and GWs in YM, YO, ZM and ZN squares at 10-20°.

John Palfrey G4XEN (NHM) worked a few GMs in the Oct 6 Ar and again on the 10th. He heard ZSs on the 8th, 1440-1542, but could not raise any on c.w. with the 100W e.r.p. legal limit.

Ela Martyr G6HKM (ESX) experienced her first 50MHz Ar on Oct 6 and found it much easier going than on 144MHz. She worked GM4IPK (SLD), GM8MBP (GRN), GM0EWX and GI8YDZ. In the Oct 10 event GM6JUA (CTR) was new.

Bill Biltcliffe G6NB (OFE) has just started buying *Practical Wireless* again and wrote, "... I think it is now a super magazine, just the right balance." Since moving from his previous excellent QTH at Oving (BKS) he has worked 19 countries including ZS on Sept 27 and Oct 8 and 9. On the 8th he was called by FH5E? but who faded before being positively identified. Almost certainly it was FH5EF. Then on Oct 22 at 1340, Bill made probably the first contact with Nigeria, with G3GJQ/5N28 (JJ16).

Steve Damon G8PYP (DOR) has moved recently but only about a mile. He heard some ZSs on Oct 8 but only had a temporary indoor dipole. A few new counties were worked in the Oct 23 contest by answering CQ calls.

John Fitzgerald G8XTJ (BKS) is very pleased with his Howes transverter used with a somewhat deaf Yaesu FT-480R and poor antenna. He reckons hearing ZS and 5N is a good omen. He added GJ4ICD for a new country and county on Oct 16 and ten more counties in the WAB and RSGB contests on the 9th and 23rd respectively.

Gerry Elliott GI4OWA (LDR) found things very quiet until 1313 on Oct 18 when he worked ZS3E. He was audible for about ten minutes and peaked to S9+20dB for 30 seconds. No other ZS stations or beacons were heard.

GJ4ICD, in chronicling many openings to ZS, writes, "It is becoming quite clear that Jersey is in a good situation for these southerly openings." This is echoed by a note Geoff received from ZS6BMS, alias G3HBW, who wrote, "We seem to hear you around here when nothing else is audible from G."

Geoff records South African stations heard/worked on Sept 14–16, 20, 22, 27, 28 and 30. In the Oct 1–23 period, the only days when nothing transpired were the 7th, 11–12th, 15th, 17th and 21st. The September activity resulted in 48 QSOs with ZS3 and ZS6 stations, the best day being the 27th when there was an F2 opening, and two t.e.p. ones in the evening.

GJ4ICD operated in the Oct 23 Trophy contest and completed 143 QSOs in nine countries and 37 counties. Best DX was ZS6XJ at 1156 but under the silly rules that was only worth 25 points! Geoff heard Clive Penna GM3POI/A (IO88OW/OKE) around 1020. Clive spoke to me later and he too thinks the scoring system would discourage remote stations from entering. It does seem ridiculous to penalise distant stations who will not work the quantity of stations one can from central England.

Andy Steven GM4IPK (IO99IW) is gradually getting his station together in Dunrossness (SLD). He has an 18m Versatower to put up but at present his 5-ele Yagi is only 3m a.g.l. fixed at 020° purely for Ar events. The Auroras of Oct 6 and 10 were quite good visually, too. He used 50 and 144MHz in both and worked over 300 stations in all. He suggests the IO or JO parts of the locators be omitted when giving reports but he would like to know the QTE. Reports in the form "54A/93JD/030" would be ideal.

John Baker GW3MHW writing from his Dyfed QTH says he has now worked 27 licensed countries the latest being ZS3E on Oct 8. He also contacted ZS4TX and ZS6s AXP, LW and XJ. Signals were audible from 1233 till 1740.

Finally a note that as from Oct 8 the Dutch stations have been able to use s.s.b. In Sweden 27 permits have been issued to the national society for distribution to clubs but to date, nobody seems to have heard any SMs.

QTH Locator Squares Table

Station	Band (MHz) 1296	430	144	Total
G3IMV	42	122	406	570
G8GXP	45	151	331	527
G4KUX	—	120	372	492
G3UVR	79	129	239	447
G4RGK	48	115	274	437
GJ4ICD	59	119	253	431
G3XDY	81	137	185	403
G3JXN	87	134	179	400
G1EZF	32	93	263	388
G4XEN	—	107	268	375
G6DER	78	110	183	371
G0DAZ	—	114	249	363
G3COJ	44	103	186	333
G4DEZ	48	37	248	333
G6HKM	39	102	191	332
G4SSO	—	92	228	320
G4DHF	—	—	307	307
G4TIF	—	107	198	305
G4RRA	—	51	253	304
G1EGC	23	80	199	302
G6XVV	25	64	211	300
G4SWX	—	—	293	293
G1KDF	35	93	163	291
G8PNN	63	98	128	289
G6MGL	59	89	141	289
G8HHI	31	106	148	285
G8ATK	45	91	143	279
HB9AOF	55	80	141	276
G4MUT	28	90	149	267
G4NBS	59	103	102	264
G4PCS	—	3	258	261
G1LSB	—	126	125	251
G6DZH	—	87	154	241
G3NAQ	—	80	160	240
ON1CAK	—	33	204	307
G3FPK	—	—	233	233
G4IGO	—	—	230	230
G8LHT	4	77	146	227
G1GEY	—	68	158	226
G6STI	22	66	128	216
EI5FK	—	47	168	215
GM4CXP	—	31	184	215
ON1CDQ	—	32	182	214
G4MEJ	—	—	213	213
G0EHV	—	75	137	212
G8LFB	—	—	209	209
GW4FRX	—	—	203	203
G4YCD	—	—	197	197
G8MKD	—	49	142	191
GM0BPY	—	57	129	186
G4DOL	—	—	186	186
GI1JUS	—	—	181	181
GJ6TMM	—	40	137	177
G6AJE	5	57	95	157
G4AGQ	1	41	104	146
G4FVK	20	46	75	141
G6MXL	14	38	88	140
GW6VZW	—	6	121	127
G4TGK	—	—	118	118
G0FEH	—	24	88	112
G1IMM	—	13	98	111
G8XTJ	—	—	110	110
G7ANV	—	—	103	103
GI4OWA	—	—	101	101
G4ZTR	29	29	37	95
G1SMD	—	—	93	93
GM0GDL	—	19	66	85
PA3EUS	—	18	57	75
GM0HBK	—	—	75	75
G0HEE	—	—	73	73
G8PYP	—	6	61	67
GU4HUY	—	—	67	67
G1CRH	—	—	62	62
G0HDZ	—	—	61	61
G1VTR	—	—	55	55
G1NVB	—	—	49	49
G2DHV	2	6	31	39
G7AHQ	—	—	34	34
GM0JOL	—	—	29	29
GM1ZVJ	—	—	21	21

Starting date 1 January 1975. No satellite or repeater QSOs.

The 70MHz Band

Eddie Ashburner G0EHV (TWR) enjoyed the Trophy contest on Sept 18 working 52 stations of whom 33 were fixed. He had contacted 128 different stations up to mid-October but still needed GJ and GD. **Pat Billingham G4AGQ** (SRY) worked GW4ALG (GWT) in the contest for an all-time new county but otherwise found the band "... pretty dead as usual."

John Jennings G4VOZ (LEC) wonders why people invest in outdoor rotatable antennas for other bands but make do with dipoles in the loft for 70MHz. Many operators tell him they hear G4VOZ regularly but cannot make a QSO. September brought contacts with GU2HML on s.s.b., G8KQW/A (IOS) on c.w., GM4ZUK/P (GRN) and GW4BZD (IO73). Other QSOs were with G0DQA, who used to be G5DQA, and GM4THB/P near Stranraer on the 17th. GB5XX in Daventry on the 24th was a special event station to celebrate the town's connection with 5XX in the early days of broadcasting.

G4XEN reports contest conditions very good on Sept 18 and John's 25W to a dipole found 15 new counties and three more countries, best DX being GI3TCU/P at 474km. **Ian Harwood G8LHT** (YSS) worked G4VCJ (CVE) following a 430MHz QSO.

GM4IPK plans to operate -/P from time to time in 1989. As he will be in Shetland for four years most all 70MHz operators should have a chance to work him, especially in Ar events. He could activate both

ZT and ZU squares quite readily.

GW3MHW operates on the band for inter-G contacts from IO72XG at nights and on Sunday mornings. John starts on c.w. changing to s.s.b. if conditions are good enough.

The October issue of *QSB, The Newsletter for Four Metres* has arrived and continues its high standard. It includes the first part of an article describing a 4CX250B amplifier. Editor Roger Banks G4WND plans to publish an Activity Table in 1989 to encourage more operation on 70MHz. For details of the Newsletter contact G4WND who is QTHR.

The 144MHz Band

Tom Cocking's EI4DQ (CRK) letter got held up in the September postal disruption so missed last month's deadline. He reports the tropo propagation to EA8 starting around noon on Sept 9 and carrying on till 2100 on the 10th. He worked eight EA8s in IL18 and IL27. At 0134 on the 10th EA8BML was calling CQ with no takers so Tom called him on his Yaesu FT-290R using just 2.5W and its quarter wave whip. They still exchanged S9 reports. The period Sept 16-20 brought lots of D, F and PA stations plus HB9s in JN36 and JN37, OK2KFM (JN99FN) on c.w. and SP6GWB/6 (JO80JG).

EI5FK worked six EA8s and reported the opening lasting 24 hours. Highlight of 1988 for G0EHV was working the EA8s, plus several EA1s, and the QSO with EA8BML was Eddie's best DX at 3201km.

G0EVT had some QSOs in the Oct 6 Ar with GMs in WR and ZT, EI3GE (WN) and GI4KIS (WO). The QTE varied between 000° and 045° and the event faded around 1900. G0ISW lists some excellent DX on Sept 20 including OK1KFQ/P (JO70), OE5XDL (JN78), LX1DB (JN39), HB9s and I2FAK (JN45).

Bob Nixon G1KDF (LNH) caught Auroras on Oct 6, 10 and 18 working a few GMs and EI5FK. On the 16th DG8MET (FH) was a new square. **Maurice Williams G1NVB** (LCN) has been using a 100W amplifier with his FT-290R. I presume it must have a pre-amp as he says he is hearing the stations much better even though no new squares have been worked.

G3XDY has added six new squares since his last report including Y88VSL (JO61) on Oct 16. September QSOs included OK3LQ (JN88) on the 19th, OK1OA/P (JN99) and SP6GWB/6 on the 20th and OK2KYC/P (JN99) on the 21st.

G4IGO worked some of the EA8s on Sept 9/10 along with northern EAs in ZB and VD. In the Oct 6 Ar Ken contacted GM3JIJ (WS) and GM0EWX between 1808 and 1856 at a QTE of 010°. For G4TIF EA8 was Martyn's 35th country and the two new squares brought his total to 200.

For G4XEN, Sept 23 brought a completed m.s. sked with EA6/DF5GX (BA) on Menorca. John worked him again on random c.w. on the 27th when he had moved to CZ. A UR1 was heard in the Oct 6 Ar but the event on the 10th was better with D, EI, GM and OZs worked. The Ar lasted continuously from 1320–2225.

G6HKM enclosed a map showing the many squares worked on Sept 19/20. Ela made contact with SP6GWB/6, OK2KFM and OK2KYC/P both in JJ. The Oct 6 Ar yielded GM0EWX, GM3JIJ and GM7BUD (TYS) at QTE 000° and four more GMs and GI6ATZ on the 10th at QTE 020°. **Colin Redwood G6MXL** (DOR) worked numerous Ds on Sept 20 plus OE3s OBC and XXA (JN88). **Howard Staddon G6STI** (LDN) added LA6VBA (ES) for square number 130 on Oct 16.

Welcome to **David Martin G7AEY** (LDN) who wrote for the first time. He uses a Trio TS-711E, Heatherlite "Explorer" amplifier and 15-ele Cue-Dee Yagi 88m a.s.l. He lists some very fine DX worked in early September including SM7s.

Stephen O'Malley G7ANV (NLD) wrote to update his scores, his letter covering several months. I see he worked EA8BML at 1847 on Sept 9. More recently he caught the Oct 10 Ar working D, EI, G, GM and OZ but nothing new. In mid-October DG8MET was new.

Steve Beazley G7BIM (LDN) is another new contributor. Using 2.5W from an FT-290 and 5-ele ZL-Special antenna he had accumulated 46 counties in quick time. G8PYP reports on the "small lift" to the south-east on Oct 16 which brought QSOs with DJ0XR/P (JN39) and assorted Fs in JN08, 15, 16 and 18.

GI4OWA thought the tropo on Sept 17/18 promised more than it delivered. However Gerry does list GJ, EA1, D and F stations worked. **Calum MacPherson GM0EWX** has recently added nine more counties including GM1SMI/P (OKE), EI4GRC (GAL), EI4EY (LIM) and EI9FD (MTH). **Colin Smith GM0CLN** (DGL) reports that his father, Bob GM0BWU was probably the first Scottish station to work EA8BML at 1403 on Sept 9 getting an S2 report. At 1412 Colin contacted the EA8 by which time reports were S9. He later worked EA8ACW.

GM4IPK runs 300W to a 15-ele Cue-Dee Yagi on a chimney 9m a.g.l. Andy is QRV on m.s. mode and can come on at short notice for anyone needing ZT square. He says there is very little v.h.f. activity from Shetland at present although GM3XOQ should be back on the band shortly. GM6RGN (ZU) on Unst is active on 144MHz and also 50MHz. The Lerwick beacon GB3LER on 144.965MHz is ". . . still alive and well . . ." and is a useful Ar indicator.

John Nelson GW4FRX (PWS) telephoned me at about 1300 on Oct 10 to report reception of GB3LER via AR. He was noting two distinct events at QTEs of 005° and 040°. He worked the usual GMs and some near continentals plus the odd U station.

At G3FPK there was an odd "see-saw" effect. Beaming at 005° some GMs were quite strong and others much weaker. Then beaming at 025° reversed the situation suggesting the stations I was hearing were not all beaming in the same direction. No Russian stations were heard in ZL60j and the event did seem to keep coming and going till late evening.

On the subject of Auroras, GM4IPK asks that radio amateurs consider sending reports to Ron Livesey of the British Astronomical Association. He would not want lists of stations worked but would like the start and finish times, how the QTE changed and any special effects. His address is 46 Paidmyre Crescent, Newton Mearns, Glasgow G77 5AQ.

The 430MHz Band

September produced some nice DX for EI5FK. GM8COX (YP) and G4MTR (YO) were new on the 15th. On the 17th Charles worked GM0HBK (XR) who was only running 10W, followed by many German and Dutch stations including DK6OH (EM). More D, PA and Fs and ONs were contacted on the 18th and 19th.

G1IMM has added five more countries, D, F, GM, ON and PA and four more squares. G1KDF operated in the French contest on Sept 18, 0500–1200, and worked stations in AG, BG, BI and ZH plus G4YPC/P (XJ) and on the 20th Bob got HB9MIN/P (DH). He found activity low in the Oct 1/2 contest and in eight hours only made 24 QSOs. Low activity too in the Oct 6 cumulatives session with just 16 stations in two hours. The 16th brought FD1GYA/P (BF) and GM0EWX for a new square.

Paul Brockett G1LSB (LCN) found LX/ON1KPW/P (CJ), DK0VS/P (DJ) and F6KSX (BF) on Oct 2. There was a good opening to the south-east on the 16th and new squares were OE9PMJ (EH) and DG8MET (FH). Other QSOs included HB9AGE (DH), DK2GR (FJ), DC6HQ and DJ2IB (EI), DK2LM/P (EJ) and FC1EZQ (CH).

G3XDY added one more square on Sept 21, SP6ASD (IL), John's 138th on the band. The period Sept 18–20 proved rewarding bringing EI5FK, FF6KFV/P (ZI), OK1VPZ (HK), OK1MDK/P (HJ), OE5MKM (HI), OE9HHV (EH), Y22ME (HM), SP6MLK/6 (IK), OK1FFD/P (GK), OK3LQ (II) and some HB and D stations. DG8MET was contacted on Oct 15. I wouldn't mind many of those on 144MHz.

G4AGQ only had five QSOs in the IARU contest and Pat found activity low. His best DX was F6HPP/P (BJ). He worked DJ2IB on c.w. on Oct 16. September was the best month for a long while for G4TIF with three new squares, DF, XH and SP6MLK/6 which was Martyn's 110th square and 21st country.

Sept 7 brought G4XEN a QSO with EI2DJ, John's first EI after five years on the band. He contacted OK1MDK/P on the 19th and the next day OE5MKM was a new square. At 1405 on Oct 10 he heard G8XVJ on s.s.b. and G3LQR on c.w. via Ar at a QTE of 45°. Did anyone else hear any u.h.f. Ar signals that day?

G6HKM worked numerous stations in southern Germany in the Oct 19/20 period including DG3MDJ/P (FH) and DJ7GK (FI) for new squares. F8ZW (DI) was also new for Ela, other good contacts being with OE9HHV, OE9ERC and Y22ME. On the 22nd a very sore throat curtailed operation in the Cumulatives but she did manage 24 QSOs and collected G1GEY (TWR).

G6MXL worked several Ds on Sept 20 and OE5MKM was Colin's first OE. Best DX in the IARU contest was PE0MAR/P (JO21). G6STI's best QSO on Sept 20 was SP6MLK/6 to bring Howard's total to 69 squares.

G7AEY's 430MHz station comprises a Trio TS-811E running 25W to a 19-ele Tonna Yagi. David worked SM7SCJ on Sept 10. G8LHT took advantage of the Oct 16 tropo to work FD1GYA/P, FE1HPK (AH), FC1ECZ (CH) and F6HPP/P. Ian has added a few more counties plus GD in various contests.

GM0EWX is presently running 10W to a 12-ele Yagi but will soon have 100W. Calum's countries so far are G, GI and GM and his counties are GI4SZU (ATM), GI6ATZ (DWN), GM0HBK (HLD), GM8LWR (LTH), GM1SMI/P (OKE), GM8COX (SCD) and GM1SGB/P (WIL).

The Microwave Bands

G1KDF reports EI2DJ (WN) now regularly active on 1.3GHz and Bob worked him on Sept 17. On the 18th G4YPC/P (IOS) was new on the band. In the Oct 1/2

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contest 14 stations were worked but only in EI, G and GW. On Oct 14 he was out portable for the first time on 1.3GHz and contacted 14 stations, although he had battery problems. The antenna was a 39-ele loop Yagi.

Recent new squares for G3XDY on 1.3GHz were DK2GR (FJ), HB9RG (EH) and SP6GWB/6 on Sept 20, plus DK2LR (FH) on Oct 16. Other notable QSOs were with G4XBF/P (XJ) on Sept 19 and on the 20th, DL6SAQ/P and DC6HQ/P (EI), OE9HHV and OE9ERC, DK5IE (EJ), HB9ASB (DG), FC1DBE/P (AJ) and F6DZK (AI). On 2.3GHz in the IARU contest John worked G8IFT/P (IOW) for a new square and county on Oct 2, plus F6HLC/P (AK). PE0AGO (DM) was contacted on the 16th.

G6HKM worked DC7QH in Berlin on 1.3GHz on Sept 20. Ela found the band open on the morning of Oct 16 with a German beacon S5, but "... not a soul around." But FC1DBE/P was worked; he was running just one watt. She had several QSOs with DC6HQ/P, which was a new square, and they were wondering where everyone was. She worked her first YL on the band, DH5KAY/P and at 1702 OE2KMM (GH) was her first ever Austrian. FC1EZQ was worked at 1829.

For G6MXL Sept 20 brought G4YPC/P (CNL) for an all-time new county and square on 1.3GHz. In the IARU contest Colin found G8IFT/P and G4IEV/P (BKS). G6STI runs 0.7W on 1.3GHz and on Sept 20 this was enough for Howard to work HB9AMH/P (DH). He was unable to contact any SP stations though.

The next three deadlines are: Dec 22, Jan 25 and Feb 27

Worked All Britain

G8XTJ, the Publicity Officer of the WAB group, has sent me the November Press Release. On 50MHz the first two Basic Awards for working 250 areas went to G0JHC for all s.s.b. contacts, and to G4ZUR for mixed modes. G0JHC also won the first 50MHz Islands Award on s.s.b. No QSLs are required for WAB awards.

The first 50MHz contest on Oct 9 saw lots of activity from most English counties. The Winter Activity Award will run again from Dec 1 through Feb 28 and is based on a points system. For all details of the WAB organisation send an s.a.e. to G4KSQ at 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED.

Rare Irish Squares

G1KDF is planning another week's trip to EI in 1989 and would like to hear from readers about their most wanted Irish squares. He has in mind UL and WL and proposes 144MHz, 430MHz and 1.3GHz operation. Drop him a line at 4 Weldon Drive, Ormskirk, Lancs L39 4RA.

All that remains is for me to wish all readers a Very Merry Christmas and a Happy New Year.

RTTY

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

John Barber has written confirming my impressions of the CQ World Wide RTTY Contest. He reports that conditions on 21MHz and 28MHz were well up with lots of activity except from the UK! Prefixes worked were:

28MHz—W, I, LZ, OH, UB, UA3, JA GW, UL, VS, VE, 10 US States and 10 CQ Zones.

21MHz—I, TK, W, OH, VE, UZ3, UB, HC8, PY, TG, 4X, SP, TI, HP, LA, HA, KL7, UL, LZ, JA, OK, YB, YU, 26 US States and 5 CQ Zones.

14MHz—JA, VS, VU, CE, VK, VE, YV, UM, YB, 5B, HC8, YO, 19 US States and 19 CQ Zones (amongst others).

7MHz—UZ, LZ, W, I, D, EA, 2 US States and 5 CQ Zones.

3.5MHz—HB.

John apparently is always extolling the virtues of his home-brew two-tone a.m. terminal unit. When asked for a demo after the contest he was delighted to oblige. Whilst demonstrating how well his t.u. copes when only one tone is present, he discovered that the space tone detector had failed and he had worked the whole contest on mark tones only! All rather embarrassing, but it does prove the point that an a.m. terminal unit with slide-back detectors must be the best for h.f. working, especially when selective fading is a problem.

More news from John as he actually managed to get on the air in-between contests. This is apparently quite a rare occurence due to TVI problems. The middle of October saw some very good openings on 21MHz and 28MHz. On October 16 he managed to work W0, W4, W5, W8, JA and VE all on 28MHz. In fact, after giving up his frequency to WA8FLF the band was so busy, he couldn't find a free frequency. This makes a pleasant change.

One thing John, and a lot of others, are looking for is a good quality RTTY program with split screen and memories that will run on the Amstrad PCW series of computers. If anyone can help, please drop me a line.

Goof of the Month

This year I was determined to have a go at the BARTG v.h.f. RTTY contest as I always seem to miss it for one reason or another. I had bought a 12-element ZL Special at one of the rallies and my new Tennamast had arrived in plenty of time. Come the weekend before the contest I thought I'd better get on with planting the mast. Well, what with the new addition to the family and our variable climate I realised that I was not going to be able to complete the base for the mast in time, so on to Plan B. I managed to get my hands on some suitable lengths of 50mm aluminium tubing to enable me to put up a temporary mast for the ZL Special. Come the Saturday morning I was still beavering away finalising the mast and setting up the antenna. At this point I thought I would search out my copy of *Datacom* so I could check the start time of the contest. Imagine my face when I discovered that the contest took place the previous weekend! I'm sure you can also see that it was somewhat embarrassing to report to Elaine that all my effort had been in vain.

Moral of the story: Make sure of your facts before you start your preparation.

DTI Licence Enhancements

I have just received a very interesting press release from the DTI detailing a package of changes aimed at the data operator. To quote from the release: "... The changes will enable radio amateurs to:
—use their stations for automatic digital communications;
—receive and transmit digital communications along a chain of amateur stations;
—allow such operation to be conducted unattended;
—keep a modified log to accommodate the speed of operation and complexity of chains involved in this form of communication ..."

The modes specifically mentioned are Packet Radio, RTTY and AMTOR.

Unattended operation is only allowed on the following bands:
50–51MHz (max 10dBW e.r.p. carrier or p.e.p.)
144–146MHz
436.6–436.8MHz
2310–2450MHz
3400–3475MHz
5650–5680MHz
5755–5765MHz
5820–5850MHz
10000–10250MHz
10270–10300MHz
10400–10500MHz
24000–24050MHz
and all bands above 47000MHz

This restriction of course means that unattended h.f. operation is still outside the licence.

With regard to mailbox and bulletin board operation this is now perfectly legal providing it only handles personal messages for the station operator. If you want to run a conventional mailbox or bulletin board for general, use this is also possible providing you obtain a notice of variation from the RSGB. Along with this notice of variation will be a special callsign in the GB7 + 3 letters group, rather like the special event callsign system. Another welcome addition is that there will be provision for licensing microwave links between mailboxes to handle the auto-forward message system.

I hope that the RSGB will issue mailbox/bulletin board licences with great care, as a properly organised and networked system can be very effective, but over provision of mailboxes merely creates chaos!

Log keeping has always been a problem with the digital modes and a welcome change here is that it is no longer necessary to record callsigns when using auto-

The next three deadlines are: Dec 22, Jan 25 and Feb 27

matic operations, i.e. digipeating, though you still need to record the time, mode and frequency of the start and finish of operation, hardly arduous!

With the spread of computers into the amateur shack the nature of the log has been changed to allow the use of databases, the requirement being that the recording medium must be of a permanent nature rather than the old rule which required the use of a book.

The final change covers the rationalisation of station identification. This identification is required every 15 minutes and may be sent using the same transmission technique as the message, i.e. you don't have to keep resorting to Morse every 15 minutes. Having said that Morse or telephony identification is still required for transmissions lasting 30 minutes or more.

Incidentally Class B licensees are now allowed to send Morse identification.

As I'm sure many of you have noticed, these changes simply legalise some of the operating practices that are in common use. Nevertheless it represents a very welcome change for the better as I'm sure everyone involved in data communications would prefer to operate within the law.

Beginners Guide to Packet Radio

Ian Brothwell (BARTG Secretary and Publicity Officer) has recently sent me a copy of a new publication from BARTG designed to cover the basics of Packet radio. The book has been produced in A5 size and runs to some 21 pages.

The first section comprises a very good potted history of Packet from its beginning in the mid-sixties through to the development of the commercial AX.25 TNCs which set the path for rapid expansion.

This is followed by a detailed explanation of the AX.25 protocol which covers the subject very well. Equipment is the next topic and again the coverage is very useful. There is even a short section dedicated to answering some common questions.

The next six pages deal with the practicalities of getting started and included valuable details on how to set up the TNC parameters.

The final section of the book deals with some of the more advanced operating techniques including bulletin boards and digipeating, finishing off with a glossary of Packet terms.

I thought the book covered the subject very well and, at a cost of 95p plus 20p P&P, must represent excellent value for money. Copies of this book are available from: John Beedie, Ffyonnonlas, Salem, Llandeilo, Wales SA19 7NP.

The SARTG New Year RTTY Contest

The Scandinavian Amateur Radio Teleprinter Group are holding the h.f. and v.h.f. contest on January 1.

HF

The operating times are 0800-1100UTC using the bands 3.5 and 7MHz. There are three classes: (a) single operator, (b) multi operator and (c) s.w.l.

The message you have to exchange is rather novel: RST, QSO number, name and "Happy New Year" in your own language. You score one point for each QSO on each band, the same station may be contacted once on each band. There are multipliers for each DXCC country and each LA, OH, OZ, SM and TF prefix number (0-9) contacted on each band. The final score then is the sum of the QSO points multiplied by the sum of the multipliers.

Logs must be sent within 15 days, containing: Name and callsign, band, date and time in UTC, message sent and received, points and multipliers. You should use a separate sheet for each band and enclose a summary sheet showing the scoring, class, your name and address. Logs for multi operator stations must contain names or callsigns of all operators involved. Short wave listeners use the same rules, but based on stations and messages copied.

VHF

The times for this part of the contest are 1300-1500UTC on the 144MHz band only. Contacts via repeaters or satellites are not valid. The message you must send is: RST, QSO number, name, QTH locator and "Happy New Year" in your own language.

The scoring works like this: all two-way RTTY contacts will score according to the distance chart given here.

0-50km = 1 point: 50-100 = 3: 100-150 = 5: 150-200 = 7. etc., and pro rata on 50km circles.

The logs need to be the same as for h.f. All logs should be sent to: SARTG Contest Manager, Bo Ohlsson SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

There will be awards to the top five stations in each class and to the winner in each country.

It just leaves space for me to wish readers a Merry Christmas and a Happy New Year.

Amateur Satellites

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

MIR "Ham in Space"

The event foretold in my earlier column is now imminent. Probably by the time that you are reading this month's news, the newly licensed MIR cosmonaut Musa Manarov will be active on 145MHz f.m. looking for QSOs as the Soviet manned space station orbits the world.

Already the last automatic supply mission Progress-38 has taken up the two watt multi-channel 145.500–145.600MHz f.m. transceiver to be used. During the 21 October 1988 4 hour 12 minute EVA (Extra Vehicular Activity) when working on the attached KWANT modules X-ray telescope, a quarter wave 145MHz ground plane using the MIR body as ground was erected on the space station's exterior.

The next step taken was to teach Musa his "RAE" by radio, so five Russian amateurs have been busy in tutoring the subject content and the ways and means of amateur radio operations as MIR passed over the USSR. This will result in the first amateur radio ground to space and space to ground communications tests on November 14 and the licensed cosmonaut getting the callsign U1MIR ready for the first round-the-world QSOs commencing 19 November 1988.

The planned operation will use split frequency, with Musa transmitting on 145.550MHz (S22) and listening on either 145.525 or 145.575MHz (S21 or S23) for replies from earth. When out of range of western Europe, where 145.600MHz is much used as the RO repeater output, this also will be used as an uplink and the 145.500MHz calling frequency as well. The exact plan has yet to be completely finalised, so a few minor changes are still possible, and further updated topical information on this new "Ham in Space" mission will come from Leonid Labutin UA3CR, via the 1000UTC Saturday morning 14.280MHz AMSAT European net.

In operation, the Doppler effect (as depicted on the right hand column of our Figs. 2 and 3 last month) will cause movement from the exact nominated frequencies to give overall shifts of up to 7kHz that will be very noticeable on an overhead pass. However, the swing created will be just about within the 10kHz f.m. bandwidth of the receivers at both ends of the QSOs. Operations will be limited to work free periods, and thus mainly located to weekends, e.g. Saturdays and Sundays USSR time, i.e. 2100 Fridays to 2100 Sundays.

Space enthusiasts will remember the chaos that resulted when Owen Garriot came on as W5LFL from the USA space shuttle, which was even more apparent from a study of the tapes that he made on the mission. Whilst we in high amateur population areas on earth may only hear the QRM of a few hundred stations calling, from orbital height it comes to many thousands and almost impossible to hear anybody, especially when the spacecraft footprint covers most of western Europe where activity on 145MHz f.m. is so high! Remember, make short, sharp, calls using internationally recognisable phonetics and spend more time listening. Then the QSO rate will be far greater with everyone having a chance.

The bad news is that the operation from U1MIR may not be for very long as both Musa Manarov and Vladimir Titov have almost completed their planned year in space. They are likely to return to earth with their accompanying supervising medical doctor on December 21. The new crew will probably leave earth by the Soyuz-TM-7 on November 21 or 26 to dock with MIR on November 23 or 28. So, a very large crew is expected for a month, part of which will be devoted to handing over operations. The good news is that the new crew will also have a licensed member, who will use the callsign U2MIR, and the next U3MIR, and so on to U0MIR. What is more, a ten watt transceiver is now ready and tested and this will be taken to MIR to be used for the next mission.

It is very difficult to predict with accuracy the exact pass times of MIR over the UK horizon. Unlike a normal constantly decaying satellite, the manned spacecraft is constantly having orbital manoeuvres, changing its attitude and orbital period by frequent firings of the onboard rocket motor in order to adjust its parameters for drag, special rendezvous and observational experiments.

Our Fig. 1 attempts to predict the most likely periods, and gives the estimated pass times over several weekends when activity is expected, work-load and rest periods permitting. With the variations expected, and with the changing drag factor altering with the atmospheric ex-

pansion brought about by the solar flux changes, we can only predict to an accuracy of plus or minus some ten to fifteen minutes with any degree of confidence so far ahead. The columns of Fig. 1 read from left to right: the day, the acquisition of signal time in UTC (GMT), the time of maximum elevation of the space station and finally the actual maximum elevation over the horizon in degrees. No azimuth values are given, as it would not normally be advantageous to use beams, the rate of shift of the spacecraft dictating that a sharply directional antenna would "miss" most of the time. Ten watts to an omni-directional antenna will provide more than a sufficiency of signal in any case.

In a serialised set of passes, the first of the set will travel from our south-east to east, the next from south to north-east, the next south-west to north-east, then west to east and close to overhead in the centre of the set, then north-west to south, then next west to south-west, and so on until we lose the spacecraft until the following day's set of passes. Activity can be mostly expected during the earlier passes as these will overfly the USSR, and bed-time is dictated by Moscow time, that being three hours ahead of UTC.

The positions for the first and last passes of December 17 are shown by the top lines of Fig. 2, which does give azimuth and elevation throughout the pass. In East Anglia, the satellite just comes above our south-west horizon for a few brief minutes commencing at 0922 and 58 seconds. The azimuth change of this short pass is quite fast, the elevation little and the Doppler shift low. A similar situation is shown by the bottom lines of Fig. 2, giving the last pass of that day when the spacecraft just pops over our south-west horizon. By contrast, Fig. 3 shows the tracking for the middle pass of December 10, when (other than when going almost overhead) the azimuth changes slowly, but the elevation rapidly. Note also the large Doppler shift, maximising its rate of change as it passes overhead, producing a 3kHz change in only three-quarters of a minute!

These print-outs from the AMSAT AMS-81 tracking program are included as being approximate and typical, but for the reasons aforesaid cannot be assured as being at the correct times stated, unless the orbital characteristics remain exactly as they are at the time of computation, and this is unlikely. For these reasons, it would pay to commence listening up to some 15 minutes before the pass and up to fifteen minutes after. Even so, the path taken, hence the azimuth, elevation and Doppler curve will remain very close, and shows the difficulty of using a beam with any degree of accuracy in following the spacecraft path. An omni-directional antenna is best, ideally a cross or circularly polarised "turnstile" surmounted some 0.7 metres above a mesh reflector, as described in previous issues.

If the skies are clear, then passes such as that commencing at 1837UTC on December 3, 1859 on December 4 and 1735 on December 9, plus any similar high angle passes after dusk, will permit visual tracking until MIR enters earth eclipse toward the end of the pass. The spacecraft is a very bright moving object, more easily seen than even Mars or Venus. This visual tracking will provide a check on the passes and under these conditions it will be practicable to sight the spacecraft along the boom of the beam, thus ensuring perfect tracking, and so also ensuring maximising the f.m. capture effect.

AMSAT AMS-81 TRACKING SYSTEM
ACCESS SKED FROM: 02DEC88 140000
>>G3IOR VIA MIR <<

DAY	AOS	LOS	MAX	DX	EL	AZ
02DEC	1642	1650	1646	13	EL	
02DEC	1816	1826	1821	45	EL	
02DEC	1951	2001	1956	72	EL	
02DEC	2126	2135	2131	37	EL	
02DEC	2301	2309	2305	10	EL	
03DEC	1530	1537	1533	05	EL	
03DEC	1703	1712	1707	25	EL	
03DEC	1837	1847	1842	66	EL	
03DEC	2012	2022	2017	60	EL	
03DEC	2147	2156	2152	21	EL	
03DEC	2323	2328	2326	03	EL	
04DEC	1550	1558	1554	13	EL	
04DEC	1724	1734	1729	44	EL	
04DEC	1859	1909	1904	73	EL	
04DEC	2034	2043	2039	38	EL	
04DEC	2209	2217	2213	11	EL	
09DEC	1426	1435	1430	21	EL	
09DEC	1600	1610	1605	61	EL	
09DEC	1735	1745	1740	64	EL	
09DEC	1910	1919	1915	24	EL	
09DEC	2046	2052	2049	05	EL	
10DEC	1313	1321	1317	10	EL	
10DEC	1447	1456	1451	37	EL	
10DEC	1621	1631	1626	73	EL	
10DEC	1756	1806	1801	43	EL	
10DEC	1931	1940	1935	13	EL	
11DEC	1201	1206	1204	03	EL	
11DEC	1333	1342	1338	20	EL	
11DEC	1508	1517	1512	59	EL	
11DEC	1642	1652	1647	66	EL	
11DEC	1817	1826	1822	25	EL	
11DEC	1953	1959	1956	05	EL	
17DEC	0922	0925	0924	01	EL	
17DEC	1054	1102	1058	16	EL	
17DEC	1227	1237	1232	52	EL	
17DEC	1402	1412	1407	69	EL	
17DEC	1537	1546	1542	30	EL	
17DEC	1712	1719	1716	07	EL	
18DEC	0940	0947	0944	07	EL	
18DEC	1113	1123	1118	30	EL	
18DEC	1248	1257	1253	69	EL	
18DEC	1423	1432	1427	51	EL	
18DEC	1558	1606	1602	16	EL	
18DEC	1734	1737	1736	01	EL	

◀ **Fig. 1**

AMSAT AMS-81 TRACKING SYSTEM
TRACKING FROM 17DEC88 092100
>>G3IOR VIA MIR <<

UTC	AZ	EL	RANGE	PHS	DOPPLER
0922:58	145	00	2044	---	145.55
0923:41	136	01	1987	---	0.6
0924:24	127	01	1977	---	0.1
0925:07	118	01	2014	---	-0.4
1734:58	249	00	2097	---	145.55
1735:42	241	01	2022	---	0.8
1736:25	231	01	1992	---	0.3
1737:08	222	01	2010	---	-0.2
1738:06	213	00	2107	---	-0.8

Fig. 2 ▲

Fig. 3 ▼

AMSAT AMS-81 TRACKING SYSTEM
TRACKING FROM 10DEC88 162000
>>G3IOR VIA MIR <<

UTC	AZ	EL	RANGE	PHS	DOPPLER
1621:58	265	00	2047	---	145.55
1623:32	264	08	1390	---	3.4
1624:41	262	18	917	---	3.3
1625:19	259	28	669	---	3.1
1625:38	256	35	559	---	2.9
1625:57	250	45	461	---	2.5
1626:09	244	54	410	---	2.1
1626:21	230	64	373	---	1.5
1626:33	200	72	353	---	0.8
1626:40	171	73	351	---	0.1
1626:47	146	70	357	---	-0.4
1626:57	126	63	375	---	-1.0
1627:06	116	55	404	---	-1.5
1627:18	108	47	453	---	-2.0
1627:30	104	39	513	---	-2.4
1627:48	100	31	617	---	-2.7
1628:15	097	22	783	---	-3.0
1629:06	095	13	1126	---	-3.2
1630:25	093	04	1671	---	-3.4
1631:21	092	00	2065	---	-3.4

OSCAR-13

As time proceeds, our latest satellite A-O-13 seems to be improving. At preferred parts of the orbit, as the satellite approaches the end of its pass, signals are very strong and the spin modulation brought about by the offset lobes of the angled antenna are barely noticeable at such times.

Ernie Hayman G3ABU, who operates the satellite regularly from Kingskerswell in Devon, sends a few comments on his findings whilst using the "B" 435 to 145MHz transponder. He says, "It seems easy to get the DX as long as the squint angle is good and the alligators are eating and not shouting. I find most of the DX stations when the satellite is in the lower mean anomaly values and at this time the spin modulation is not so deep. When the satellite is at apogee, I find that I can rarely work DX using my QRP and have to elevate the power up to 70 watts to even get a return signal. OSCAR-13 seems to behave in very much the same manner as did OSCAR-10 when the a.l.c was above 5, or, indeed, on the Monday QRP days, when the alligators reigned supreme!".

For the uplink to A-O-13, Ernie uses a Microwave Modules MM432/28 28MHz to 435MHz transverter, which gives an output of 9 watts when driven with his long held TR-10515 h.f. transceiver with the p.a. switched off. At the 12-turn, home-made, helix antenna he gets a measured 7 watts after the signal has passed through his Andrews 50A coaxial feeder. If high power is necessitated, as at apogee, then a 100 watt linear is available. It rarely is, as Ernie using just the 7 watts has had recent QSOs with VK2 and 5, KH6, KL7, VP8, JA, W4, 5, 6 and 7, VU2 and many European stations, all on c.w.

His downlink at 145MHz uses a 10-element Jaybeam crossed Yagi which, via a GaAs-f.e.t. masthead pre-amplifier and separate Andrews coaxial feeders, goes to his MM 144/28MHz converter, thence to his Yaesu FRDX-400 tuning 28–30MHz. The beams have both azimuth and elevation control coming from his Spectrum autotrack running on the sopp4 and ELIPRS computer programs.

Mode "S" on A-O-13 is said to be working extremely effectively, although it can only be well used when the spacecraft antennas are pointing directly at earth, currently between mean anomaly 195 and 209, e.g. for some 13 minutes, during which time the mode "J" uplink is commanded off. Doppler shift ignored, the passband uplink runs from 435.601 to 435.637MHz to give a downlink from 2400.711 to 2400.747MHz.

The first mode "S" beacon tests took place during the second week of September and more than a dozen stations, including DB2OS, DF5DP, DK2ZF, G2BFO, IN3HER, K0RZ, ON6UG, VE4MA, WA3ETD and WB5LUA reported hearing the 2400.644MHz signal, varying from specific station reports to between 6 to 16dB over the noise. The transponder tests commenced at 2025UTC on September 17 and all findings were excellent. The first known QSO took place between K0RZ and VE4MA. K0RZ uses a 1m grid dish, converted from commercial 2.2GHz service, DK2ZF a 1.2m dish, whilst DF5DP employs only a 20dB gain Yagi for his downlink. JA4BLC uses a large dish and has uplink capabilities of up to 65kW e.i.r.p.!

The mode "L" tests that took place in an attempt to locate the nature and source of the high level of attenuation on September 9 found a consistent a.l.c. level of –8dB, and failed to support the earlier data that showed far greater levels when earth pointing. Spread Spectrum and/or radar transmissions from earth continue to be the main suspect, but these are not necessarily continuous, so further similar experiments are to be planned.

James Miller G3RUH has now pro-

The next three deadlines are:
Dec 22, Jan 25 and Feb 27

duced a set of smoothed Keplerian elements for OSCAR-13. His set for OSCAR-10, produced over a year ago, are still those used in the G3IOR computer and continue to give good tracking. The use of the set following will save the time in putting in new data every few months.

Satellite:	OSCAR-13
Epoch Year:	1988 (88)
Epoch Day.Decimal Day:	258.28144
Inclination:	57.57°
Right Ascension of Asc.Node:	239.56°
Eccentricity:	0.6563
Argument of Perigee:	190.53°
Mean Anomaly:	0.0°
Mean Motion:	2.09699369 revs. per day
Decay rate or Drag:	0 rev/day/day
Epoch Rev. or Orbit No:	193
Semi-major Axis:	25783km

Also supplied is the attitude of the satellite brought about by precession for the next month, which may be put to good use by those with computers by utilising the "squint" programs to discover when the satellite is at its.best beaming angle to earth.

Date	ALON	ALAT	Date	ALON	ALAT
06/12/88	210.3	−1.9	13/12/88	210.4	−2.5
20/12/88	210.5	−3.0	27/12/88	210.7	−3.5
03/01/89	210.8	−4.0	10/01/88	211.0	−4.5

Jim says that the next attitude change to 180/0 will commence from 2 January 1989. Until that time the satellite schedule is expected to remain the same as present, i.e., in Mode "B" from mean anomaly 3 to 150, in Mode "L" from MA 151 to 200, back to "B" from 201 to 240, and then off from MA 241 through perigee to MA 002. Mode "S" will appear at selected optimum earth pointing times (at which time the "J" mode normally on with "L" will be closed). The current period for this is from MA 195 to 199 for the Mode "S" beacon, and from MA 200 to 209 for the transponder, giving just 13 minutes of beacon and 27 minutes of pass-band operation each orbit.

Thankfully, no changes have been made to the schedule resulting from the "J" mode controversy, and this excellent 145–435MHz mode continues to give excellent results. AMSAT-DL have attempted to have meetings with DARC to properly discuss the matter, but these have yet to be agreed to.

The RUDAK experiments conducted over three weeks were unsuccessful and it is now switched off.

FO-12

The power problems of the JAMSAT/JARL satellite have escalated, with the result that Fuji-OSCAR-12 had to be put off completely from October 9 to November 15 to attempt to recondition the battery. It is hoped that the power malfunction experienced may be overcome and that a new schedule will prove viable. The JARL report that the schedule will be placed on the satellite's own Bulletin Board System as soon as it becomes available.

Meanwhile, preparations are now in hand for the launch of JAS-1B to be carried aloft with the MOS-1B marine observation satellite due for launch in early 1990. The orbit will be slightly elliptical, with a period of some 106 minutes, far lower than the current Fuji. The JARL News bulletin states, "Based on the experience gained from FO-12, the JARL will attempt to improve the power budget and antenna characteristics of JAS-1B".

UoSATs

UoSAT-1, alias OSCAR-9, was seven years old on October 6 and is still going strong. It continues to work alongside the Solar Mesosphere Explorer, supporting daily experiments in the increasing solar flux period, in addition to its normal services. It started life at launch at an altitude of 556km, but has now dropped to 463km, and is expected to re-enter earth's atmosphere to burn out in early 1991 as atmospheric expansion and hence the drag escalates.

UoSAT-2, OSCAR-11, is involved in a valuable scientific research programme detecting single event upsets, or SEU for short. The TDRS satellites are experiencing such upsets twice daily, brought about by a charged particle from the solar wind or cosmic radiation that cause a loss of memory due to damaging ionising of the chips holding vital information. Minute electrical charges so developed can cause a potential disaster to missions relying on data integrity. OSCAR-10 showed many such events, its internal housekeeping unit n.m.o.s. RAM eventually succumbing completely as a loss of "hard" memory. SEUs give a "soft" failure that can be overcome by re-writing the data to the affected cell. OSCAR-11 has an on-going program that loads a test pattern that can be examined on later down loading at 4800 baud at 435.025MHz to find any changes that have developed due to the impact of the SEUs.

RS-10/11

The rapid escalation of solar flux has led to considerable changes in the propagation and problems of the Radio Sport satellites 29MHz downlink signal. Where a few months ago, the 29MHz downlink was often the only signal source to be heard on the band, it is now competing with vast numbers of terrestrial f.m. users, many of whom are very wide and far stronger. Despite wide publicity of the frequency coverage of the downlink, beacon and ROBOT, it appears little heeded by the many, particularly "G" stations, who have converted 27MHz CB transceivers and tend to think in terms of channel numbers.

For those that use the top 300kHz of the 28MHz band, and for those satellite users who may wish to pass this on to those who are unwittingly creating the problems, the "channels" to avoid when RS-11 is active are 11 to 15 inclusive, e.g., 29.410 to 29.450MHz, so as to avoid the beacon on 29.407MHz through the 29.410 to 29.450MHz passband to the ROBOT on 29.453MHz.

When RS-10 is on, then channels 6 to 10 need to be kept clear. When RS-12 comes on in 1989, we shall need to have channels 11 to 15 clear and for RS-13 channels 16 to 20 inclusive, which will still leave plenty of space for f.m.

The problem is that whilst strong wide band f.m. can wipe out the satellite downlink, c.w. and s.s.b. from the satellite are barely noticeable on the average f.m. receiver, so it will probably be necessary for satellite users to also go onto f.m. to advise those who are not aware of the band-plans.

A further effect of the heightening sunspot number means that in daylight passes, considerable attenuation is being given to the h.f. satellite downlink signals that have to pass through the now densely ionised F2 layer, thus giving even greater susceptibility to QRM. An advantage is that the scattered downlink signal can invariably be heard (though often multipath and auroral in quality) well below the horizon and frequently when the satellite is over the antipodal point, e.g. New Zealand in the case of the UK. Naturally (despite the many calling the sub-horizon DX heard "blind"), the uplinked 145MHz signal would require a sunspot number at least in the 400's to manifest the same super-sub-horizon access! It is, however, when the 29MHz downlink is audible, possible to access the satellite by the 21MHz uplink and some very long-distance QSOs are possible. The first ZL:G satellite contact confirmation is awaited.

QRP Tests

A series of QRP tests are now underway to determine and prove the effectiveness of low power in accessing the USSR RS-10 and 11 satellites. **Ron Mikkenie PE1ISP**, of Burg. Loysonstraat 51, 6373 BP Landgraaf, The Netherlands, will be conducting a series of test transmissions on those passes that are close to overhead over western Europe during the weekends from November 1988 until the end of February 1989. These passes are all of those that have a descending equatorial crossing between 140 and 175 degrees and an ascending EQX from 340 through 360 15 degrees west.

Ron writes, "Since the launch of RS-10/11 in June 1987, many amateurs have found their way to satellite communications, one reason being that this satellite combination is very easy to use. Only small equipment is needed to have access to the satellite's transponders—the tests will show just what is possible with low power on the uplink . . .".

At acquisition of signal the full recommended power of 100 watts e.i.r.p., i.e. 10W of r.f. to a 4-element Yagi will be used, reducing as the satellite becomes nearer down to 10 milliwatts at the time of closest approach. As the pass progresses, the power in use will be transmitted, followed by a two letter code, e.g. "One watt Romeo Sierra" in a random combination that changes approximately every 15 seconds. All transmissions will be recorded in Ron's log, so that reports can be verified.

The mode is to be u.s.b., and the frequency set is 29.445MHz for RS-11 and 29.395MHz should RS-10 come into use, these frequencies within ±3kHz to allow for differential Doppler shift and any QRM present.

It is requested that all stations listen to the frequency and refrain from calling and transmitting on the test transmissions during the specified pass times of the satellite(s). Reports should be sent to Ron at the address given, and should include the date, time in UTC, frequency, the satellite in use, maximum and minimum signal strength received, the letter codes received, plus the receiving station's antenna, pre-amplifier, receiver and QTH locator. All reports will be replied to, and when collected and analysed will be used to produce a ground station recommendation.

Microsats

The frequencies to be used for some of the small satellites to be launched soon are now known. Microsat A, the American PACKSAT, will use 145.900, .920, .940 and .960MHz as an uplink and use

437.050MHz for its downlink. The AMSAT-Brazil DOVE will have a downlink from 145.970 to .775MHz. The Weber State University Microsat C will use a downlink (only) of 437.1MHz, and the Argentinian D microsat will use 145.840, .860, .880 and .900MHz for its uplink, with a single downlink on 437.150MHz. Space is getting short, and now the problem comes in finding a slot for the new UoSAT pair!

Due to the high level of items of topical interest, we have had to postpone our list of Keplerian elements to next month. The set for the four new weather satellites NOAA-11, OKEAN-1, METEOR 3/2 and FENG-YUN-1 are in *Short Wave Magazine* with some pass times also.

Propagation

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

This month I'll begin with an example showing the importance of monitoring solar noise. At 0745 on 22 August 1976, I was beacon checking when a strong burst of solar noise spread across 28MHz. I spent the rest of the day on exercise with 2464 (Storrington) Squadron, Air Training Corps and, as squadron signals instructor, I had a v.h.f. radio-telephone (Pye Cambridge) in my car. Communications between vehicles on the South Downs and back to HQ were satisfactory. However, at 1158 I was unable to hear the reply to my call because the incoming signal was completely overpowered by very high background noise. It was a good 10 minutes before our channel cleared and, although I only had the Pye vertical rod antenna on my car, this sound was familiar. Remembering that burst at 0745, I soon realised that it was coming from the sun.

My first thought on arriving home was to check the midday solar recordings. There, on the chart, was this massive burst which lasted for 16 minutes at 95 and 136MHz. A colleague told me later that he heard it for about 30 minutes on 28MHz, proving that on this day the solar radio noise was very strong and spreading over a wide chunk of the spectrum.

Apart from a few insignificant bursts, I found the sun quiet at these frequencies from May 2 to July 31 when a noise storm began and lasted until August 10. This was followed by a variety of individual bursts on days 13, 15, 18, 19, 22 and 31.

Although my log shows a low level of activity in 1975, Fig. 1, I recorded continuous noise storms on Jan 5 and 13/14, Feb 8/9, Mar 17–19, May 2 and 5, July 1, 21 and 27/28, Aug 1–8 and 11/12 and Nov 14–22. The August storm was severe on days 6 and 7 at 95 and 136MHz and bursts were heard at 50MHz on the 8th. I entered the word "severe" in my daily log during the November storm from the 17th to 22nd because the recording pens on both frequencies were hitting the upper stops. In addition, some of the bursts within the storm were heard at 28MHz on days 18 and 20.

Auroral reflected signals were reported on the 17th and 22nd and the BBC's World Service announced that ionospheric disturbances were affecting signals on their north Atlantic route on days 23 and 24. The rise in solar activity over the next 5 years began in 1976 and, apart from the August event already mentioned, noise storms occurred in Jan, Mar, Sept, Oct, Nov and Dec.

Noise storms in 1977 occurred in Jan, Feb, Mar, Apr, June, Sept, Oct, Nov and Dec. During the September event, auroral openings were reported on days 13, 19, 22, 24 and 25, plus an ionospheric disturbance on the 24th.

1978 proved to be a memorable year for **Cmdr Henry Hatfield** and me, because during a major noise storm on February 11 we both recorded a massive burst of radio noise, Fig. 2. Henry, using his spectrohelioscope, actually saw and photographed the event taking place on the sun's surface. The sun was very active during the month, in fact, I recorded radio waves, mainly noise storms, daily from the 2nd to the 26th with severe storm conditions on days 3 and 9 to 12 inclusive. February's weather is not always good for visual observations, but a clear spell on the 5th enabled Henry to count 27 sunspots. Unfortunately, rain and snow prevented further observation until the 11th, so we had no idea what was causing the solar storm which had been raging since the 7th. Our luck and the weather changed on the 11th. It was a bright, frosty and sunny day and Henry, with his spectrohelioscope, found that two large ugly-looking spots and an active area between them was responsible for all the radio noise that we were recording. Now for the lucky bit, at 1420, Henry decided to photograph these two spots while the sky was still clear, then, at 1425, a massive explosion occurred and manifested, for at least 5 minutes, well above the level of the prevailing noise storm which is clearly seen on my recording, prior to the big burst, in Fig. 2. What an opportunity this was! Henry, not only recorded the radio noise from this massive burst at 136MHz, he witnessed and photographed the explosion actually taking place at the left of the upper of the two "troublesome" sunspots, Fig. 3. Soon after, the land line between Sevenoaks and Storrington was buzzing with excitement as two solar radio astronomers compared notes. This storm finally died out on the 19th.

More "sunshine" next month, but for now it's back to the happenings in 1988.

Solar

From his observatory in Bristol, **Ted Waring** reports seeing 39 (Sept 3), 12 (11th), 16 (18th), 17 (29th), 18 (Oct 10) and 35 (23rd) sunspots in his log.

As usual, thanks to **Patrick Moore** (Selsey) for the impressive sunspot drawings he made at 1615 on Aug 31 and around 1000 on Sept 3, Oct 2 and 7, Figs 4–7.

During his morning observations, Henry Hatfield observed, among the sunspots, 19 filaments and 8 prominences on Sept 23; 18f and 8p on the 29th; 18f and 5p on Oct 1; 20f, 9p, many spicules and a remarkable active prominence on the east limb on the 6th and 15f and 7p on the 10th. Henry's 136MHz radio telescope

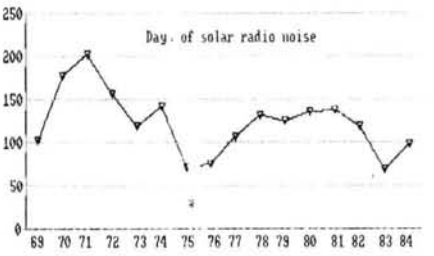
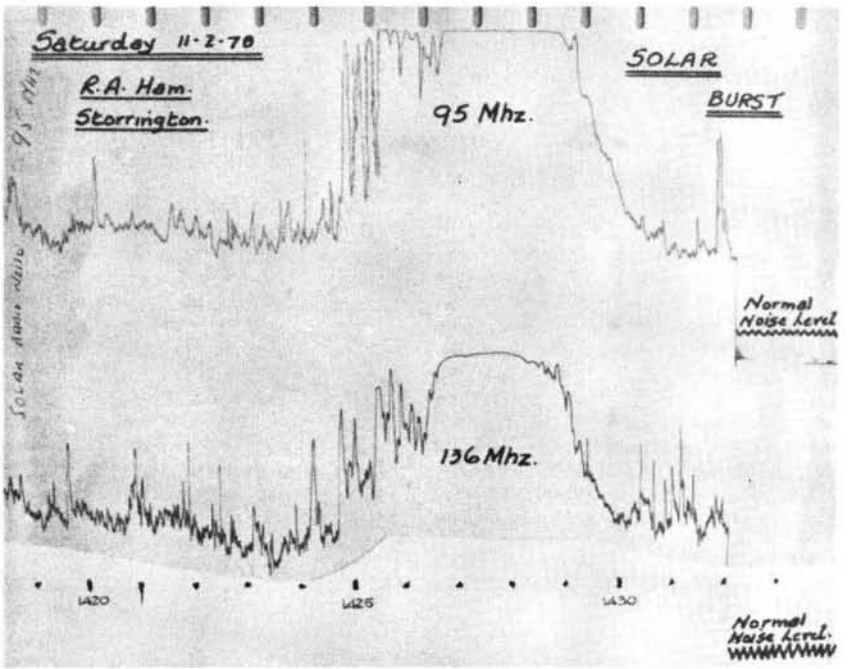


Fig. 1 ▲

Fig. 3 ▶

Fig. 2 ▼



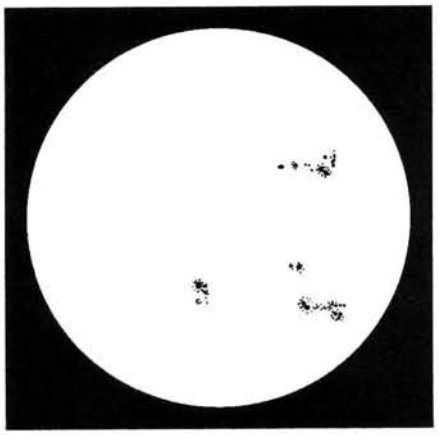


Fig. 4

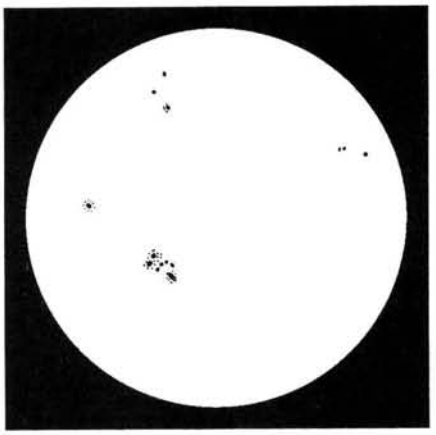


Fig. 5

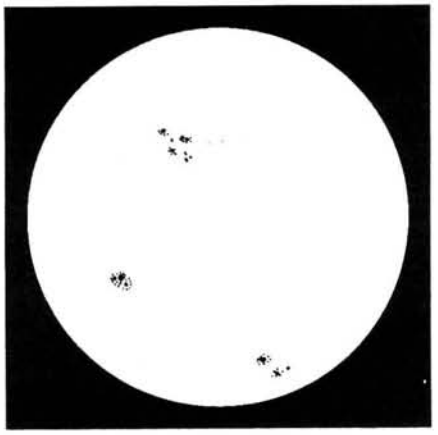


Fig. 6

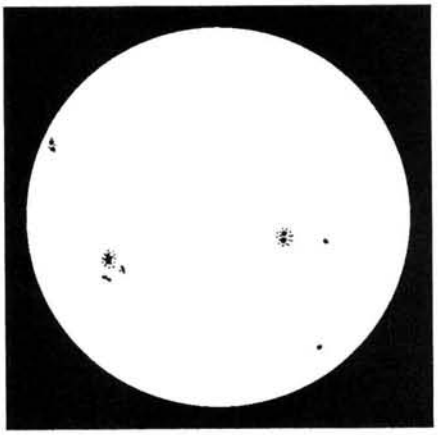


Fig. 7

recorded individual bursts of solar noise on Sept 22, 23, Oct 6, 10 and 11 and varying periods of noise storms on September 15, 21, 22, 26, 27, October 1, 3, 6, 7, 10 and 13.

"A long duration (185 minute) flare was detected on the 23rd and was accompanied by radio emissions, loops and an eruptive prominence (similar to the types so often seen in astronomy text books) on the north-eastern limb. This highly active region was especially interesting as it was associated with a spotless active area. A second largish flare was noted on the 26th and showed no sign of being out of the ordinary," wrote Jim Knight in his September report for *Canopus,* the monthly newsletter of the Astonomical Society of Southern Africa (ASSA).

"The monthly mean for September was 152 solar flux units, slightly down on August," wrote **Neil Clarke G0CAS** (Ferrybridge). The daily variations can be seen in Neil's computer print-out, Fig. 8.

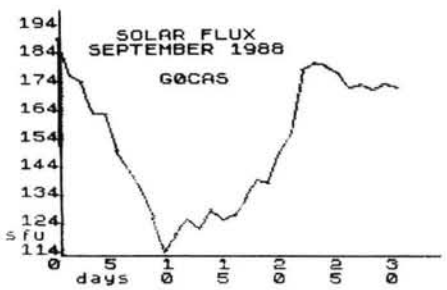


Fig. 8

Magnetic

Jim Knight reports that a period of minor to major magnetic storms was recorded around the world in middle and northern latitudes following the flare detected on the 23rd.

The magnetometer used by **Karl Lewis** (Saltash) indicated storm conditions on the 22nd and very unsettled on days 25, 30 and 31. For September, Karl reports very unsettled to storm conditions on days 11, 12, 17 and 18. **Doug Smillie** (Wishaw) logged "unsettled periods" on September 4, 8, 11, 12, 16, 20 and 21.

Neil Clarke says that September was mainly unsettled to disturbed with no quiet days when the Ap index was below 10. Stormy periods were recorded on days 1 (index 39), 11 (65), 12 (36) and 18 (51).

Aurora

"Tom McEwan (Kilbirnie) reported an active aurora with glows, rays, active rayed arcs, quiet bands and further rays between 0227 and 0314UTC" (August 21/22), wrote **Ron Livesey** in his Auroral Section report for August to the British Astronomical Association. Ron detected this activity with a jam-jar magnetometer in Edinburgh, measuring a gross change in magnetic field alignment of 0.75 degrees between 1640 and 2110UTC. Ron received reports of radio aurora from two sources on September 11 and visual aurora from observers on the ocean weather ship *Cumulus* and in Iceland, north Scotland and Stavanger for overnight periods on Aug 31, Sept 10, 11, 12, 17, 18, 19, 21 and 24. These events carried such descriptions as "active storm", "active rayed arc", "glow", "rayed arc" and "rays, arcs and glows".

The 28MHz Band

"An incredible evening," remarked **John Levesley G0HJL** (Bransgore) for Sept 8, when he heard signals from the Middle East, the USSR, most of the Gulf of Mexico states and from Texas to Tennessee and the Carolinas. Between October 1 and 16, he logged about 70 stations from Australia, countries in Europe, both American continents with many call areas in the USA, the Middle East, Scandinavia, South Africa and the USSR.

"Conditions generally quite good," wrote **Greg Lovelock G3III** from Shipston-on-Stour. Between Aug 26 and Sept 23, Greg heard the South American beacons LU1UG and PY2AMI on 13 and 18 days respectively, plus a fair bit of DX. In addition he worked stations in Australia, Hong Kong and Japan on the key.

Margaret Brownlow G4LCU found band conditions very good on September 25 when she was operating the amateur station, GB2CPM, at The Chalk Pits Museum. Between 1100 and 1200 she was called by and worked 7 Japanese stations and when these faded out, around 1200, an Australian from Perth contacted her at good strength. During the afternoon, Margaret exchanged words with stations in Turkey, USA and the USSR.

While beacon checking on the 25th, **Don Hodgkinson G0EZL** (Hanworth) tuned to 28.386MHz and heard Margaret, "busily working Japanese stations." Also on this day **Ken Lander** (Harlow), copied the signals "KJ4X/BCN EM 84 SC" and "TEST WB4JHS/B QSL BX13167 RTP NC 27709" on 28MHz and reports that 28MHz conditions deteriorated on October 10. I should think they did, Ken; take a look at that day in Fig. 9. "What happened?" asked **Fred Pallant G3RNM** (Storrington), referring to the 10th, "the only beacons up until 1200 were ZS6PW and Z21ANB—very weak. Also heard a VK1 working a ZL at 0830—again very weak and rather distorted—no copy on the ZL—but the VK mentioned 'Aurora'." Fred also had a QSO wiped out by a high level of noise at 0815 on the 7th.

At 1020 on October 15, **Mark Appleby G4XII** heard BY1QH and a rather large pile-up waiting to contact him.

The DX worked by Greg Lovelock G3III (Shipston-on-Stour) during the month prior to October 24 covered all Continents, including JA, VK6, ZL and "umpteen" Ws.

Propagation Beacons

First, thanks to Mark Appleby, **Chris van den Berg** (The Hague), **John Coulter** (Winchester), Henry Hatfield, Don Hodgkinson, Ken Lander, John Levesley, Greg Lovelock, **Ted Owen** (Maldon), Fred Pallant and Ted Waring, for their 28MHz beacon logs. These enabled me to show the world-wide reception of the large number of beacon signals that were copied between September 26 and October 24, Fig. 9.

During the same period last year, Ted Owen had 98 entries in his log, but this time the score is 196. "I don't remember ever having such a variety of N. American beacons coming in," said Ted Waring.

Mark Appleby, with his Racal RA17 receiver and Zepp antenna, has logged ZS6PW almost daily for the past 4 months and he frequently hears the Australian Bicentenary beacon, AX2RSY, on 28.260MHz. At 2200 on October 14, Mark heard the following, "WA4DJS/BCN FORT LAUDERDALE FLORIDA 50 WATTS ANTENNA 5/8 GROUND PLANE".

Among the first-timers for Don Hodgkinson this period are AL7GQ/B, Jackson, Mississippi; KC4DPC/BCN (28.211MHz), running 15 watts into a 3-element Yagi, some 14m a.g.l. and bearing 095° from Winnabow, North Carolina; VE1MUF/B

(28.281MHz) using 1 watt from Keswick Ridge, New Brunswick; VE6YF/B (28.191MHz), Edmonton, Alberta; WB9VMY/B, Calumet, Oklahoma and from New Zealand, ZL2MHF (28.230MHz). Referring to the latter, Don said, "I was staggered to learn from the message that output is now only 1 watt e.i.r.p., but the beacon is on top of a 867m high mountain."

John Coulter heard "BEACON TEN WATTS" from OK0EG (28.282MHz) at 0959 on October 21.

Tropospheric

The slightly rounded atmospheric pressure readings for noon and midnight for the month prior to October 25 were taken from the barograph installed at my home in Sussex, Fig. 10. DX signals were received in the broadcast Bands II (88–108MHz) and III (175–230MHz) during the periods Sept 26–30 and Oct 1–5 and 14–18.

934MHz

"Favourable conditions were enjoyed during the late evenings through to the early hours of September 7 and 7/8," wrote **Terry Wyatt UK-845** (Walton on Thames). Terry heard stations from the Channel Isles and Essex and made contacts with GB-563 in Birmingham (169km), CB-02 in Cornwall (370km), EM-43 in Nottinghamshire (209km) and GC-36, RP-95 and SB-344 in Staffordshire (193km).

The UK 934MHz Club contest was held on October 16 when the pressure was high and conditions favourable for u.h.f. communications. Among the contacts that Terry made at distances between 100 and 300km were with stations in Cambridge, Felixstowe, Kettering, Marksfield, Northampton, Peterborough and, his best, Sheffield.

John Levesley received signals from Guernsey on October 8 and 12, worked into Southampton over a very difficult path on the 9th and also found conditions good for the contest on the 16th. During the event, John operated from the New Forest and made contacts ranging from the south coast to south Lancashire.

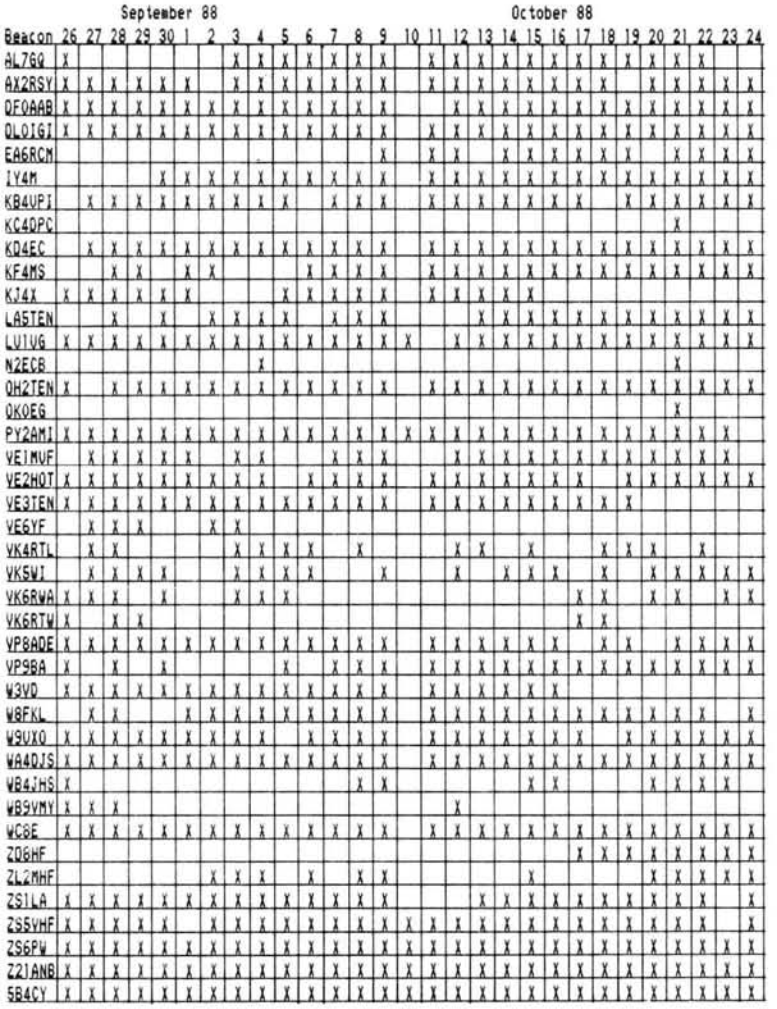


Fig. 9

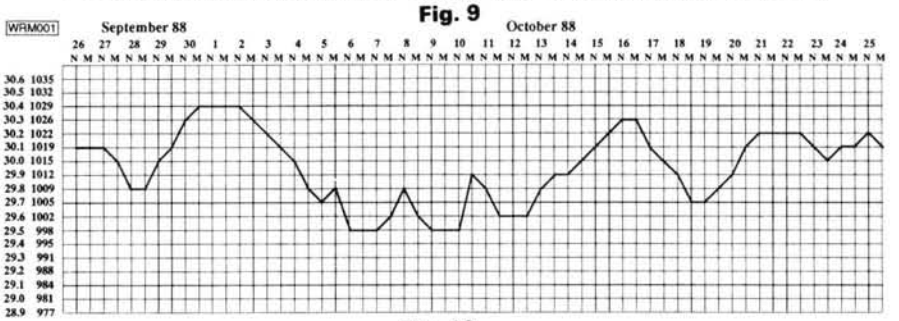


Fig. 10

The next three deadlines are: Dec 22, Jan 25 and Feb 27

Broadcast Round-up

Peter Shore

We are now at the end of that strange "in-between" time with one set of frequency changes at the end of September out of the way, but just before the early November ones. This really can be somewhat frustrating for the listener, as Moscow makes major changes again, and can upset the apple cart for other stations who have chosen frequencies to run through from September until March. However, we'll try and update you fully in next month's column, and correct any changes which are not reflected here.

On the general news front comes information that Radio Denmark may soon have a relay agreement with Radio Norway. Regular readers will recall that in these pages earlier this year, it was predicted that Norway's transmissions might before too long change to a half-hour format, doing away with that wasteful fifteen minutes between programmes, and it seems that this would tie in rather well with the new relay plans. However, it is up to the Danish government to come up with funding for this arrangement but it is expected that a decision will be made by the Spring.

BBC 648 has been suffering from interference in central Europe—it would seem that Albania has started using a transmitter on this channel. As with most of Tirana's transmitters, it is not exactly calibrated, so an annoying heterodyne can sometimes be heard. The service being broadcast has not yet been identified, but treating the medium wave band in such a cavalier manner does not bode well . . .

Here in the UK the BBC will have a new radio service starting in January 1990. BBC Radio Five will be a composite service of education and sport, with World Service in English as fill-in. The new station will use the frequencies of 693 and 909kHz, currently occupied by Radio Two, which will move entirely to v.h.f. f.m.

Europe

All times UTC (=GMT)

The BBC has started using 25.750MHz for World Service in English from 1100 and this gives excellent reception through to Australia.

Radio France International is also using 25.820MHz during the morning period from 0900 for French.

English from Greece has moved to 1.530MHz, with a new Swedish 'cast heard at 1.540MHz. Frequencies used are 17.565, 15.63 and 11.645MHz. At 2335, English can be heard on 9.395 and 7.43MHz.

Turkey is now using 15.05, 11.96 and, new, 9.445MHz from 1100, with the new frequency running until a frequency change at 1700 when 11.775 and 9.46MHz come on the air.

Radio Yugoslavia has English at 1930 on 9.66, 9.62 and 5.98MHz and at 2200 on 9.66, 9.62, 7.13 and 5.98MHz.

Radio Flash, a local radio station in Paris which has broadcast illegally since summer 1987 has been closed down because of alleged interference caused to air navigation services.

Radio Fax, the media orientated station broadcasting from the Republic of Ireland on 6.205MHz during the day, and 1.611MHz at night, has announced it is to close at the end of December. It is presumed that it will apply for one of the Republic's new community radio franchises during 1989. The Soviet regional station in Tashkent has moved from 5.925 to 5.995MHz. This carries regional programming and relays of central programming from Moscow.

Africa and the Middle East

Radio RSA's Danish service on Wednesdays at 1745 is now using 21.535MHz, and the 1800 English service uses 17.795 and 15.365MHz.

Information suggests that Liberia may be back on short wave. The h.f. facilities have been in a state of disrepair for more than a year, but now are reported back on the air. Try 3.255MHz from 0700 until 2300.

UAE Radio Dubai has English at 1030 on 21.605, 17.865, 15.435 and 11.955MHz and at 1600 on 17.865, 15.435, 11.955 and 11.73MHz.

Asia and the Pacific

Bangladesh Home Service uses new 15.52MHz around 1500 with English news broadcast at 1530.

Radio Japan's English transmission at 0700 is on 21.695, 17.81, 15.325 and new 15.27MHz.

The Akala transmitting station of Sri Lanka Broadcasting Corporation is to be re-equipped with Japanese aid. Two high power and four low power short wave transmitters are to be put into service, and Radio Japan will receive air time from this new site.

KYOI Saipan, now part of the Christian Science Monitor, has a schedule as:

2200–0200 on 15.405MHz
0200–0800 on 17.78MHz
0800–1600 on 11.90MHz
1800–2000 on 9.67MHz
2000–2200 on 9.465MHz

The 11.90MHz transmission is heard well here in the UK during the morning period.

Voice of Vietnam is using a new channel of 12.02MHz for the 2030 English broadcast, with French at 2100. This replaces long established 15.01MHz.

Voice of Free China, Taiwan has English at 2200 on 11.905, 9.955 and 9.455MHz.

You may be able to hear Papua New Guinea during the winter as some transmitters have been uprated in power. These include Radio Simbu on 3.355MHz and Radio West Highlands on 3.375MHz, Radio Milne Bay on 3.365MHz, Radio Central on 3.29MHz, Radio Western on 3.305MHz, Radio West Sepik on 3.205MHz and Radio East New Britain on 3.385MHz.

The Americas

HCJB Ecuador upset many listeners to Radio Australia by using 9.655MHz during the early morning and thereby causing severe interference, rendering both stations' signals in Europe completely unintelligible! The station is now back on 9.61MHz for its European morning transmissions. HCJB has a new Greek service at 0500 on 11.835 and 9.655MHz. Radio Canada's rearranged schedule looks like this:

1930–2000 Mon.–Fri. on 17.875, 15.325, 11.945, 7.235 & 5.995MHz
2200 daily on 11.945 & 9.76MHz (relays CBC Home Service on weekdays)

That wraps things up for this short column this month, but watch out for plenty of news from the bands next time around.

Any reports for Broadcast Round-up should be sent to the PW offices

S.E.M.

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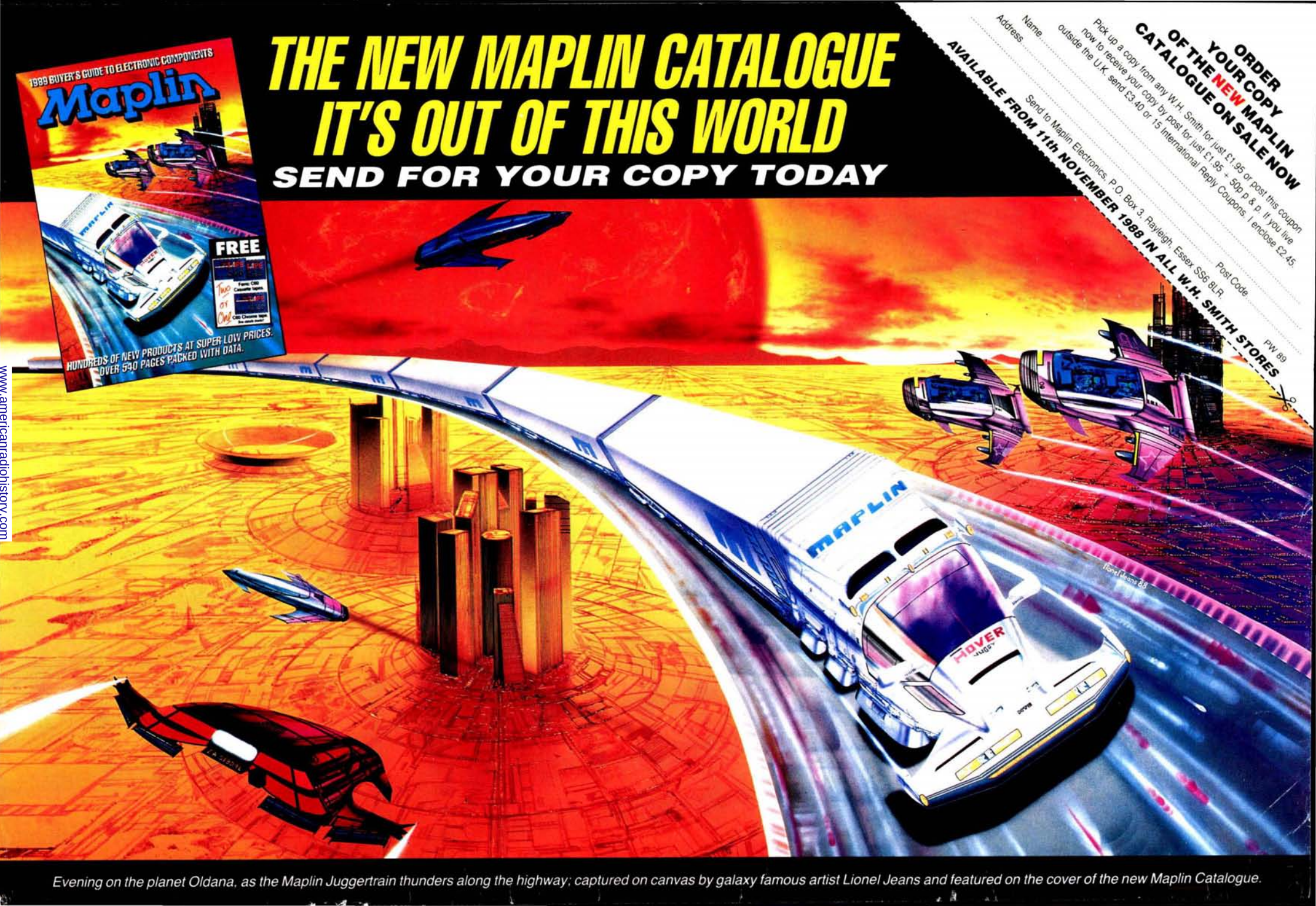

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