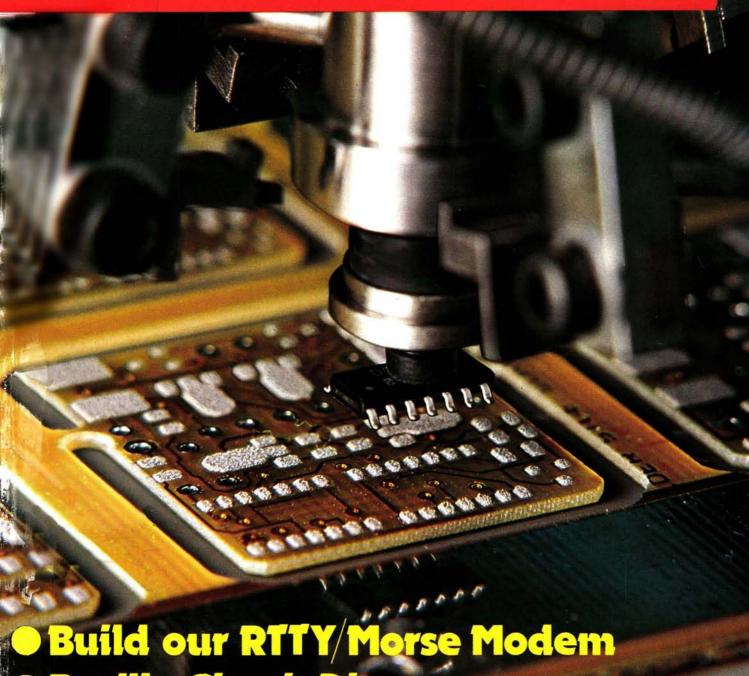
# JANUARY 1986 £1-00 Australia \$2 New Zealand \$2.25 Malaysia \$5.25 ISSN 1041-0857

The Radio Magazine



- Braille Circuit Diagrams
- Valved Communications Receivers The R107

# REG. WARD & CO. LTD.

## 1 WESTERN PARADE, WEST STREET, **AXMINSTER, DEVON, EX13 5NY.**

THE SOUTH-WEST'S LARGEST AMATEUR RADIO STOCKIST

-	n			
- 1		-	n	

TS940S	9 Band TX General Cov RX	1695.00	
TS930S	9 Band TX General Cov RX	1295.00	()
TS830S	160-10m Transceiver 9 Bands	832.75	(-)
AT230	All Band ATU/Power Meter	157.99	(2.00)
SP230	External Speaker Unit	47.73	(1.50)
TS530S	160m-10m Transceiver	698.00	(-)
TS430S	160m-10m Transceiver	720.00	()
PS430	Matching Power Supply	138.00	(3.00)
SP430	Matching Speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	13.17	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
TS130S	8 Band 200W Pep Transceiver	633.06	(-)
SP120	Base Station External Speaker	30.74	(1.50)
AT130	100W Antenna Tuner	108.62	(1.50)
MC50	Dual Impedance Desk Microphone	36.19	(1.50)
MC35S	Fist Microphone 50K ohm IMP	17.01	(1.00)
LF30A	HF Low Pass Filter 1kW	24.68	(1.00)
TR7930	2M FM Mobile	329.00	
TR9130	2M Multimode	499.00	()
TW4000A	2M/70cm mobile	522.00	(-)
TM201A	2M 25W mobile	296.00	()
TM401A	7cms FM 12W	316.00	()
TH21E	2M Mini-Handhelds	170.00	(-)
TH41E	70cm Mini-Handhelds	199.00	()
TM211E	2M FM Mobiles	365.00	()
TM411E	70cm FM Mobiles	399.00	
TS711E	2M Base Stations	768.00	
TS811E	70cm Base Stations	895.00	
TR3600	70cm Handheld	292.00	
TR2500	2M FM Synthesised Handheld	258.00	()
TR3500	70cm Handheld	270.00	()
TR2600	New 2M FM Synthesised Handheld	275.00	()
ST2	Base Stand		(1.50)
SC4	Soft Case		(1.00)
SMC25	Speaker Mike		(1.00)
PB25	Spare Battery Pack		(1.00)
MS1	Mobile Stand		(1.00)
R600	Gen. Cov. Receiver	299.52	()
R2000	Synthesiser 200KHz-30MHz Receiver		()
HC10	Digital Station World Time Clock		(1.50)
HS5	Deluxe Headphones		(1.00)
SP40	Mobile External Speaker		(1.00)
O. 10	mount Caterinar opeaker	.0.40	11.001

### – Linear Amps —

TONO	(G	series	)
	-		Ξ.

2M40G	2m, 1-3W in, 20-35W out, preamp	101.81	(2.00)
2M90G	2m, 10-15W in, 70-90W out, preamp	161.20	(2.00)
2M130G	2m, 10-15W in, 110-130W out, preamp	159.00	(2.50)
4M70G	70cms, 10-15W in, 40-60W out, preamp	219.74	(2.00)

### TOKYO HIPOWER AMPS. NOW BACK IN STOCK

### MICROWAVE MODULES

MML144/50-S	inc preamp, switchable	92.00 (2.00)
ML144/100-S	inc preamp (10w i/p)	149.95 (2.50)
MML144/100-HS	inc preamp (25w Vp)	149.95 (2.50)
MML144/100-LS	inc preamp (1/3w l/p)	169.95 (2.50)
MML144/200S	inc preamp (3/10/25 l/p)	299.00 (2.50)
MML432/30L -	inc preamp (1/3w i/p)	145.00 (2.00)
MML432/50	inc preamp (10w Vp)	129.95 (2.00)
MML432/100	linear (10w i/p)	299.00 (2.50)
B.N.O.S.	A III A	9
I PM 144-1-100	2m 1W in 100W out nearmo	181 00 (2.50)

LPM 144-1-100	2m, 1W in, 100W out, preamp	181.00	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	181.00	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	157.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	217.00	(2.50)
LPM 144-3-180 d	2m, 3W in, 180W out, preamp	247.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	247.00	(2.50)
LP 144-3-50	2MN 50W out, preamp	108.00	(2.50)
LP 144-10-50	2M 10W in, preamp	108.00	(2.50)
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00	(2.50)
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00	(2.50)
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00	(2.50)
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00	(2.50)

### – SWR/PWR Meters —

HANSEN FS50VP FS300V FS300H FS210 W720	50-150MHz 20/200 Interval PEP/SWI 50-150MHz 20/200 PWR/SWR 1.8-60MHz 20/200/10W 1.8-150MHz 20/200 Auto SWR	53.50 53.50 63.50	(1.50) (1.50) (1.50)
W/20	140-430MHz 20/200W	41.50	(1.50)
WELZ		===	
SP45	130-470MHz PWR/SWR	69.00	(1.50)
SP10X	1.8-150MHz PWR/SWR	34.00	(1.50)
SP200	1.8-160MHz PWR/SWR	89.00	(1.50)
SP250	1.8-60MHz PWR/SWR	65.00	(1.50)
SP300	1.8-500MHz PWR/SWR	129.00	(1.50)
SP350	1.8-500MHz PWR/SWR	79.00	(1.50)
SP400	130-500MHz PWR/SWR	89.00	(1.50)
NEW	BANGE OF WELZ METERS NOW AV	AII ARIE	generale.

т	o	Y	0	
+				

T430 T435

### - Scanning Receivers -

	0	
SMC8400	VHF/UHF Scanner	249.00 (2.50)
SX200	VHF/UHF Scanner	325.00 (2.50)
SX400	VHF/UHF Continuous Coverage	625.00 (2.50)
AOR2001	VHF/UHF Continuous Coverage	345.00 (2.50)
FDK RX40	141.00-180.000 MHz	159.00 (2.00)

### — Icom Products —

IC751	HF Transceiver	1299.00 ()
IC745	HF Transceiver	899.00 ()
IC735	New HF Transceiver	849.00 ()
PS15	P.S. Unit	145.00 (4.00)
PS30	Systems p.s.u. 25A	297.85 ()
SM6	Base microphone for 751/745	40.25 (1.00)
IC290D	2m 25w M/Mode	479.00 ()
IC290E	10w Multi-Mode Mobile	449.00 ()
IC271E	2m 25w M/Mode Base Stn.	729.00 ()
IC271H	100W version of above	899.00 ()
IC25H	2m 45w FM	359.00 ()
IC27E	25W FM mobile	379.00 ()
IC45E	70c 10w FM	345.00 ()
IC47E	25w 70cm FM mobile	469.00 ()
ICBU1	B/U Supply for 25/45/290	29.90 (1.00)
ICR70	General Coverage Receiver	629.00 ()
ICR71	General Coverage Receiver	729.00 ()
IC02E	2m H/Held	269.00 ()
IC2E	2m H/Held	199.00 ()
ML1	2m 10w Linear	79.35 (2.00)
IC4E	70cm H/Held	259.00 ()
IC04E	70cm handheld	279.00 ()
BC35	Base Charger	62.10 (1.00)
HM9	Speaker mic	18.56 (1.00)
IC3	Carry Case	5.50 (1.00)
ICBP3	Std Battery Pack	27.50 (1.00)
BP5	High Power Battery Pack	52.80 (1.00)
CP1	Car Charging Lead	5.50 (1.00)
DC1	12v Adaptor	13.75 (1.00)
		The second second

### Mutek Products

77	Much I Touncis	10.3	200
SLNA 50	50MHz Switched preamp	44.90	(1.5
SLNA 144s	144MHz Low noise switched preamp	39.95	(1.5
SLNA 145sb	Preamp intended for 290	29.90	(1.5
GLNA 432e	70cm Mast head preamp	149.90	(2.5
RPCB 144ub	Front end FT221/225	79.90	(1.5
RPCB 251ub	Front end IC251/211	84.90	(1.5
BBBA 500u	20-500MHz Preamp	34.90	(1.5
GFBA 144e	2m Mast head preamp	149.90	12.5
SBLA 144e	2m Mast head preamp	89.90	12.5
RPCB 271ub.	Front end for IC271	89.90	(1.5
TVHF 230c	2M-FM Transverter	334.90	(5.0
LBPF 144v	Bandpass Filter	22.40	(1.5
LBPF 432u	Bandpass Filter	22,40	(1.5
TVVF 50c	6M Transverter	199.90	(2.5
GLNA 433e	70cm Pre-amp	79.90	(2.5
TVVF 144a	2M Transverter	239.90	(2.5
- A 10	4 ED 24		

### Datona Products

	90	Dutong I Touties	A
١	PC1	Gen. Cov. Con.	137.40 (1.50)
	VLF.	Very low frequency conv.	29.90 (1.50)
	FL2	Multi-mode audio filter	89.70 (1.50)
	FL3	Audio filter for receivers	129.00 (1.50)
	ASP/B	r.f. speech clipper for Trio	82.80 (1.50)
	ASP/A	r.f. speech clipper for Yaesu	82.80 (1.50)
	ASP	As above with 8 pin conn	89.70 (1.50)
l	D75	Manual RF speech clipper	56.35 (1.50)
	D70	Morse Tutor	56.35 (1.50)
	MK	Keyboard morse sender	137.40 (1.50)
	RFA	RF switched pre-amp	33.90 (1.50)
	AD270-MPU	Active dipole with mains p.s.u.	51.75 (1.50)
	AD370-MPU	Active dipole with mains p.s.u.	69.00 (1.50)
	MPU	Mains power unit	6.90 (1.50)
	DC144/28	2m converter	39.67 (1.50)
	PTS1	Tone squelch unit	46.00 (1.50)
	ANF	Automatic notch filter	67.85 (1.50)
	SRB2	Auto Woodpecker blanker	86.25 (1.50)
		The second secon	

### - CW/RTTY Equipment -

Tono 9000E Reader/Sender

Tono 550	Reader	329.00	(2.50)
MICROWAY	E MODULES		
MM2001	RTTY to TV converter	189.00	(2.00)
MM4001	RTTY terminal	269.00	(2.00)
MM4001KB	RTTY term with keyboard	299.00	(2.00)
BENCHER			
BY1	Squeeze Key, Black base	53.95	(1.50)
BY2	Squeeze Key, Chrome base	69.95	(1.50)
HI-MOUND	MORSE KEYS		
HK702	Up down keyer marble base	30.95	(1.50)
HK703	Up down keyer	29.35	(1.50)
HK704	Up down keyer	19.95	(1.50)
HK705	Up down keyer	15.49	(1.50)
HK706	Up down keyer	16.96	(1.50)
HK708	Up down keyer	14.95	(1.50)
HK802	Up down solid brass	86.30	(2.00)
HK808	Up down keyer	39.95	(1.50)
MK704	Twin paddle keyer	13.50	(1.50)
MK705	Twin paddle keyer marble base	25.65	(1.50)
KENPRO			
KP100	Squeeze CMOS 230/13.8v	82.50	(2.50)
KP200	Memory 4096 Multi Channel	169.50	(2.50)

### - Yaesu -

FT1	HF Transceiver	P.O.A.	()
FT980	HF Transceiver	1450.00	(-)
SP980	Speaker	78.95	(2.00)
FC700	Tuner	105.00	(2.00)
FT757GX	HF Transceiver	739.00	(-)
FC757	Auto A.T.U.	255.00	(2.00)
FP757HD	Heavy Duty PSU	175.00	
FP757GX	Switched Mode PSU	160.00	
FL2050	Linear Amplifier	115.00	
FT290	2m M/Mode Port/Transceiver	315.00	(-)
FT290	With Mutek front end fitted	345.00	(-)
FL2010	Linear Amplifier	69.00	(1.00)
MMB11	Mobile Bracket	30.00	(1.00)
NC11	Charger		(1.00)
CSC1	Carrying Case		(1.00)
YHA15	2m Helical		(1.00)
YHA44D	70cm ½wave		(1.00)
YM49	Speaker Mike		(1.00)
MMB15	Mobile Bracket		(1.00)
FT203R	NEW 2m H/Held/C/W FNB3	195.00	(-)
FT209R	NEW 2m H/Held/C/W FNB3	239.00	(-)
FT703R	70cm H/Held	235.00	(-)
FT709R	70cm H/Held	259.00	(-)
FT270R	2m 25W F.M.	315.00	
FT270RH	2m 45W F.M.	365.00	
FT2700R	2m/70cm/25W/25W	499.00	
FRG 9600	60-905MHz Scanning RX	449.00	
MMB10	Mobile Bracket		(1.00)
NC9C	Charger		(1.00)
NC8	Base/station Charger		(2.00)
PA3	Car Adaptor/Charger		(1.00)
FNB2	Spare Battery Pack		(1.00)
YM24A	Speaker Mike		(1.00)
FT726R	2m Base Station	775.00	(-)
430/726	70cm Module for above	255.00	
FRG8800	HF Receiver	475.00	(-)
FRV8800	Convertor 118-175 for above		(1.50)
FRT7700RX	A.T.U.		(1.50)
MH1B8	Hand 600 Spin mic		(1.00)
MD1B8	Desk 600 8pin mic		(1.00)
MF1A3B	Boom mobile mic		(1,00)
YH77	Lightweight phones		(1.00)
YH55	Padded phones		(1.00)
YHI	L/weight Mobile H/set-Boom mic		(1.00)
SB1	PTT Switch Box 208/708		(1.00)
SB2	PTT Switch Box 290/790		(1.00)
SB10	PTT Switch Box 270/2700		(1.00)
QTR24D	World Time Clock		(1.00)
CEEO1DY	Loss Page Eller		(1.00)

### Power Supplies -

100					
DRAE			BNOS		
4 amp	40.50	(2.00)	6 amp	58.00	(2.50)
6 amp	63.00	(2.50)	12 amp	99.00	(3.00)
12 amp	86.50	(3.00)	25 amp	148.00	(4.00)
24 amp	125.00	(4.00)	40 amp	296.00	(4.00)

### - Aerial Rotators -

FU200	Light Duty	49.95 (2.00)
AR40	5 core Medium Duty	115.00 (2.00)
KR400	Med/H Duty	109.95 (2.50)
KR500	6 core Elevation	139.95 (2.50)
KR400RC	6 core Medium Duty	132.50 (2.50)
CD45	8 core Heavy Duty	189.95 (2.50)
KR600RC	8 core Heavy Duty	189.50 (2.50)
HAM1V	8 core Heavier Duty	299.00 (4.00)
T2X	8 core Very Heavy Duty	365.00 (4.00)

### - Switches -

Sigma	2 way SO239	14.49 (1.00)
Sigma	2 way 'n' Skts	19.95 (1.00)
Welz	2 way SO239	22.95 (1.00)
Welz	2 way 'n' Skts	41.90 (1.00)
Drae	3 way SO239	15.40 (1.00)
Drae	3 way 'n' Skts	19.90 (1.00)

### - Miscellaneous -

DRAE	Wavemeter	27.50 (1.00)
T30	30W Dummy load	8.05 (1.00)
T100	100W Dummy load	35.20 (1.00)
T200	200W Dummy load	42.55 (1.50)
CT300	300W Dummy load	69.00 (2.00)
DRAE	2m Pre-set A.T.U.	14.50 (1.50)
ALTAI	KDM6 Dip Meter	68.60 (1.50)

TOKYO HI-POWER HC200 10-80 HF Tuner HC400 10-160 HF Tuner 82.50 (2.00) 176.00 (3.00)

AERIALS BY:- JAYBEAM — HYGAIN — G. WHIP — TET — TONNA — MINIBEAM — MET

COMPLETE RANGE OF WOOD & DOUGLAS KITS



(Tel: 0297-34918) FDK CLOSED MONDAY/OPEN TUES-SAT 9:00-5:30 (closed for lunch 1:00-2:00)
STOCK ITEMS NORMALLY DESPATCHED WITHIN 48 HOURS

SEASONS GREETINGS FROM REG G2BSW and RODNEY G6LUJ



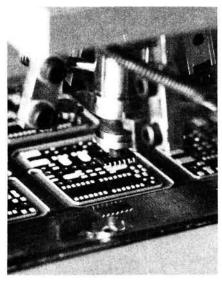








VOL 62 JANUARY 1986 NO. 1 ISSUE 946



# THIS MONTH'S COVER

This month's cover shows an automatic pick-andplace surface-mounting p.c.b. assembly head. Surface-mounting techniques such as this, featuring pre-printed solder paste and robust miniature components, permit the location of some 5000 components per hour. Accurate control of board/component stress, soldering and improved high frequency performance are just some of the advantages of this, soon to be widespread, technology—which does not exclude home construction. Our thanks go to Surface Electronics Ltd, Patrick House, West Quay Road, Poole, Dorset, for their invaluable assistance.



- 22 A Cautionary Tale
  Derry Parker G1MBC
- 22 Errors and Updates
  PW Meon, October 1985
  The W-Q MW Loop Antenna,
  November 1985
- 23 RTTY/ Morse Modem
  N. Allen-Rowlandson G4JET
- 28 Valved Communications Receivers—The R-107 Chas E. Miller
- 32 Braille Circuit Diagrams
  George Day
- 35 Crystal Calibrator R. H. Pearson G4FHU
- 38 Broadside and Endfire Arrays—2 F. C. Judd G2BCX
- 40 Working with the Ethodyne Receiver John D. Heys G3BDQ.
- 46 PW Review
  The Halbar QDX 144MHz Antenna
- 48 A Simple Continuity Tester
  R. H. Pearson G4FHU

71 Advert Index 16 Comment 20 Products
48 Benny 45 Mods 44 PW Programs
17 Bookshelf 18 News 44 Subscriptions
49 Club News 51 On the Air 16 Write On

### **Editorial Offices:**

Practical Wireless Westover House West Quay Road Poole, Dorset BH15 1JG ♣ Poole (0202) 671191 Prestel 202671191 Editor Geoff Arnold T.Eng(CEI) FSERT G3GSR
Assistant Editor Dick Ganderton C.Eng., MIERE, G8VFH
Art Editor Steve Hunt
Technical Editor John Fell GOAPI
Technical Sub-Editor Elaine Howard G4LFM
Technical Artist Rob Mackie
Secretary Kathy Moore

### Advertisement Offices:

Practical Wireless King's Reach Tower Stamford Street London SE1 9LS Telex: 915748 MAGDIV-G Advertisement Manager Roger Hall G4TNT 201-261 6807
Secretary Sally Stewart 201-261 6636

Amanda Morton

**☎** 01-261 5846 **Make-up & Copy** Ian Sweeney **☎** 01-261 6570

Classified Ads

COPYRIGHT © IPC Magazines Limited 1986. Copyright in all drawings, photographs, and articles published in *Practical Wireless* is fully protected and reproduction or imitation in whole or in part is expressly forbidden. All reasonable precautions are taken by *Practical Wireless* to ensure that the advice and data given to our readers are reliable. We cannot however guarantee it and we cannot accept legal responsibility for it. Prices are those current as we go to press.

# Name Address Code You TICK YOUR SPECIAL INTEREST RECEIVERS WHF/UHF HF With a copy of the LOWE ELECTRONICS catalogue and antenna book in the shack (send £1 for your copy) the best in amateur radio is quickly available.

# LOWE SHOPS

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041-945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret Road, off Queen Margaret Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical gardens are well worth a visit.

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham Road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230). Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Carl GW0CAB, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

For South Coast radio amateurs there's a LOWE ELECTRONICS' shop in Bournemouth. It's manager is Colin G3XAS. The shop's address is 27 Gillam Road, Northbourne, Bournemouth, that's the north side of town, just off Wimborne Road (the telephone number is 0202 577760). Easy to find, the shop has free street parking immediately outside.

**LOWE ELECTRONICS' London shop** is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01-429 3256). The shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings. For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 10p. There is also free street parking outside the shop.

**Although not a shop** there is on the South Coast a source of good advice and equipment – John G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex (telephone 0323 848077). An evening or weekend telephone call will put you in touch with John.

**Finally, here in Matlock**, Richard G4NAD is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

# TRIO



# hf transceiver

The TRIO TS830S is for the operator who wants a dedicated amateur bands only transceiver, who is used to and wants a pair of rugged 6146B valves in the PA stage and who wants a compact rig which has its own in-built power supply. The TS830S is for the radio amateur who requires a rig capable of rising above today's crowded band conditions, a rig that has, as standard, the necessary features that will produce consistently good contacts where other lesser equipment would fail. The TRIO TS830S, a proven rig with an impeccable pedigree.

The TS830S covers on USB, LSB and CW the full amateur bands from 160 through to 10 metres.

Convenient to use, the transceiver has its own in-built power supply.

**VBT (variable bandwidth tuning)** enables the operator to, at will, vary the IF filter passband width and establish optimum IF bandwidth relative to the interference being experienced.

The IF shift control allows the IF passband to be moved up or down in frequency without having to retune the receiver. Hence, an unwanted signal, present in the IF passband, may be attenuated significantly by moving the passband in the appropriate direction.

As the IF shift and VBT are independently adjustable they can, to advantage, be used together.

The tunable notch filter in the TS830S is a high-Q active circuit in the 455KHz second IF. Sharp, deep notch characteristics will eliminate a strong interfering carrier within the passband of the receiver section.

The RF speech processor in the TS830S provides added audio punch and increases the average SSB output power whilst suppressing sideband splatter. Compression levels can be monitored and controlled from the front panel.

To cope with pulse type (such as ignition) noise, the transceiver has an in-built noise blanker.

For perfect listening, a tone control adjusts receiver audio frequency response to suit operating conditions.

**Both RIT and XIT,** transmitter as well as receiver incremental tuning are included to aid operating. XIT being a distinct advantage when calling a station that is listening 'off frequency'.

It is possible to monitor the transmitted audio in order to assess the effects of the speech processor: a most useful feature ensuring perfect signal reports.

TS830S amateur band transceiver......£832.75 inc VAT, carr £7.00

### LOWE ELECTRONICS LTD.

Ä





Chesterfield Road, Matlock, Derbyshire DE4 5LE Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.

# the TRIO two metre base station, the TS711E

**Several weeks have passed** since I took delivery of my own TRIO TS711E. The Japanese home market model has returned whence it came and I am using the version designed specifically for the UK market. The rig is perfection epitomised. For todays two metre operator any base station with less facilities and performance than the TS711E would be far from acceptable. The TS711E's receiver performance in sensitivity and in its ability to reject unwanted adjacent signals is outstanding. I'm not talking about test equipment figures though undoubtedly these will soon be published. My own on air operating with the rig has enabled me to hear what I previously couldn't.

The transceiver covers the 2 metre band from 144 to 146 MHz in FM, USB, LSB and CW modes. When switched to the auto position the rig correctly selects mode according to frequency, a great advantage to the blind operator. Simple up/down frequency shift is provided both on the transceiver front panel and microphone.

IF shift is available, an essential when considering todays crowded 2 metre band. For more penetrating transmitted audio when working DX speech processing can also be switched in.

The TS711E has two separate VFO's and forty channels of memory. Each memory remembers frequency, operating mode, simplex or repeater shift and whether or not a tone burst is to be included. Frequencies stored in memory can be readily transferred to either VFO A or B. The VFO can be either free running as for SSB or CW operation or electrically switched to a "click" stop where it changes frequency in 12.5 or 5 kHz steps. The two VFO's can quickly be put on the same frequency, an aid when checking the position of a strong adjacent signal with one VFO whilst remaining on your operating frequency with the other.

Frequency scan on VFO can be either between or outside user set limits. On memory the transceiver can either scan the entire memory contents or be instructed to look at those frequencies of a particular mode. The TS711E has a timed hold on an occupied channel. Both priority channel and the immediate recall of your local net frequency are possible with the TS711E.

For those with failing sight or a blind operator the TS711E is a dream come true, not only is the operating mode identified by the appropriate CW letter sent in tone (F for FM, U for upper side band etc.), other rigs just bleep but, when fitted with the VS1 optional board, a digitally encoded girls voice will announce both frequency and where applicable, whether the rig is switched to repeater shift.

### TS711E 2 metres £695.00 carr £7.00



# also on seventy, the TS811E.

TS811E 70 centimetres £795.00 inc. VAT carr £7.00

# not even a mouse, could hide behind a TRIO TH21E...

I am not for one moment suggesting that current hand-helds should be photographed with an elephant but I have heard many amateurs refer to their existing hand-helds as "bricks" That the TH21E could not be called. In fact I am tempted to say it is the rig that not even a mouse could hide behind. Over the past fourteen years I have watched amateur radio equipment develop from cumbersome to perfection. I remember John, G3PCY, showing me the first TR2400 and our mutual amazement at how TRIO could put so much radio in such a small package. Later developments produced the TR2500 and its 70 centimetre version, the TR3500 and left me in no doubt that TRIO

would soon produce a compact inside pocket transceiver. At the same time it became apparent that a simpler rig with performance would have great appeal. That transceiver is the TH21E and being typically TRIO is right first time. Size is not the most important feature, it's just the way the transceiver feels when picked up, impossible to put down. I am not going to size its dimensions. Juill just say to give its dimensions, I will just say that it is hand sized, the true inside pocket transceiver. As an owner and with the rig always on your person the hobby of amateur radio expands to an all day event. Never miss contact, never miss a friend.

A similar transceiver is available for 70 A similar transceiver is available for 70 centimetres, the TH41E. Having the same features including reverse repeater the TH41E is just the rig that newcomers to the hobby have been looking for. Around the country are many 70 centimetre repeaters and what has been needed for some time has been a low cost FM rig that has been a low cost FM rig that everyone could afford. The TH41E from TRIO is that transceiver and many amateurs are discovering the 70 centimetre band with one.

### First of all the Pocketfone, now the TH41E.

watt output in high power position, 150mW in low position.

Full coverage of the 2 metre amateur band from 144 to 146MHz. (TH41E covers from 430 to 440MHz.)

Frequency selection by simple thumbwheel switches.

repeater facilities including reverse repeater.

The rig comes complete with nicad pack and charger.

TH21E ...... £170.00 inc VAT TH41E ...... £199.00 inc VAT





Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.







# \*\*FREE FINANCE\*=

# HAMPSHIRE, YORKSHIRE, HUMBERSIDE, JERSEY

# **DARTCOMS NOW OPEN**

NORMAN DILLEY Former sales manager with S.M.C. has now opened his own shop in Dartmouth, extending the renowned S.M.C. service to all the West Country amateurs.

PHONE OR CALL IN NOW! 9-5 Mon to Sat Eves by appointment At rear of FACET'S, 14 BROADSTONE, DARTMOUTH, DEVON.

### SMC BRANCHES & AGENTS XMAS CLOSING TIMES

SMC (Leeds) SMC (Chesterfield) SMC (Humberside) SMC (Stoke) SMC (TMP) SMC (Scotcomm) Dartcoms Transworld Comms SMC (Jersey) SMC (Northern Ireland)

SMC (HO)

25th-28th Dec & 1st Jan 25th-27th Dec & 1st Jan 25th Dec-2nd Jan 25th-28th Dec & 1st Jan 25th Dec-2nd Jan 28th-31st Dec-1st-4th Jan 25th Dec-7th Jan 25th & 26th Dec-1st-5th Jan 25th Dec-30th Dec 25th & 26th Dec & 1st Jan Phone for details



The SMC Oscar was designed to satisfy the stringent specifications of MPT1320. It is a solid state, compact, transceiver built to withstand the shock and vibrations experienced in the mobile environment for years to come. It also makes an ideal base station when used in conjunction with an external 12V P.S.U. and optional amplifier such as our type PA10L/25. A high level of frequency stability over a wide temperature range is achieved by the use of low tolerance quartz crystal and the latest in CMOS integrated circuits. The receiver provides good sensitivity allowing excellent reception of even the weakest stations, good selectivity and signal handling allows perfect reception of local signals with minimum interference from adjacent channels. The power output is 5W giving a good range. This coupled with highly controlled modulation and high spurious rejection gives maximum readability with minimum interference to other users.

### ONLY £65 inc

LEEDS SMC (Leeds) 257 Otley Road, Leeds 16, Yorkshire Leeds (0532) 782326

Chesterfield Chest. (0246) 453340

BUCKLEY SMC (TMP) Unit 27, Pinfold Lane Buckley, Clwyd Buckley (0244) 549563

STOKE SMC (Stoke) 76 High Street Talke Pits, Stoke Kidsgrove (07816) 72644 9-5.30 Tues-Sat GRIMSBY (SMC) Grimsby 247A Freeman Street

JERSEY

10 Ward Avenue

### FT-290R £315 inc VAT



### FT 290R

Frequency coverage (MHz): 144-146 or 144-148

Modes of operation: SSB (USB, LSB) CW & FM SSB (USB, LSB) CW & FM Synthesizer steps: SSB/CW: 100Hz/1kHz FM: 12.5/25kHz Sensitivity (better than): SSB/CW: 0.5µV for 20dB S/N FM: 0.25µ for 12dB SINAD

Repeater Split: 600kHz (+ and -) Tone burst frequency: 1,750Hz

### MULTIMODE OPERATION

Never before possible from such a compact package, true multimode operation is yours to enjoy. With CW and SSB activity at an all-time high, you will not be left out of the satellite or DX action and you can still ragchew on FM simplex or even via a repeater

ADVANCED MICRO CONTROL
Advances in microprocessor circuitry allows selectable
synthesizer steps, up/down scanning from the microphone,
priority channel operation, and ten memories (with memory scan), all called up with fingertip ease

### LCD DISPLAY

A large Liquid Crystal Display provides readout of the operating frequency. It is highly readable under conditions of bright sunlight and is backed up by a lamp for night-time operation.

PROGRAMMABLE SYNTHESIZER
The optimum synthesizer steps for SSB/CW/AM or FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz per step on SSB, AM & CW, and 12½/25kHz on FM.

### GENERAL

Power Output: 2.5 Watts at 12VDC

Frequency response: 300-2,700Hz (a -6dB

Carrier Suppression: Better than -40dB

Sideband Suppression: Better than -40dB

FM Deviation:

Spurious radiation:

Intermediate frequencie 1st IF 10.81MHz 2nd IF 455kHz (FM)

Image rejection:

Audio output: 1 Watt @ 10% THD

Audio output impedance

Antenna: SO239 on rear Dimensions:

58H × 150W × 195D m 1.3kg (without cells)

## FT726R(2) £775 inc VAT



The Yaesu FT726R has been designed and built for the discerning VHF and UHF operator. Up to three modules can be simultaneously installed giving pushbutton band selection. Choose between 6M, 2M, 70cms and 10, 12, 15M.

SSB (with fully adjustable speech processor), FM and CW (optional 600Hz CW filter available) are standard. The CW filter combined with Yaesu's excellent IF shift/width system enables optimum receive performance despite today's crowded bands.

An 8 bit NMOS microprocessor offers a level of control hither to unsurpassed, dual VFO's -20Hz step tuning, standard repeater shifts including reverse, push button band selection and 25/12.5KHz FM channel tuning knob.

The eleven memory channels store mode as well as frequency and can be scanned for busy or clear, stop or pause, even on different bands. Programmable limited band scan between memories is provided as well as priority channel checking. All the memories and both VFO's are protected against power failure by a lithium cell.

With the optional "plug-in" satellite IF unit installed, full crossband duplex capability is available with independent tuning and mode selection, as well as full metering of both transmit and receive parameters (power O/P and signal strength).

An LED display plus two digit clarifier display are provided with large digits for easy reading at any angle. Standard features also include selectable AGC and noise blanker, all mode squelch and RF gain and continuously adjustable transmitter output power.

CHESTERFIELD SMC (Jack Tweedy) Ltd 102 High Street New Whittington,

owroom open 9-5.30 pm Monday to Friday, 9-1 pm Saturday

SMC (Jersey)
1 Belmont Gardens
St. Helier, Jersey
Jersey (0534) 77067
9-5 pm Mon-Sat
Closed Wed

N. IRELAND SMC N. Ireland

HQ & MAIL ORDER S.M. HOUSE, RUMBRIDGE ST, TOTTON, SOUTHAMPTO



DeSouth Midland

# -e2 YEAR GUARANTEE

# DERBYSHIRE, STAFFORDSHIRE, CLWYD, CO. DOWN

When changing modes from SSB/CW to FM, your transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

### TEN MEMORY CHANNELS

As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell

### **DUAL VEO SYSTEM**

These transceivers feature a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set in the SSB portion of the band, and the other in the FM sub-band, for immediate QSY when changing modes.

### CONVENIENT FEATURES

Among the many features adding to the convenience of the transceiver is a supplied portable antenna, a high-perfor-mance noise blanker, a high/low power switch. A clarifier allows you to follow unstable or Doppler-shifted signals.

### **EATURES**

### Current consumption:

800mA Tx (2.5 W RF FM)

### Power requirements:

8 × C size dry cells 8 × C size Nicad cells

External 8.5-15.2VDC Memory backup: Lithium cell

### Microphone:

(YM47 supplied) 600 ohms ppt with scan

### FT-690R £289 inc VAT



### 690R

### Frequency coverage (MHz): 50-54

50-54 Modes of Operation: USB, CW, AM & FM Synthesizer Steps: SSB/CW/AM: 100Hz/1kHz

Sensitivity (better than): SSB/CW/AM: 0.5µV for 20dB S/N FM: 0.25µV for 12dB S/NAD

FM: 0.25µV for 12dB S/N. Selectivity: 2.4kHz (-6dB) 4.1kHz (-6dB) 15kHz (-6dB) 15kHz (-6dB) FM: 14kHz (-6dB) 25kHz (-6dB) Repeater Shift: 1MHz (+&-)

# FT757GX £739 inc VAT

The FT757GX is the latest in a long line of superb HF transceivers from Yaesu. The transceiver covers all the amateur bands with a full 0.5-30MHz continuous coverage receiver. Dual VFO's and eight memories all controlled by three microprocessors allow quick and accurate control of all the main functions.

All modes SSB, CW, AM and FM are included as standard along with a 600Hz CW filter, iambic keyer with dot-dash memory, 25KHz marker, noise blanker, AF speech processor and IF shift/width filters. Top panel switch selectable semi-break in or QSK is available for CW operation.

The Yaesu CAT (computer aided transceiver) system is fitted to enable external control of VFO frequency and memory functions from a personal computer via an interface unit for customised band scanning and control of the memories and VFO's.

The remarkable new heatsink design includes a quiet cooling fan with a new duct-flow cooling system incorporating the heatsink into the body of the radio. This gives forced air circulation allowing 100W PEP continuous output at 100% duty cycle in all modes.

The high performance general coverage receiver with Yaesu's unsurpassed IF shift/width system, switchable AGC and 20dB attenuator, combined with the switchable, RF preamp provides the FT757GX with a dynamic range in excess of 100dB in CW narrow.

The optional FC757AT is a fully microprocessor controlled antenna tuner which gives fast, reliable automatic tuning of a broad range of SWR's, with manual override for that particularly 'difficult' aerial. Also included is a dummy load, automatic SWR calculating system and meter and a dual range RF wattmeter.

### FREE FINANCE

On many regular priced items SMC offers
Free Finance (on invoice balances over £120).
20% down and the balance over 6 months or
50% down and the balance over a year.
You pay no more than the cash price! details on eligible items on request

### SMC SERVICE

Free Securicor delivery on major equipment. Access and Barclaycard over the phone. Riggest branch agent and dealer network. Securicor 'B' Service contract at £5.00 Biggest stockist of amateur equipment. Same day despatch possible.

### CRYSTAL FILTERS For Home Constructors

### 10.7MHz F10.7H600, CW600Hz F10.7F2.4, SSB 2.4kHz F10.7H12, FM12kHz USB/LSB (AM,CW,FM) XTALS £10.00

### F90H600, CW 600Hz £12.50 F90F2.4, SSB 2.4kHz £10.00 F90H12, FM 12kHz £12.50 USB/LSB XTALS

### FT101 I,II,III,B,E £15.00 F30F350, CW350Hz £15.00 £10.00 F30F600, CW600Hz F30FC1, CW600Hz F30F12, FM12kHz F30H12, FM12kHz £10.00

Postage & Packing £5 any quantity

### END OF LINE

	incl p&p
YM40	10 pcs only £5
XF-8.2HC	5 pcs only £10
XF8.2HCN	5 pcs only £10
FANT 101 etc	5 pcs only £5
FT901/2 MEMUNIT	5 pcs only £25

### EDEEL

DC Kit FRG7700	p&p 50p
FF5 Filter	p&P 50p
MMBI	p&p £2.50
To owners of FRG7700, FT101, 901 etc	, riease senu

### FM 2033



144 MHz, 12VDC Transceiver. 25W/5W Hi/Lo (both adjustable). Compact  $2^2/_{16}" \times 6^3/_8" \times 7^3/_{16}"$ . 12½ KHz steps (100 fast QSY). Amber LCD Sunlight View, Side Lit. Display; 100's of Hz or channel number. Sensitivity <0.2 $\mu$ V for 12dB SINAD. Single knob frequency conrol "Dial". Endless or non-endless dial options. RIT; 1 KHz steps, V.F.O. + memory. Two 5 slot memories A, B, A+B, A×B. 11th memory instant "call" channel. Memories simplex or duplex channels. Band scanning, programmable limits. Scan halts squelch + centre zero. Pause on scan halt for 3 seconds. Scan/tune/RIT from microphone ±600 KHz split, plus cross memory. Repeater in-put listen by pressing "dial". Setable; steps, tone, splits, limits. Simple controls for safe mobile operation. C/W mobile mount, mic

### NOW ONLY £219 inc SAVE £30 on RRP

### **GUARANTEE**

GUAHANTEE
Importer warranty on Yaesu Musen products.
Ably staffed and equipped Service Department.
Daily contact with the Yaesu Musen factory.
Tens of thousands of spares and test equipment.
Twenty-five years of professional experience.
2 Year warranty on regular priced Yaesu products.

STOCK CARRYING AGENT. JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 52374 DAY (0639) 2942 EVE JACK McVICAR, SCOTCOMMS, EDINBURGH 031 657 2430 NORMAN DILLEY, DARTCOMMS, DARTMOUTH (08043) 3534

SO4 4DP, ENGLAND. Tel: (0703) 867333. Telex: 477351 SMCOMM G.

# munications Ltd.



# R WITHERS

**584 HAGLEY ROAD WEST, OLDBURY,** QUINTON, B68 OBS BIRMINGHAM.

Tel: 021 421 8201 (24hr answerphone)

Telex: 334303 G TXAGWM

UHF or VHF PORTABLE, MOBILE or **BASE STATION • HANDHELDS ARE** ONE OF THE MOST POPULAR MEANS OF COMMUNICATION FOR THE AMATEUR IN





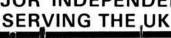
### STOP PRESS Just arrived -

Alinco ALM 203E ONLY £209

We also sell and service Cellular Radio, and PMR (Business) radio equipment.

BIRMINGHAMS

MAJOR INDEPENDENT







COMMUNICATIO



FT209R

KT400E

KT200E

For the best deals in the UK, see our huge range of top name products at rock-bottom prices

Full range of matching linears from 15-50 watts We also sell and service Cellular Radio, and PMR (Business) radio equipment

£1000.00 instant credit available for licensed amateurs. Details upon request. Call now!







HP/PERSONAL LOANS AVAILABLE (written details upon request)

RWC CREDITCARD

### **GREAT NEW SOFTWARE**

The RX-4 Multimode receive program for SSTV - RTTY - AMTOR - CW

No expensive hardware is needed. This program has everything you want, including text and picture store for instant recall, save and printer dump. Frequency scale and fine-tune adjustment for accurate, easy tuning and a long list of other top features.

For SPECTRUM (not 16K), BBC-B, CBM64, VIC20 (+ at least 8k). Tape only £25. Spectrum needs no hardware, the others use the same interface as our RTTY/CW program (see below).

### TY and CW TRANSCEIV

You don't need a pricey terminal unit with our program, although if you already have one it will perform superbly with that, too. Split screen, type ahead, 26 saveable memories, auto CR/LF, preset baud rates and shifts, receives any shift automatically, autotrack CW to 250wpm, QSO review to screen or printer and much more. For **BBC-B**, **CBM64**, **VIC20** (+ at least 8k). Tape £20. Interface kit £5, ready-made £20 inc all connections (state rig). CW-only version for **SPECTRUM** (no hardware needed) £12.

# And superb programs for BBC-B, CBM64, VIC20, SPECTRUM, ELECTRON

MORSE TUTOR Britain's best. Absolute beginner to over 40 wpm. Easy, effective, with full learning guide. Tape £6. For ZX81-16K also

LOCATOR QTH or Maidenhead locator or lat/long. Distance, headings, contest points, converts between locator and lat/long. Tape £7.

LOGBOOK Date, band, mode, call and remarks. Instant callsign search. Screen/printer output. VIC20 needs expansion. Tape £8. RAE MATHS All the practice and testing you need. With comprehensive reference sheet. Tape £9. For ZX81-16K also.

Any BBC-B, CBM64, VIC20 program available on disc at £2 extra. BBC: state 40/80 tk.

Prices include VAT and p&p by return 1st class inland, airmail overseas. Channel Islands, Eire, BFPO Europe deduct 13%.

### technical software (PW)

Fron, Upper Llandwrog. Caernarion, Gwynedd LL54 7RF. Tel. 0286 881886

### COMMUNICATION CENTRE OF THE NORTH

The largest range of communications equipment available in the North. Full range of receivers, transceivers, antennas, power supplies, meters. Ali tubing – wall brackets – rotators – insulators.

We are the original amateur radio suppliers in the North West with 20 years experience in all types of equipment.

We are the only official TRIO stockists in the North West, Full range of equipment on display, Guaranteed after sales service.

Stockists also for Tonna, Welz, TET, G.Whips, Jaybeam, RSGB Publications.

### RECEIVERS

TRIO R600 Solid State Receiver £299.00 TRIO R2000 Solid State Receiver £479.00 Wide Band Scanning Receiver AR2002, 25-550 MHz AM-FM + 800 to 1300 MHz £375.00 R532 Airband Receiver £189.00 RS37S Hand Held Airband Receiver £55.00 Yaesu FRG8800 Receiver £475.00 AT1000 SWL Antenna Tuning Unit £53.00 YAESU FRG9600 Scanning Receiver £449.00 Please send SAE for full information and up-to-date prices as these fluctuate to change in sterling rates. For the caller a wide range of Aluminium Tubing, Clamps, etc. at competitive prices, i.e. 12' × 2" Ali Tubing £9.00.

Full range of RSGB and ARRL publications in stock. Part Exchanges welcome. Second hand lists daily. Send S.A.E. for details of any equipment. HP terms. Access/Barclaycard facilities. Open 6 days a week. 24 Hour Mail Order Service. Phone 0942-676790.

## STEPHENS JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCS. WN7 3EA



MERRY CHRISIMAS

Seasons Greetings to all Our Customers and Retailers with Best Wishes for a Prosperous and Peaceful New Year.

Perhaps Santa Claus can give you some help in selecting your Christmas presents, or maybe you would like to choose from our products listed below. In either case we're sure that any of our retailers would be pleased to gift wrap it for you.

### SANTA CLAUS' SELECTION FROM THE FAIRY GROTTO:

### LINEAR AMPLIFIERS: MML 144/30-LS -MML 144/50-S MML 144/100-S -MML 144/100-HS MML 144/100-LS MML 144/200-S MML 432/50 MML 432/100 2m 30 watt linear/preamp, 1 or 3w input, switchable . 2m 50 watt linear/preamp, 10w input switchable . . . . 82.90 92.00 149.95 149.95 169.95 299.00 129.95 299.00 2m 100 watt linear/preamp, 10w input switchable. 2 m 100 watt linear/preamp, 10w input switchable. 2 m 100 watt linear/preamp, 25w input, switchable. 2 m 100 watt linear/preamp, 1 or 3w input, switchable. 2 m 200 watt linear/preamp, 3, 10, 25w input, switchable. 70cm 50 watt linear/preamp, 10w input. 70cm 100 watt linear, 10w input. TRANSVERTERS 2m Linear transverter, 10m input, 10w output, - 2m linear transverter, 10m input, 25w output - 23cm linear transverter, 2m input, 2w output - 6m to 10m down converter. MMT 144/28 129.95 MMT 144/28-R MMT 1496/144 MMC 50/28-S MMC 144/28 MMC 144/28-P MMC 432/28-S 215.00 235.00 .34.90 .47.90 .39.90 .39.90 .129.95 145.00 .75.00 115.00 .89.00 .89.00 .95.75 .29.90 RECEIVE - 2m to 10m down converter - 2m to 10m high performance down converter - 70cm to 10m down converter - 70cm to 2m down converter - 23cm to 2m down converter, GaASFET preamp - 1691 MHz Metostat converter - 2m RF switched GaASFET preamp, 100w capacity - 23cm GaASFET town noise preamp - 1691 MHz Meteosat GaASFET preamp - RTTY to TV converter - RTTY transceiver with keyboard - THE MORSETALKER - Speaking Morse Tutor - Advanced Morse Trainer - 500 MHz digital frequency meter - 1500 MHz+ 10 prescaler - 70cm ATV converter. UHF Outbut 2m to 10m down converter RECEIVE PREAMPS MICROPROCESSOR MM2001 MM4001KB MMS1 MMS2 MMD050/500 MMD1500P CONTROLLED **PRODUCTS** FREQUENCY COUNTER AMATEUR TELEVISION - 70cm ATV converter, UHF Output - 70cm ATV 20 watt transmitter .... MMC435/600

PRICES INCLUDE VAT BUT NOT POST & PACKAGE - PRICES CORRECT AS 31st DECEMBER 1985. DELIVERY BY RETURN OF POST.

## MICROWAVE MODULES! THE CONNOISSEURS CHOICE.



### MICROWAVE MODULES

BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND Telephone: 051-523 4011. Telex. 628608 MICRO G CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST HOURS: MONDAY-FRIDAY 9-12.30, 1-5.00 E & O.E.

# DADIO CHACK

# FOR EVERYTHING

## ARMATELID DADIO

K/	ADIO SHA	しい	<b>L</b>	EVENTI INING	/IVI	416	ON NADIO	J
	RECEIVERS AND ACCESSORIES (Limited Stock Av			ROCKWELL COLLINS			HF ANTENNAS	
R-7A	0.1-30 MHz HF Digital Receiver, SSB/CW/AM	1595.00	KWM-380	HF Amateur Band Transceiver	3438.50	HUSTLER		granden.
SL-300	300Hz CW Filter for R-7 &TR-7	69.00	MM-280	Hand held Microphone	73.50	4-BTV	10-40m 4 Band Trap Vertical	149.85
SL-4000	4000Hz AM Filter for R-7 & TR-7	63.00	MM-281	Noise Cancelling Hand Microphone	103.45	5-BTV	10-80m 5 Band Trap Vertical	189.95
SL-1000	1000Hz RTTY Filter as above	69.00	AC-3801	Noise Blanker	396.75	3-TBA	3 Element 10/15 & 20m Beam Antenna, 14'8" boom,	379.50
J. 1000	Total Control of State Control		AC-3802	Speech Processor	396.75	27-TDX	27MHz/10m Base Vertical Ground Plane	59.80
NB-7A	Noise Blanker for R-7 receiver	73.60	AC-3803	Control Interface	275.95			
RP-700	Receiver Protector from lightning and static	79.35	AC-3804	WARC/MARS Coverage Kit	91.25 205.25	AVANTI		
RR-3	Manne Reserve & General Coverage Receiver	2070.00	AC-3810 AC-3811	500Hz CW Filter 250Hz CW Filter	205.25	AH 028.9B	10m Switchable Dual Polanty Beam/Quad antenna	79.35
R-4245	Nigh Spec 0.1-30MHz Commercial Receiver	2852.00	AC-3811 AC-3812	1.7KHz RTTY Filter	205.25	AV-200	27MHz/10m On glass mobile antenna, 22inches high	19.55
C-7011	Table Top Cabinet for RR-3 & R-4245	184.00	AC-3813	6.0KHz AM Filter	191.75	74.700	Ermito for on glass mobile antonia, etimenes myn	(2000)
ACCESSORIES	FOR R-4C RECEIVER		AC-2801	Rack Mount	295.00	550 P.00 Page 100 p		
FL-250	250Hz CW Filter	59.95	AC-2808	Blower Kit	449.65	HY-GAIN		
FL-500	500Hz CW Filter	59.95	AC-2821	DC Power Cable	95.00	18-TD	3.5 to 30MHz Portable Tape Dipole Antenna	230.00
FL-4000	4000Hz AM Filter	59.95	AC-2828	Microphone Foot Switch	68.75	153-BA	15m 3 Element Beam, 26' Boom, 24.5 Longest Element	135.00
FL-6000	6000Hz AM Filter	59.95	AC-2830	Lightweight Headphones	66.00	103-BA	10m 3 Element Beam, 8' Boom, 17' Longest Element	99.00
CRYSTALS	Accessory Crystals for R-4 & T-4X Series	10.35	CS-7	Lightweight Headphones Communications Quality Headphones	99.95	204-BA	20m 4 Element Beam, 26' Boom, 36.5' Longest Element	420.00
	LITE TV RECEIVERS	, exc. [47]	OM-769	Spare Operators Manual	8.95	205-BA	20m 5 Element Beam, 34' Boom, 36.5' Longest Element	499.00 78.95
ESR-240	Earth Station Receiver with I R Remote Control	1035.00	SM-770	Service Manual	51.75	12-AVQ	10, 15 & 20m Trap Vertical	106.00
ESR-324	Earth Station Receiver	695.00	New KWM-3	Transceivers can never be repeated at this price to	wnen existing	14-AVQ 14-RMQ	10-40m Trap Vertical Roof Mount Kit for Vertical Antennas	39.90
ESR-2220	Commercial Rack Mount Single Conversion RCVR	1127.00		stocks are sold		14-HMU 413	10m 8' Stainless Steel Whip, Mobile	14.95
LNA-2573	85 Degree Low Noise Amplifier	695.00		SCANNING RECEIVERS		BDBM	Flush Body Mount for above Whip	13.80
	FOR TRANSCEIVERS		AR-2001	AOR 16 Channel 25-550MHz	345.00	DUDM	Flush body Mount for above Whip	13.00
RV-7	Remote VFO for TR-7 & 7A	172.50	BC-150FB BC-200FB	Bearcat 10 Channel, 66-88, 138-174, 420-512MHz Bearcat 16 Channel, Scan & Search, Freq. as abo 2 Band 4 Channel Hand held thinscan	159.95 ove 199.95			
MMK-7	Mobile Mount for TR-7	69.00	BC-200FB	Bearcat to Channel, Scan & Search, Freq. as abo	ove 199.95 87.40	JAYBEAM		
CW-75	Electronic CW Keyer	79.35	BC-24 BC-46	4 Band 6 Channel Hand held thinscan	99.95	TB-1	Triband Rotary Dipole	69.00
P-75	Phone Patch	87.40	FRG-9600	Yaesu All Mode 60-905MHz Scanner	449.00	TB-2	Triband 2 Element Beam	126.50
FA-7	Fan for TR-7, PS-7, DL-1000	46.00	PRO-30	16 Ch. Hand held as above + aircraft band	239.95			
AUX-7	Auxiliary Range board for TR-7	46.00	PRO-30 PRO-2003	16 Ch. Hand held as above + aircraft band 50 Ch + 10 FM Broadcast, freq. as PRO-30 2M Amateur Band Scanner	298.95	DATONG		
RRM-7	Range Receive Modules for AUX-7	10.35	TM-56	2M Amateur Band Scanner	79.00	AD-270	Indoor Active Receiving Antenna	47.15
NB-7	Noise Blanker for TR-7	99.95	TM-56B	VHF Marine Band Scanner	79.00	AD-370	Outdoor Active Receiving Antenna	64.40
1548	R-7/TR-7 Interface Cable	34.50		DATONG PRODUCTS		MPU	Power Supply for above antennas	6.90
SP-75	Speech Processor	138.00	PC1	Gen. Cov. Con.	137.40		A CONTRACTOR OF	1000
NB-5	Plug in Noise Blanker for TR-5	87.40	VLF	Very low frequency conv. Multi-mode audio filter	29.90			0
PS-75	Power Supply for TR-5 & TR-7	149.95	FL2	Multi-mode audio hiter	89.70	G4MH	CONTRACTOR AND TAXABLE ASSESSED	92 E0
TV-42LP	100 Watt Low Pass Filter	14.95	FL3 ASP/B	Audio filter for receivers	129.00 82.80	G4MH-B G4MH-K	G4MH Minibeam 2 El. Triband Antenna	82.50 65.00
WH-7	HF VSWR/Wattmeter 20/200/2kW Ranges	69.00	ASP/B ASP/A	r.f. speech clipper for Trio r.f. speech clipper for Yaesu	82.80	D4MH-K	Kit for above less aluminium tubing	40.00
1525	Tone Encoder Microphone	24.95	ASP/A ASP	As above with 8 pin conn	89.70			
7073	Hand Microphone for TR-5 and TR-7	29.90	D75	Manual RF speech clipper	56.35	ARCHER		
977	Astatic Desk Microphone for TR-5 & TR-7	49.95	D70	Morse Tutor	56.35	All Band	75' Long Wire Kit + 50' Feed in with insulators	10.99
S-230	R/A Mic Plugs for TR-4 & T-4X	3.45	MK	Keyboard morse sender	137.40			
ALAN AND DES	GENERAL		RFA	RF switched pre-amp	33.90		USED BARGAINS	
LA-7	600 Ohm Balanced Line Amplifier	46.00	AD270-MPU	Active dipole with mains p.s.u.	51.75	HY-GAIN	OSED DANGAINS	
SD-240	240-120V Auto Transformer 500W 2 US Sockets	27.60	AD370-MPU	Active dipole with mains p.s.u.	69.00	TH3MK3	3 El Triband Beam, 14' Boom, Stainless Hardware,	
8202	Auto Scale Digital Multimeter	69.00	MPU	Mains power unit	6.90	InsMK3	Superb Condition	250.00
DC-PC	SPR-4 DC Power Cord	3.80	DC144/28	2m converter	39.67		Superu Condition	230.00
Manuals	Operator Manuals, available for most models	10.00	PTS1	Tone squelch unit	46.00	STEPPHARES	72.73A.5	
The above ite	ems cannot be replaced when present stocks are sold.		ANF	Automatic notch filter	67.85 86.25	MINI PRODU		
91027, 10 11 11 10 743			SRB2	Auto Woodpecker blanker	<b></b>	HQ-1	2 El. Triband Mini Beam	85.00
l		_				200		

**YAESU ICOM** TRIO

### NOW AT THE NEW REDUCED PRICES



### RADIO SHACK LTD

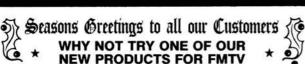
**188 BROADHURST GARDENS** 

**LONDON NW6 3AY** 

(Just around the corner from West Hampstead Station on the Jubilee Line) Giro Account No. 588 7151 Telephone 01-624 7174 Telex: 23718



# WOOD & DOUGLAS ~DA



VP/D1 Pre-Emphasis/De-emphasis (CCIR)
Improve your video quality with this low-cost add-on board. May be wired for transmit or receive use. Includes amplification to compensate for attenuation of CCIR network.

SCT2 Transmit Sound Modulator

10

Generates FM sound sub-carrier which is then combined with composite video to drive UFMO1. Requires 350mV RMS AF input. Specify 5.5MHz or 6.0MHz.

SCR2 Receive Sound Demodulator
Takes FM sub-carrier from VIDIF board and provides two squelched audio outputs, 600 ohm and 8 ohm, independently adjustable. Specify 5.5MHz or 6.0MHz.

Pac	kage Prices		Kit
1.	500mW TV Transmit	(70FMO5T4+TVM1+BPF433)	£40.00
2.	500mW TV Transceive	(As 1 above plus TVIP2+PSI433)	£65.00
3.	10W TV Transmit	(As 1 above plus 70FM10+BDX35)	£75.00
4.	10W TV Transceive	(As 2 above plus 70FM10+BDX35)	£100.00
5.	70cms 500mW FM Transceive	(70'T4+70'R5+SSR1+BPF)	280.00
6.	70cms 10W FM Transceive	(As 5 above plus 70FM10)	£115.00
7.		(144PA4/S+144LIN10B)	£45.00
8.	2M Linear/Pre-amp 25W	(144PA4/S+144LIN25B)	£48.00
	2M Linear/Pre-amp 25W	(144PA4/S+144LIN30)	£51.00
9.	70cms Synthesised 10W Transceive	(R5+SY+AX+MOD+SSR+70FM10)	£165.00
10.	2M Synthesised 10W Transceive	(R5+SY+SY2T+SSR+144FM10A)	£125.00
11.	2M Crystal Controlled 10W Transceiver	(R5+T3+BPF+144FM10+SSR)	£95.00
12.	70cms Linear/Pre-amp	(70LIN10+70PA2/S)	£47.00
13.	24cms FMTV Receive, video out (Kit)	(VIDIF, 1250DC50 Boxed)	£105.00
14.	24cms FMTV Receive, video out (Ass)	(VIDIF, 1250DC50 Boxed)	£120.00
15.	24cms FMTV Receive. Ch 36 out (Kit)	(VIDIF, TVMOD1, 1250DC50 Boxed)	£110.00
16.	24cms FMTV Receive, Ch 36 out (Ass)	(VIDIF, TVMOD1, 1250DC50 Boxed)	£126.00
17.	24cms FMTV Transmit (Kit) (UFMO1, 70	LIN3/LT, 70FM10, WDV400/1200 Boxed)	£140.00
18.	24cms FMTV Transmit (Ass) (UFMO1, 70		£170.00

Details of these and other new products are included in our 1986 catalogue. This will be posted to you on receipt of an A5 stamped self addressed envelope. Kits are usually available by return of post but please allow 28 days for any unforeseen shortages. Place your order by post or by telephone using your credit card. Please include £1.00 to cover order handling and postage.

Our products are kits or assembled kits consisting of circuit board and all components to mount on the board. We do not include external hardware such as boxes, connectors etc.

If your purchase does not work when assembled then apart from being surprised we will offer to service the module for a small charge depending on the complexity of the project. So please remember

. REPUTATION SELLS OURS ANYONE CAN SELL A KIT



UNIT 13, YOUNGS INDUSTRIAL ESTATE ALDERMASTON, READING RG7 4PQ TEL: (073 56) 71444 TX: 846630



RECEIVERS A.M. type R1155B Rx with N type slow motion drive, 5 bands L.F. Long & Med & 2SW to 18Mc/s regs ext power 250v/6.3v supplied as recieved for M.O.D. in original condition with DF section. Customers should allow for fact these have been held in store for some time, with circ, £85. METER UNIT 270 deg scale 1 Ma FSD scale 0 to 8  $\times$  100 approx 3" dia aircraft spares, £12.50. PANEL METERS. DC 0 to 10 amps 21/2" dia, £4.50 DC 0 to 25 amps 31/2" dia proj mt, £8.50. DC 100 Ua scale 0 to 100  $3\times21/4$ ", £5.50. AC 0 to 1 amp Educ type in table case with term, £5.50 all new. **PRESS GAUGE**. Dual scale 0 to 160 PSI twice (vehicle type) 21/4" dia new, £6.50. **COMP/VAC PUMP**. 240v 1/4 HP motor driving Edwards comp unit nom 10 PSI at 2 CFM on base plate approx  $14 \times 6 \times 9''$  ex equip tested, £45. Related equip available inc heaters, dryers, dehumidifier ovens see list. 37. **SIGS GENS ARMY** type CT402 Marc TF995/A3 bench unit 1.5 to 220Mc/s AM/FM var to 75Kc, fine coarse atten, level meter etc, tested with book & accs, £100 or less accs, £85. Few advance AM 100Kc to 100Mc/s at £65. TAPE RECORDERS. 2 chan 3 speed ¼ track with mon spk in wood carrying case size 20×13×9" for 240v transis unit, supplied with circ inst, headset with boom mike, reel of tape, £29 or less accs, £19. MOTOR. 6/24v DC 60 RPM at 24v size  $2\frac{1}{2}\times1\frac{1}{2}\times1\frac{1}{2}$ " int gearbox, £4.50. **COAX**. Type UR57HD 75 ohm 10mm OSD 15 mts for £6.50. 30p mt over this. **ROTARY INV**. Aircraft type I/P 18v DC approx 18 amps at full load O/P 230v AC at 180 watts nom 50c/s sine wave new condition, £45. Also 26v DC I/P, 115v O/P at 360 watts 1600c/s, £28. ROTARY SWTS. ¼ shaft 2p 10 way ceramic. 2 for £2.50. SCREW TERM HD in black insul panel mt with ¼" stud. 2 for 4 for £3.50. AUTO TRANS enc type 240 to 115v at 560 watts, £14.50. PYE PF.1 pocket phone UHF Rx FM nom 450Mc/s with crystal circ reqs 9v batt, £6.50. ARMY AE EQUIP. Whip ae 4 section 16ft with base, £9.50. Telescopic 27ft 6 section, 5ft closed, £30. Guy Kit, £8. Mast Kit 30ft 10 section 1" with carrying bag with guys, stakes, etc., new cond, £33. Long wire approx 120ft, green insul wire plus nylon cord on wind up card, £4.50. 31/88 Set AFV Kit with 10ft whip, base coax etc, £8.50. SILICON DIODES. Stud type 100 PIV at 20 amps ea, 4 for £4.50. TAPE RECORDERS. Small portable reel to reel type by Fi. Cord 2 speed 4" spools, size 9×6½×4" supplied with mikw, tape, carrying case, inst book, battery holders, reqs two DC supplies of 7/12v at 170Ma ea, £65 For callers. Batteries 12v 75 A/Hr, new £18. S/H £11.50. Old type telephone Swt boards, £65. CT316 trigg scopes, £15. CD523 Gen prp scopes, £55.

Above prices in. carr/postage & VAT. Goods ex equipment unless stated new. Allow 14 days for delivery. SAE with enquiry or 2×17p stamps for List. 37

### A.H. SUPPLIES

122 Handsworth Road, Sheffield S9 4AE. Telephone: (0742) 444278.

## COUN

HIGH PERFORMANCE HIGH RELIABILITY LOW COST

**EX-STOCK** DELIVERY

The brand new Meteor series of 8-digit Frequency Counters offer the lowest cost professional performance available anywhere.

- Measuring typically 2Hz 1.2GHz
- Sensitivity < 50mV at 1GHz
- Setability 0.5ppm
- High Accuracy
- 3 Gate Times

PRICES (Inc. adaptor/charger, P & P and VAT)

(1GHz)

METEOR 100 METEOR 600 METEOR 1000 (100MHz) (600MHz) £117.30 £148.35 5204 70 Low Pass Filter

- **Battery or Mains**
- Factory Calibrated
- 1-Year Guarantee
- 0.5" easy to read L.E.D. Display

### NOW AVAILABE WITH T.C.X.O. OPTION

Illustrated colour brochure with technical specification and prices available on request



BLACK STAR LTD (DEPT. P.W.) 4, Stephenson Road, St. Ives, Huntingdon, Cambs. PE17 4EB, England. Tel: (0480) 62440 Telex: 32762.



Designed and manufacti in Britain.

Black**\***Star



British Technology & Innovation

B.*N.*O.S

ELECTRONIC



LIMITED

"Dear Santa,

Let me SLEIGH 'em next lift With A BNOS Linear"

**BNOS '85. A Year in Review** 

The early months of 1985 saw the fruition of many of BNOS's ongoing projects. Our R&D team finished their **extensive** field trials of the many prototypes which have allowed many new products off the starting blocks. The first launch was that of the **New LP Series** of **2M** Linear Amplifiers which immediately became an overnight success. The **Highly Efficient** design allowed the size to be kept down. Their small dimensions have pleased the mobile and portable stations who have discovered that these miniscule linears still mange to put out a **Big** signal.

In the spring we introduced low cost L Series versions of the popular 50w 70cm amplifiers. This was in answer to the demand from all the people with masthead preamps — are you happy now?

Whilst using the Friedrichshafen show to support our many European distributors in their sales efforts, we also managed to capture the UK agency for DARC Publishing. This has brought their colourful Maidenhead Locator Map to G-land for the first time.

Later in the year, we completed our range of VHF amplifiers with the addition of **Linears** for **4** and **6** metres. And, only recently we launched our new flagships. **100W 70cm** linears whyich have even more useful features than their predecessors. Don't forget, with BNOS, **100W** means **100W** — **Continuously**.

Watch for a few surprises in '86. Merry Christmas and a DX-ful new year

NEW

OVERDRIVE PROTECTION **VSWR SHUT-DOWN** TRUE 100W RMS O/P TV COMPATIBLE SEQUENCED MASTHEAD COMPATIBLE + All the usual

**BNOS** features

70cm



3W IN 100W OUT CONTINUOUSLY! NEW

HIGHLY EFFICIENT PUSH-PULL DESIGN

£295 L432-3-100 L432-10-100 £295 LPM432-3-100 £335 LPM432-10-100

1985's NEW PRODUCTS

L432-1-50

L432-3-50

L432-10-50

LP144-3-50

LP144-10-50

DARC LOCATOR MAPS

LPM-50-10-100

LPM-70-10-100

LPM432-10-100 L432-10-100

Carriage free on orders over £10 Securicor £4 extra

BNOS ELECTRONICS LTD. DEPT. PW, Bigods Hall, Gt Dunmow, Essex CM6 3BE. Tel: 0371 4677



TRIO mobile radio, dedicated to quality

Now from TRIO, the eagerly awaited range of high quality purpose designed, VHF and UHF mobile

radio transceivers.

Built with uncompromising quality in mind, these fully synthesised transceivers use a completely diseast backbone chassis for reliability and ease of use.

Up to 32 channels are held in PROM and frequency changes or additions can be carried out without delay to the customer. The transceivers will handle all current frequency allocations including UHF community repeater channels and, plug in CTCSS modules allow 5 minute.

community repeater channels and, plug in CTGSS modules allows installation time with no wiring necessary. CTGSS encoder/decoder units are available with 37 tone dip switch programming, or prom programming when you wish to allocate different tones on different channels. If you deal in radiotelephones, the TRIO range is designed for you. Remove your installation and service headaches by contacting the sole distributor right now for further details. You will not be disappointed.

### LOWE ELECTRONICS LTD

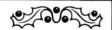
Chesterfield Road, Matlock, Derbyshire DE4 5LE Telephone 0629 2817, 2430, 4057, 4995.

ADDRESS NAME COMPANY

PW.1.86

# A.R.E. co

# CHRISTMAS GREETINGS FROM BRENDA & BERNIE



# Communications Ltd.

PHONE: 09252-29881

38 BRIDGE ST., EARLESTOWN, NEWTON-LE-WILLOWS, MERSEYSIDE.

AT OUR EARLESTOWN SHOP WE HAVE THE MOST COMPREHENSIVE STOCK OF AMATEUR RADIO EQUIPMENT TO BE FOUND UNDER ONE ROOF IN THE WHOLE OF THE COUNTRY. WE OFFER FULL RANGES OF YAESU, ICOM AND TRIO-KENWOOD, PLUS MANY OTHER MAKES. BUT MOST OF ALL WE OFFER THE FACILITIES TO TRY AND TEST ONE RIG AGAINST ANOTHER TO MAKE SURE THAT THE EQUIPMENT YOU DECIDE TO BUY IS RIGHT FOR YOU. OF COURSE, WE ALSO HAVE A LARGE RANGE OF SECOND-HAND, ALL WITH GUARANTEES. SO PHONE US FOR THE BEST POSSIBLE PRICES.

### **ALINCO POWER SUPPLIES**



12 VOLT-55AMP **£295** 



12 VOLT-30AMP



12 VOLT-11AMP £95



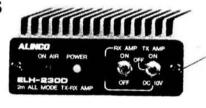
12 VOLT-6AMP **£69** 

This superb range of power supplies will be arriving this month, they are extremely robust as well as being good to look at, fully stabilised and crowbar protected.

### **ALINCO RF AMPLIFIERS**



ELH230G 3 Watts in 30 Watts out £49.00



3 Watts in 30 Watts out with Pre-Amp £69.00



ELH 730G –3 in 30 out ELH 730D –3 in 30 out Pre-Amp

with 1 Watt in 15 out

ELH 730G - £89 without Pre-Amp

ELH730D - £119 with Pre-Amp

### ALINCO ROTATORS

Well tried and tested, the now famous Alinco EMR400 Rotator will soon be available similar in specification to the KR400 £89.00



And now the ELH200 Rotator suitable for light weight antenna up to 5 ele. Beams can also be modified for use as an elevator rotator.

£49.00

# £169

### Fairmate VHF/UHF

Receiver 55-85MHZ 115-170MHZ 322-470MHZ AM/FM Scans 10 memories. Scans band. By-pass channel

All prices include VAT and are correct as we go to press

### **AOR 2002**

The new FM Scanner 25-500 plus 800-1.3GHZ **£369** 



Now available – converter for the AR2001 for extended cover

### Sony 7600D

The amazing HF Gen. Cover Receiver. AM-FM-SSB



### FT690 6m All Mode

Similar in spec to the famous FT290. Now available.



Phone 092-52-29881 for all mail order - Access & Barclaycard accepted

Trade enquiries welcome

Opening hours: Tuesday – Saturday inc.

10am-5pm

Communications Ltd.

PHONE: 09252-29881

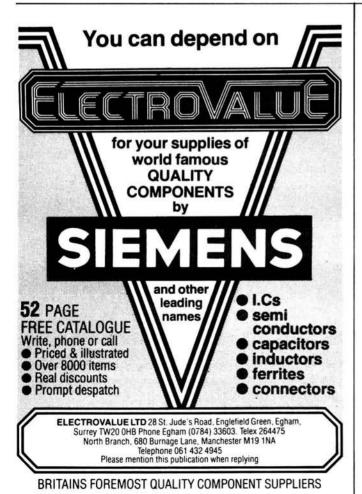
38 BRIGE ST., EARLESTOWN, NEWTON-LE-WILLOWS, MERSEYSIDE.

# **GREATEST EVER SALE OF** amateur radio equip

The equipment offered below is new, and carries a full 12 months guarantee. Most items have been on display at our shop or at exhibitions, but are in perfect condition.

[19] - [1		1.00	
4 only YAESU FT757GX	£599	6 only YAESU FRG9600 scanning received	/er <b>£379</b>
5 only YAESU FC757	£210	4 only YAESU FT209	£195
4 only YAESU FP757GX	£99	5 only YAESU FT203	FROM <b>£149</b>
6 only YAESU FP757HD	£135	3 only KENWOOD TS211E 2m	£299
3 only YAESU FT726 with 2m band	£649	3 only KENWOOD TS411E 70cms	£319
4 only YAESU FT2700 dual band transceiver	£379	1 only KENWOOD TW4000 duo-bander	£425
5 only YAESU FT270 25w 2m transceiver	£252	2 only ICOM IC3200 duo-bander	£395
3 only YAESU FT270 45w 2m transceiver	£290	2 only MUTEK 2-6m TRANSVERTERS	£169
		2017/11:16:201-2017/2017-2017-2017-2017-2017-2017-2017-2017-	

5 ONLY FT290 MULTI-MODE TRANSCEIVER INC. CHARGER £279 NEW UHF CONVERTOR FOR SCANNER RECEIVERS TO 1.3 GHz £89 MIXED QUANTITY OF YAESU FRY CONVERTERS FOR THE FRG7700 £49



# RADIO AMATEURS EXAM? Before you enrol check the benefits of

RRC'S unique Home Tuition Service

RRC has helped thousands of students to success in their examinations with this unique system of postal tuition, one which guides you, step-by-step, to qualify in the shortest possible time. Only The Rapid Results College offers you all these advantages:

- A qualified personal tutor
- ✓ Study material prepared by specialists
- Completely self-contained courses
- Handy pocket-sized booklets
- ✓ Personal study programme
- ▼ Regular marked tests
- Courses regularly updated
- ▼ Stop-Press Bulletins

- ▼ Free advice before you enrol
- ▼ Telephone Helpline
- ✓ Free 'How to Study' Guide
- ✓ Instalment Plan
- ▼ Free Postage on course material
- ▼ Worldwide Airmail Service
- ▼ Extra tuition free if you don't pass first time

	DAY FOR FREE RADIO AMATEURS PRO prospectus as quickly as possible.	SPECTUS
Mr/Mrs/Miss/Ms		
Address		
<b></b>	Postcode	
	The Rapid Results College	



# with qualit

The Oryx name means a range of soldering tools and accessories designed to meet any modern requirement. Our comprehensive range includes lightweight, cordless rechargeable soldering irons, the famous "Super" and "Viking" standard designs and lightweight temperature - controlled models. All with a wide selection of tip designs and sizes. The unique Portasol butane gas soldering iron completes the range. Oryx also supply the largest range of SR desoldering tools, including the new anti-static pump, power supply units, safety stands and solder pots.



# old X -advanced design at an ordinary price

GREENWOOD ELECTRONICS DISTRIBUTORS

Toolrange 0734 22245 Reading. S.T.C. Electronic Services 0279 26777 Harlow. Veraspeed 0703 641111 Eastleigh. Electroplan 0763 41171 Royston. Engineering and Electronic Supplies 0639 54162 Wales. Cobbies 01-699 2282 London. Buck & Hickman U.K. Anglia Components 0945 63281 Cambridge. E.I.C. Ltd. 0727 36311 St. Albans. Willowvale Electronics 0734 860158 U.K. Anglia Components 0945 632 Reading. Longs 09328 61241 Surrey

Please telephone or write for further information to:

Greenwood Electronics Portman Road, Reading, Berkshire, RG3 1NE Tel: Reading 0734 595844. Telex: 848659

PW

# SOUTH MIDLANDS COMMUNICATIONS



### COVER THE SPECTRUM . . .



FRG 9600 £449 60-905MHz Continuous NBFM, WBFM, AM(W+N) & SSB\* 100 Memory Channels 7(W)  $\times$  3(H)  $\times$  8½(D) ins \* SSB up to 460MHz Both Yaesu Receivers feature keyboard frequency entry and spin tune VFO as standard and optional computer control



FRG 8800 £475 0.15-30MHz (118-174MHz)\* AM/W, AM/N, SSB, CW/W, CW/N NBFM Standard (WBFM Option) 12 Memory Channels \* Optional Unit.

### COVER THE WORLD . .



VISA

SEND LARGE SAE FOR DETAILS SM HOUSE, RUMBRIDGE ST, TOTTON SOUTHAMPTON SO4 4DP. ENGLAND. TEL: (0703) 867333

# COMMUNICATIONS



£241 FOR 6 BANDS/ INTERNAL ATU/ DIGITAL DISPLAY COMPLETE HF 6 BAND TRANSCEIVER

loin the world of ORP

Our latest transceiver kit with 6 band operation (80, 40, 30, 20, 15 & 10) fast becoming a best seller. Sensitive receiver with AGC S Meter, IRT, 3 position LC filter and lots of other features. Tx has fully shaped and variable RF output from 8W down to mW. High grade pcb's screen printed with component placings and comprehensive step-by-step manual designed for the newcomer. Available as a complete Transceiver Kit with custom Case/Hardware, INTERNAL ATU, Power/SWR metering and Digital Display at £241 inc. Reviewed by George Dobbs — "Very pleased", "Good value for money", "Hope the transceiver will become a popular option for QRP.

Brochure available (s.a.e. please)

ALPHA – our 40W + SSB/CW Monoband Transceiver for 160 or 20m. Usable as a Mobile or Base rig, it comes complete with all components, Case/hardware, Digital Display and comprehensive instructions at £179.95 inc.

MICRON MATCH ATU – developed from the MICRON ATU, complete with case

connectors and suitable for up to 20W or SWL Transmatch type. £39,95 inc.

OTHER KITS – RF Broadband preamp 1.8-30MHz, £15. Talking Frequency Meter for Blind ops at £179. UNIVERSAL MORSE MEMORY (see PW Review) at £52.45 (either std or MS version available). For more details of all kits please send 40p in stamps. Allow up to 28 days for delivery. Export a pleasure.

DON'T FORGET – The rest of our range is exclusively available from Cirkit Holdings at Broxbourne, including the DSB80, DSB 2 & 2M transceivers, speech processor, active filter & 2M/HF VFO's. Full details in our own catalogue.

COMING SOON - 4M, 6M & 2M transverters from 28MHz. 1W/20W all mode kits. SAE will fetch details when available

> 20 FARNHAM AVENUE, HASSOCKS WEST SUSSEX BN6 8NS

G3WPO MAIL ORDER ONLY



TUES-FRI 10-4 pm 079186149

### AFFORDABLE ACCURACY QUALITY MULTIMETERS FROM ARMON



**ANALOGUE** 

10ADC Range, 20kΩ/VDC, Buzzer, Battery Test £13.00 Low end voltage & current ranges, Jack for A

o/p'Voltages 20 measuring ranges HM-1015 Rugged, Pocked sized meter, for general purpo

16 measuring ranges Battery, Test Leads and Manual included with each model DIGITAL

HC-7030 0.19% Accuracy. Standard Model £39.50 HC-6010 0.25% Accuracy. Standard Mode £33.50

HC-5010T 0.25% Accuracy. TR Test Facility £39.50 DM-105 0.5% Accuracy. Pocketable

All models have full functions and ranges and

re:
31/2 digit 0.5" LCD display
Low battery indication
Auto zero & Auto polarity
ABS Plastic Casing
DC AC 10amp Range (not DM-105)
Overload Protection on all ranges.
Battery, Spare Fuse, Test Leads and Manual.

184

**FULL DETAILS ON APPLICATION FROM:** 

# ARMON ELECTRONICS LTD T. B. HERON HOUSE, 109 WEMBLEY HILL ROAD, WEMBLEY, MIDDLESEX HA9 BAG TELEPHONE 01-902 4321 TELEX 923985 SE ADD 15% to your order for VAT. PAP Free of charge. Payment by cheque with orde engulries invited Offer applicable to mainland UK only Descaration 20 days for delivery

PLEASE ADD 15% to your

BUILT

# SPECTRUM COMMUNICATIONS MANUFACTURERS OF RADIO EQUIPMENT AND KITS

2 METRE EQUIPMENT

RECEIVE PREAMP unswitched, 14dB gain RP2S RECEIVE PREAMP RF switched, variable gain 0-20dB RP2S & masthead version, RP2M RECEIVE CONVERTER, 10 metre IF, 26dB gain, low noise with OSC out, RC2-10 TRANSMIT CONVERTER, matches RC2-10, 0.5W out. TC2-10 TRANSCEIVE CONVERTER, 10 metre IF, 26dB RX gain 0.5W out, 10mW to 0.5W in TRC2-10 TRANSMIT AMPLIFIER, matches TC2-10 & TRC2-10 TRANSMIT AMPLIFIER, matches TC2-10 & TRC2-10	PCB
10 0.5W in, 20W min. out, TA2U-2 TRANSMIT AMPLIFIER, linear, 3W in 25W min. out. RF switched, suits FT290R, etc. TA2S1	BOXED £42.00 £51.00 PCB £33.00 £39.00 BOXED £39.00 £48.00
4 METRE EQUIPMENT As 2 metre, substitute 4 in place of 2 in type numbers of 2 metre equipment, also RECEIVE CONVERTER, 2 metre IF, 26dB gain low noise, with osc out  RC4-2	PCB £16.00 £22.00 BOXED £22.25 £31.00
6 METRE EQUIPMENT As 2 metre, substitute 6 in place of 2 in type numbers of 2 metre equipment, also RECEIVE CONVERTER, 2 metre IF, 26dB gain low noise, with osc out RC6-2	PCB £16.00 £22.00 BOXED £22.25 £31.00
10/11 METRE EQUIPMENT RECEIVE PREAMP, unswitched, 14dB gain RP10 RECEIVE PREAMP, RF switched, variable gain 0- 20dB RP10s & masthead version RP10SM RECEIVE CONVERTER, 2 metre IF, 26dB gain low noise, with osc out RC10-2 SYNTHESIZER CONVERSION, add 10KHz steps up to PLL02A or MC145106 rigs, SC02A or SC106 SYNTHESIZER CONVERSION, 10FM from UK FM rigs, suits LC7136/7 & TC9119P synth rigs SC29	PCB £5.50 £7.00 PCB £10.25 £14.25 BOXED £18.75 £24.75 PCB £16.00 £22.00 BOXED £22.25 £31.00 PCB £10.50 £11.00 PCB £10.50 £15.00 FITTED £28.00
MISCELLANEOUS EQUIPMENT RECEIVE CONVERTER, 20 metre in, 2 metre IF low noise, with osc out SPEECH PROCESSOR, level & frequency limiting SPECTRA FILTER, 10.7MHz filter & matching SF10.7 FM BOARD, 455KHZ for AM transceivers FM455	PCB £16.00 £22.00 BOXED £22.95 £31.00 PCB £11.75 £16.75 PCB £6.50 £7.50 PCB £6.50 £9.50

**VAT & P&P INC PRICES** Delivery within 14 days subject to availability. 24 hr answering.



UNIT B6, MARABOUT INDUSTRIAL ESTATE, DORCHESTER, DORSET. TEL: 0305 62250.



### THE SCANNER SPECIALISTS

£325

£259

£625

£269

### J.I.L. SX-200-N - THE SUPERIOR SCANNER

The choice of the professionals

AM + FM all bands

Wide coverage: 26-88, 108-180, 380-514MHz

★ 16 memories ★ Positive action keyboard
 ★ Proven reliability ★ 12v DC & 230v AC

S-meter & 96-108MHz converter available

### REVCO RS-2000-E - THE VERSATILE SCANNER

70 memories \* AM + FM all bands Covers: 60-180MHz (no gap), 380-520MHz

Search & store of active channels All the usual search & scan functions

12v DC & 230v AC operation

Counts activity of selected channel

### J.I.L. SX-400 – THE PROFESSIONAL SCANNER

★ Designed for easy plug-in expansion
 ★ Basic coverage 26-520MHz (no gaps)

AM + FM (manual, automatic or programmable)

Computer interfacing for limitless memory, remote control & data logging

Switchable channel spacing & I.F. bandwidths I.F. output terminals (10.7MHz & 455KHz)

★ Specifications set by the professionals

ACCESSORIES FOR SX400:

Regulated mains adaptor for SX-400 £29.50 SX232 (RS232 interface) Built-in "logging mode" ......£224.25

RF CONVERTERS (may also suit other receivers)

RF1030 (100KHz - 30MHz) with C.W. & S.S.B. £299.00 £115.00 ACB300 (Auto antenna control box)

REGENCY HX2000 - THE HANDHELD SCANNER

Covers: 60-90, 118-175, 406-496MHz AM + FM all bands ★ 5, 10, 121/2KHz steps

All the usual scan & search functions

★ 20 memories. Nicads, charger, flexiwhip antenna

# 

★ Superb sensitivity **£POA** 

20 memories ★ Mobile mount

### COMING SOON:

REGENCY MX8000: spec. as MX7000, but new keyboard LED S-meter & up/down step control knob **£POA** 

NEW "RADAC" BROADBAND VHF/UHF RECEIVING AND TRANSMITTING ANTENNA – ask for details

### \* REVCONE \*

A superb quality 16 element, all British made VHF/UHF broadband fixed station aerial from Revco. Ideally suited to all scanners and other VHF/UHF Receivers Covers 50-500MHz PRICE £29.95 inc

### ASK FOR OUR LIST OF SECONDHAND SCANNER BARGAINS

RESISTOR KITS a top selling line for many years. E12 series, 5% carbon film, 10w to 1m, 61 values, general purpose rating 1/4W or 1/2W (state which).

Starter pack 5 each value (305 pieces). £3.10
Standard pack 10 each value (610 pieces). £5.55 Mixed pack, 5 each 1/4W + 1/2W (610 pieces) £5.55

Giant pack, 25 each value (1525 pieces) £13.60

DC/DC TRANSISTORISED INVERTERS 12V input, 400V 200mA

rectified and fully smoothed output ..... ....£9.50 This unit is a chassis section cut from used R/T equipment, tidied, fully wired & tested. Free-standing but no luxuries like

cabinet. 24v version – same price. SAE for details.

We have in stock a very large range of spare parts for PYE RADIOTELEPHONES. Models include Olympic, Westminster, Whitehall, Europa, Mascots and PF70 Series. Parts also available for Cambridge, Vanguard

etc. etc. SAE FOR FREE EXTENSIVE LIST



MAIN DISTRIBUTOR OF REVCO PRODUCTS PRICES INCLUDE UK P&P and 15% VAT Goods normally despatched by return



Phone now for details of our interest free credit

7 NORVIC ROAD, MARSWORTH, TRING, HERTS, HP23 4LS

Phone 0296 668684. Callers by appointment only 

### UNION MILLS, ISLE OF MAN Tel: MAROWN (0624) 851277

SEMFACT – Happy Christmas to all. We have presents for everyone. Everybody should have a Braid Breaker/High Pass Filter, just in case

**S.E.M. TRANZMATCH.** The most VERSATILE Aerial Matching (Tuning) Unit available. Matches 15-5,000 ohms BALANCED or UNBALANCED feeders up to 1 KW. Air coupled BALUN (no toroids) means no connection to equipment, which can cure TV1 both ways. An SO239 and screw terminals for CO-AX, END FED or TWIN FEEDERS. Size 8¾" × 4" × 7¼". 3.5-30MHz £89. 1.8-30MHz £99. The highly acclaimed EZITUNE built in (see below) £35 extra. 90% we sell have the EZITUNE option. All Ex-stock

NEW S.E.M. WAVEMETER. Have you read your licence? Have you got a wavemeter? Produced following so many requests. 1.5-30MHz in 3 switched bands with a meter. Only £34.50 Ex stock.

S.E.M. IMABIC KEYER. No better fully auto keyer anywhere. Uses Curtis chip. R.F. proof. Sidetone etc. £45. A first class twin paddle key £17.50 Ex

BRAID BREAKER/HI PASS FILTER. Stop TVI at TV. £6.95 Ex stock.

RF NOISE BRIDGE. Adjustable 0-infinity ohms, 3" × 11/2" × 2" only. S0239s, 1-170MHz. Neat, accurate & economical. £39.50 Ex Stock.

3 WAY ANTENNA SWITCH 1Kw SO239s. Good to 2 metres. £17.50 Ex

Or 4th position to earth output £19.80 Ex stock.

S.E.M. 2 METRE TRANZMATCH. 51/2" × 2", 3" deep. SO239s. £27.50 Ex

### S.E.M. EZITUNE.

Because no similar unit is made, it's usefulness is not appreciated until you have used one. Eliminates need for S.W.R. bridge.

Clean up the bands, increase your P.A. life by many times, by tuning up without transmitting

Connects in aerial lead, produces S9 + noise in receiver. Adjust A.T.U. or aerial for minimum noise. You have now put an exact 50 Ohms into your transceiver. Fully protected, you can transmit through it, save your P.A. and stop QRM. SO239s. 3" × 1½" × 2". £39.50 Ex stock. P.c.b. + fixing + instructions to fit in TRANZMATCH or any ATU £35 Ex Stock.



SENTINEL 2M LINEAR POWER/PRE-AMPLIFIERS
Feature either POWER AMP alone or PRE-AMP alone or both POWER AND
PRE-AMP or STRAIGHT THROU when OFF. Plus a gain control on the PRE-AMP from 0 to 20dB. N.F. around 1dB with a neutralised strip line BF981. Top performance on transmit and receive.

Top performance on TX and RX.

Ultra LINEAR for all modes and R.F. or P.T.T. switched. 13.8V. SO239s.

Three Models: Ex. Stock 3/36. 12 times power gain, e.g. 3W in, 36W out. £70 10/50. 10W in, 50W out. £86. 10/100. 10 to 100W. £135.

VISA 80M. SSB/CW receiver £60. Ex. stock.

SENTINEL AUTO 2 METRE or 4 METRE PRE-AMPLIFIER (R.F. Switched)

1dB N.F. and 20dB gain, (gain control adjusts down to unity) 400W P.E.P. power rating. Use on any mode. 12V 25mA. Sizes: 1½" × 2½" × 4". £34 Ex stock.

PA5 Same specification as the Auto including 240V P.S.U. £39 Ex stock. SENTINEL 2 METRE PRE-AMPLIFIER. No R.F. switch. £21.90 Ex stock.

S.E.M. AUDIO MULTIFILTER (A very good filter at a very good price). The most versatile filter available. Gives "passband" tuning, "variable selectivity" and one or two notches. Switched Hi-pass, Lo-pass, peak or notch. Selectivity from 2.5KHz to 20Hz. Tunable from 2.5KHz to 250Hz. PLUS another notch available in any of the four switch positions which covers 10KHz to 100Hz. 12V supply. Sizes: 6" × 2½" front panel, 3½" deep, all for only £65 Ex stock.

SENTINEL AUTO H.F. WIDEBAND PRE-AMPLIFIER 2-40MHz, 15dB gain. Straight through when OFF, 9-12V.  $21/4" \times 11/2" \times 3"$ . 200W £25 Ex stock.

SENTINEL STANDARD H.F. PRE-AMP. No R.F. switching. £19.50 Ex

### 12 MONTHS COMPLETE GUARANTEE INCLUDING ALL TRANSISTORS.

Prices include VAT and delivery. C.W.O. or phone your credit card number for same day

Ring or write for more information. Place orders or request information on our Ansaphone at cheap rate times. Goods normally by return. ·····

### **AUDIO FILTERS** MODELS FL2, FL3, FL2/A

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker,

ti gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition it contains an automatic notch filter which can remove a "tuner-upper" all by itself. Model FL2 is exactly the same but without the auto-notch. Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a standalone auto-notch unit. Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

Prices: FL2 £89.70, FL3 £129.37, FL2/A £39.67

### ACTIVE RECEIVING ANTENNAS

Datong active antennas are ideal for modern broadband communications receiver: -especially where space is limited.

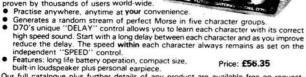
- highly sensitive (comparable to full-size dipoles). Broadl and coverage (below 200 kHz to over 30 MHz).
- needs no tuning, matching or other adjustments.
  two versions AD270 for indoor mounting or AD370 (illustrated) for outdoor use very compact, only 3 metres overall length.

Prices: Mod-I AD270 (indoor use only) **£51.75** Both prices include mains power unit.

Model AD370 (for outdoor use) **£69.00** 

### MORSE TUTOR

The uniquely effective method of improving and maintaining Morse Code proficiency. Effectiveness proven by thousands of users world-wide



Our full catalogue plus further details of any product are available free on request.

All prices include VAT and postage and packing.
Goods normally despatched within 3 days subject

Barclaycard, Access Orders – Tel: (0532) 552461



write to dept. P.W. Spence Mills, Mill Lane Bramley, Leeds LS13 3HE England Tel (0532) 552461

### PCBs SERVICE FOR P.W. PROJECTS PW RTTY Marchwood Power Unit July 1983 July 1983 WR169 PW Seven £3.10 WR169 PW Seven £2.80 July 1983 WR172A £2.90 July 1983 PW Prescale WR171 PW Prescaler £1.65 July 1983 WR174 PW Capacitance meter WR173 PW Digital calibrator £3.40 Oct 1983 WR176/177/178 (each) WR182 Bridport £2.65 Fransceiver Box Unit WR175 PW IF Signal Generator £4 90 Top Direction Receiver lay 1984 £3.90 Top Band Receive Auto Notch Filter WR184 £4.20 May 1984 June 1984 Morse Sending Trainer Microphone Pre-amp Bug Key with memory WR187 £2.40 WR188 £2,40 WR189 £4.35 WR190 Modifying FRG7 Remote MF Loop £3.15 WR191 Remote MF Loop WR192 £3.80 WR192/A/B Bug Key with memory Battery State Indicator Modifying FRG7 WR193 £3.40 £3.40 WR195/A/P Stable Tone Burst PW Teme £4.90 June 1985 WR197 PW Colne £3.60 PW Colne May 1985 PW Colne A005 £2 90 April 1985 PW Coln £3.00 April 1985 WADSOS Battery Charger Controller June 1985 £2.60 WR199A £8.20 WA002 WA001 WR202 WR203 £3.20

### COMPREHENSIVE RANGE OF TRANSFORMERS & PRINTED CIRCUIT BOARDS. A RANGE OF PLASTIC BOXES ARE AVAILABLE Terms strictly by cheque or Postal Orders with order.

PHONE FOR DETAILS Please write or Tel. for more information to:



Electronic & Mechanical Products Ltd 3 Crown Buildings, Crown Street, London SE5 OJR. Tel: 01-703 2311/2 Telex: 886379

For Goods in stock, please allow 4 days delivery

## **191 FRANCIS ROAD LEYTON** · E10

OPEN: MON SAT 9AM - 5.30PM INTEREST FREE **HP FACILITIES AVAILABLE** ON MANY ITEMS PROMPT MAIL ORDER

TELEX 8953609 LEXTON G

TEL. 01-558 0854 / 01-556 1415





### LATEST NEWS



ICOM R7000 SCANNING RECEIVER 25MHz-2GHz Full SSB, AM, FM & Memories

**AOR 2002** 

60-905MHz  $AM \cdot FM \cdot SSB$ 



60-89, 118-174, 380-495, 800-950MHz. 5-10-12-5 25KC steps complete with mount, NiCad charger and antenna

£320.00

### £849 inc ARA500 Active Antenna Worth £99 YAESU FT-757GX



+ FP757 HD PSU + FC757 ATU

### TRIO-KENWOOD TS-940



INCLUDING AUTO-ATU £1,695

### + 800MHz-1.3GHz ICOM R71

25-550 MHz



100KC-30MHz AM FM SSB CW GEN. COV.

YAESU FRG - 8800

YAESU FRG-9600 £425



+ OPTIONAL FRV8800 CONVERTOR GEN. COV.



HX 2000E An excellent hand-held scanner 60- 80MHz 118-136MHz 136-174MHz 390-490MHz 490-525MHz AM/FM 5-10-121/2Kc steps

ICOM

### DRESSLER ARA 500 ACTIVE ANTENNA 50-650MHz up to 950MHz

Gain 17dB Typical

### **TECHNICAL SPECIFICATIONS** FOR ARA 500

17dB Typical (14-17dB) Frequency Range 50-650MHz\*\*

Noise Figure 1dB at 50-180MHz

1.5dB below 300MHz 2.0dB below 350MHz 2.7dB below 400MHz 3.0dB below 500MHz 3.8dB below 650MHz

Operation is possible up to 950MHz with gain of 10dB 4-6dB

Intercept Point 3rd Order: +18dbm at Input



**EV2GAAS** 



YAESU





100W PEP

£60

£20





D200 2 MTR 500W SSB £699 D200S 2 MTR 750W SSB £799 70 CMS 550W SSB £799

> dressler – ara 30 – active antenna 200 kHz . . . 40 MHz

Professional electronic circuitry with very wide dynamic range. Meets professional demands

both in electronics and mechanical ruggedness. 120 cm long glass fibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems. £90 + £4 p&p. See Review in August Issue p.15

### MODEL FREQ. NOISE GAIN **POWER** PRICE EVV1296S 1.25-1.3GHz 0.7-0.9 16-19dB 100W £139 EVV1296C 1.25-1.3GHz 16-18dB 0.9-1.2 100W £119 EVV1296 1.25-1.3GHz 1.9-2.1 14-17dB 100W £100 430-440MHz EVV700 0.5-0.9 15-18dB 500W PEP £90 EVV2000FB 144-146 0.6-0.9 16-18dB 1000KW PEP £90 EVV200FB 144-146 0.6 - 0.916-18dB 700W PEP £80 EVV2000GAAS 144-146 0.6-0.8 16-18dB 1KW PEP £90 EVV200GAAS 144-146 16-18dB 0.6 - 1700W PEP £80

VV INTERFACE FOR ABOVE PRE-AMPS

144-146

	RECEIVE	PRE	-AMPS	
MODEL	FREQUENCY	NOISE	GAIN	PRICE
EWPA 560	50-600-1GHz		16.5dB-1dB	£60
IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	£70
ERPA 435	430-440	0.5	15-18dB	£60
ERPA 144	144-146	0.7	16-18dB	£60

0.6-0.9

15-18dB

## WRITE ON ... the page where you have your say



### Practical?

Sir: As one of the dwindling number of readers who have taken PW right from No. 1, I view with some concern the growing tendency to turn away from the "practical" aspect of our hobby in favour of "blackboxology"; the only practical requirement of this being to have the necessary cash to buy the latest all-singing, all-dancing model.

With the arrival of the November issue insult was added to injury when you have thought fit to postpone the article on "Use of FET DIP Meter" in favour of a five-and-a-bit page glorified advert concerning the Trio TS-940S talking box, the only real point of interest to

me being the price, £1695, basic model, gets worse doesn't it?

Now, I venture to suggest that in the present climate of increasing unemployment and rising cost of essentials, not many readers will be in the position to rush out and buy it.

As the holder of an Amateur Licence I constantly hear fellow hams complaining, "got to count the pennies"; in other words we're all getting hard-up and just cannot afford to go in for these super-duper transceivers.

In any case if one really wanted to know all about the latest offering I am sure the dealers would not be slow in providing the glossy brochure, so why waste space which would be better used "practically"?

Finally should you consider (I doubt it!) this letter for publication, I will start with the £10 prize saving up for a second-hand TS-940S blackbox, I may be lucky at a Bring-and-Buy in 25 years time!

L. Silvester GW6GLL Narbeth

### **EMP**

Sir: Who is Michael A. Lacey? In his letter in PW Nov. 85 he expresses opinions and beliefs which are anathema to the world of amateur radio. His opinionated views can be summed up in one word, POLITICS. A word which if accepted in our hobby would render it unworkable. He puts forward the Greenham Common philosophy" that there is no point in any form of preparation for a nuclear holocaust, simply because no-one would survive such an exchange. That may well be true. It is, however, no reason for not hedging our bets and preparing for the very real probability that many of us would in fact survive. Any other attitude is fatalism.

I have made many contacts in the Eastern Bloc countries and they are nice people, just as human as us, but if you were to suggest to them that they should dismantle their national defence systems in the hope that everyone else would respond in a like manner,

they would simply consider it part of the inimitable British sense of humour.

However, we would never discuss such a thing on the air in the first place. It would not be in the true spirit of amateur radio to do so, not to mention our respective licensing conditions.

Mr Lacey should perhaps write to his MP to express his views, but amateurs in general and RAYNET in particular should treat his over-excited letter in its true context and that is that his opinions are simply not relevant to us or our hobby.

I would like to have expressed my own point of view in much stronger words but how can you argue with people so blinkered?

Derek J. Wrathall G4XQU Bradford

Sir: I enjoyed the article Communications and Nuclear Explosions by M. J. Darby (Practical Wireless, August 1985).

Amateur radio operators can prepare for a EMP event by building a transceiver

## PW COMMENT

FIRST OF ALL, SINCERE APOLOGIES to all those readers who were disappointed to find out that the article on using the FET-DIP Oscillator was not, as promised, in our November issue. As announced at the foot of the Contents list that month, this was due to pressure on editorial space, but perhaps a little explanation of that may help.

When planning what articles are going to make up a future issue of PW, I have to make assumptions on how many pages of advertisements will be booked, how much in the way of news items will have to be included in that issue if they are not to become out of date, how long the topical articles will be, etc. Even when I have to put my neck on the block and state in an issue, what's coming next month, some of these variables are still to be decided.

Usually, things turn out alright, and none of the continuing series, regular features or promised articles has to be left out. Occasionally though, as with component tolerances in electronic circuit design, all the variables combine in the wrong way, making it impossible to get everything that I promised into the number of editorial pages available in a particular issue. Then I have to make the decision on what must be left out, based not only on the effect on readers, authors, and other interested parties in that month, but also on the "knockon" effect on plans for future issues.

On the question of whether we are right to give space to reviews of expensive radio equipment, there are several points to be made. Our recent readership survey showed that our equipment reviews rate almost as highly as constructional articles in popularity. To confine reviews to "inexpensive" equipment would be very limiting. Taking a parallel from the motor industry, magazines and newspapers will review "executive" or "luxury" models as well as family saloons. Even when money is tight, people still like to read about goodies they may not be able to afford, just to dream a little. Anyway, it's not as if the more exotic rigs were never bought—one has only to look at NFD results in *RadCom* to realise that.

Incidentally, the sort of information that was included in the TS-940S review will not appear in a manufacturer's glossy brochure. It's the outcome of separate independent evaluations in the lab and on the air.

Finally, it's good to see the current revival of interest in home construction, despite the frustrations so often experienced in getting hold of the necessary components on the retail market. I am always pleased to receive articles on small, useful projects for radio hobbyists, but they must be properly proved and fully described and documented, **and** use components that are generally available.

If you think you might have a design that would interest other enthusiasts, I'll be glad to hear about it and to send you a copy of our guidance notes for authors.

### \*\*\*\*\*

One of the most frequent complaints which we get from our readers is how difficult it is to find components to build projects nowadays. Stockists such as Cirkit, CPL, Electrovalue and Maplin who advertise in our pages, offer a mail-order service on a wide range of components, but it is convenient to be able to get at least some items locally.

Although the days have passed when there was a radio shop dealing in components in every town, and often one in each suburb of a city or large town, we know there are such shops still tucked away in side-streets in many parts of the UK. Most of them are not geared up to handle mail order, and therefore do not usually advertise in magazines such as ours.

Local inhabitants will probably know about them, but it would be helpful to others if these shops were publicised. If you know of any in your town, please let me know their names, addresses and telephone numbers, so that we can invite them to join in our new small-box advertisement feature (see the back of this issue). Thank you, on behalf of all frustrated component-seekers.

Geoff Arnold

with the following specifications:

- A. High frequency (h.f.) low-power operation
- B. CW capability
- Vacuum-tube technology for all stages
- Shielding (as close to "tempest" quality as possible)
- E. Built-in nanosecond transient-protective devices
- F. Over-rated circuit components (to accommodate excess current and voltage)
- G. Heavy point-to-point wiring instead of a circuit board
- H. Circuit layout that can be serviced with a fireheated soldering iron
- Integration of carbon block r.f. absorbers into the shielding
- J. Battery power station
- K. Rapidly deployable antenna system (this would be stored in a shielded container when not in use)

- Shielded fire-resistant container for storing the transceiver
- M. Shielded stock of spare parts

I originally published these specifications in a letter to QEX the ARRL experimenters' exchange (September 1985). This letter was then reprinted in the ARRL Field Forum (October 1985).

Amateur radio operators should also consider the possibility of a pure-case EMP attack where a nation's economy would be ruined without the firestorms, fallout, and low altitude explosions of

"conventional" nuclear war. An EMP war may be more likely to occur than would a regular nuclear war.

> Nickolaus Leggett N3NL Washington DC, USA

Sir: Heaven forbid that the fascinating and peaceful pages of PW should become

Send your letters to our Editorial Office in Poole, the address is on our contents page. We will pay £10 for the Star Letter each month, £5 for any others published. letters must be original and not duplicated to other magazines. The Editor reserves the right to shorten or modify any letter. We regret that we cannot answer letters by post unless accompanied by an s.a. & Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily thuse of Practical Wireless.

a forum for political argument. Nonetheless, I cannot let Michael Lacey's letter in your November issue pass without comment.

Anger gets one nowhere Mr. Lacey and neither does complacency. As one who survived WW2 (it was a nuclear war) I am very fortunate. I believe that radio amateurs did and can play a vital role in both peace and war and I am sure the authorities recognise this. After the war I had the responsibility of setting up communication centres for regional seats of government and although all involved were servicemen, many were also radio amateurs and it was their specialised knowledge which contributed significantly to the technical efficiency of the system.

What stops war Mr. Lacey are not those who are angry

and incensed. It is fear. Fear of the inevitable consequences. Maybe one day it will be this fear which will develop within us all a commitment to peace. But we are not there yet. In the meantime we must be prepared. If we as a nation become involved again I would like to think that the members of RAYNET who unselfishly devote a considerable part of their spare time to the service will be there to help co-ordinate the rescue services in an attempt to save lives. whatever the future holds for them. Their activities have nothing to do with politics or the rights and wrongs of nuclear armament.

V. J. Copley-May G3AAG Petersfield, Hants

This correspondence is now closed—Ed.

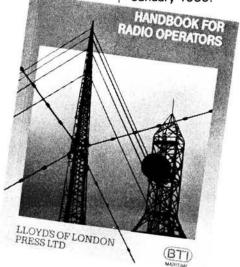
# **BOOKSHELF**

### ... available from book stockists

HANDBOOK FOR RADIO OPERATORS
Published by Lloyd's of London Press Ltd. for British
Telecom International
283 pages, 210 × 148mm (paperback).
Price £9.95. ISBN 1 85044 050 6

This latest version of a publication known to generations of seagoing radio officers as the "PMG Handbook", forms a practical working handbook for those who use radio at sea, and replaces the 1975 HMSO edition, now out of print.

There is a totally new section dealing with maritime satellite communications services, and the remainder of the book has been revised and updated to take account of the ITU Radio Regulations which became effective in January 1985.



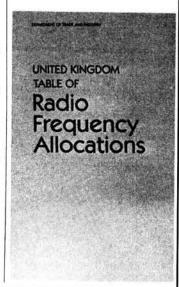
UNITED KINGDOM TABLE OF RADIO FREQUENCY ALLOCATIONS
Published by HMSO for the Department of Trade and Industry
308 pages, 209 × 146mm (paperback).
Price £12.00 ISBN 0 11 513819 6

One of the recommendations of the Merriman Report was that the UK Frequency Allocation Table, which until now has been a classified document, should be published. This book is the result of that recommendation.

It is divided into four chapters. The first two reproduce related terms and definitions from the international Radio Regulations, and explain the footnote reference system. The third chapter contains the international table of frequency allocations, with the UK national table printed on the facing pages.

Finally, chapter four contains more detailed information on the internal arrangement of certain bands and sub-bands for some of the more widely used radio services. These include the Amateur and

Amateur-satellite services, Land mobile services, Private fixed services, Lowpower systems and the UK Radio astronomy observatories.



### **GW** Repeaters

In order to provide improved 144MHz repeater coverage in the urban areas of South Wales around Swansea, Llanelli, Neath and Port Talbot, the Swansea Repeater Group are currently constructing GB3SA. Tests made from the proposed site at Clase, Swansea, have given excellent results and it is hoped to be operational by the summer of 1986.

The group do not intend to ask for yearly subscriptions but donations towards the construction and on-going maintenance will be very welcome. As with all UK repeaters their existence depends on an enormous amount of totally voluntary work. The very least that we as users of such facilities can do is to make a financial gesture of appreciation. Nobody can "listen through" a QRT "box".

Offers of help, donations and requests for further details should be sent to: The Swansea Repeater Group, c/o Peter Alexander, GW4RXO, 80 Yr Aran, Dunvant, Swansea SA27PX. construct and commission

### More Meon

It seems clear from the feedback received direct on the air, over the counter at our rally exhibition stands and from your letters that the PW Meon transverter has proved popular.

Versions for 50, 70 and 144MHz are now in use and the demand for some of the more specialised components had created temporary supply problems. Electrovalue were reported to be receiving telephone orders for the Siemens SO42P mixer every 10 minutes-fortunately they do have a large stockholding capability.

Due to popular demand the authors have produced a modified version of the Meon which will allow use of a 144MHz i.f. This should be

very useful for Class B licence holders and will also leave the h.f. transceiver available for crossband operation. Look out for this article which is coming soon, together with p.a. design options.

Meanwhile a complete kit of parts including the specified case, is available at £51 inc. P&P from C.P.L. Electronics, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE or Tel: 0642 591157. A comprehensive stock of components and tools is also maintained—CPL will undertake to supply nonstock or difficult to obtain items for PW projects. An s.a.e. will bring you the details.

For the u.h.f. minded GW stations GB3SG should be QRV by the time you read this. Operating on RB15 this South Glamorgan based repeater will cover Cardiff, Newport and surrounding areas. The group hope to

the 1-3GHz repeater GB3VG during 1986. Membership enquiries and donations to the South East Wales Repeater Group should be addressed to: Steve Williams GW6CUR, 301 Newport Road, Roath, Cardiff CF2 1BS.

### Repeater News

Chris Young, G4CCC, the Publicity Officer of the Repeater Management Group has supplied the following information. The second batch of 430MHz band u.h.f. repeater submissions to the DTI for 1985 included: GB3HL, West London (RB3); GB3BV, Hemel Hempstead (RB1); GB3GH, Gloucester (RB5); GB3DD, Dundee (RB10); GB3WJ, Scunthorpe (RB5); GB3RE, Chatham (RB11); GB3GM West Glasgow (RB12 RTTY/DATA). Franchises for repeaters on RB1, 3 and 5 will not be released until the completion of mutual non-interference/coexistence negotiations with the Scandinavian groups operating on the reverse of these channels.

A batch of 1.3GHz band (24cm) ATV repeater licence applications will be submitted for the following: GB3HV, High Wycombe (RMT3); GB3PV Cambridge (RMT2); GB3SX, Hastings (RMT1-using a.m.); GB3GT Glasgow (RMT2); GB3AF, Durham (RMT2).

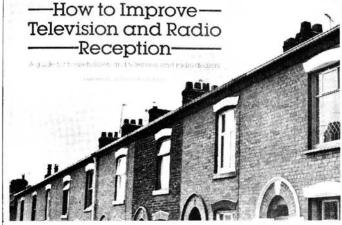
The Potteries ATV repeater GB3UD was scheduled to start up on 19 October on RMT2 (1249MHz input/1318-5MHz output), using f.m. The site is on Mow Cop at approximately 300m a.s.l. and reports will be gratefully received by G6UKP.

Financial constraints have caused the postponement of the RMG open meeting in S. Wales and the RMG technical conference. A proposed u.h.f. repeater coverage booklet has also had to be dropped due to heavy workload.

### TV and Radio Reception Guide

During October the DTI published the 28 page booklet How to Improve Television and Radio Reception, which is available free from main post offices. Its two principal parts cover advice for the householder and the TV and Radio dealer. A step-by-step procedure for verifying the installation is performing efficiently, together with an explanation of anomalous (tropospheric) interference is given, before detailing the potential sources and reasons for interference.

Amongst other radio services identified the guide clearly states that the mere existence of a local radio amateur station does not imply that his/her installation is at fault. Further details catalogue the items of equipment protected under the various Wireless Telegraphy Acts and indicate the preventative



measures that can be undertaken by the householder.

The second part is for the benefit of the servicing trade and goes into some detail in respect of equipment electromagnetic compatibility (EMC). In fact the filtering and de-coupling arrangements will be of use to most radio enthusiasts.

A series of appendix notes provide frequency bandplans (almost

correct-but when did the UK amateur enjoy bands at 425 and 450MHz?), filter analysis and commercial sources of same, together with a resume of Regulations/British Standards and address details of principal broadcasting services.

The concluding pages detail the procedure for requesting help from the RIS, including the appropriate form and where to send it.

### Licence Changes

Just in time for JOTA 85 the DTI announced a relaxation of the regulations governing messages passed via the amateur service by non-licensed persons.

In future amateur special event stations (normally GB series prefixes) in the UK will be permitted to carry third party traffic to and from

Canada, the USA and the Falklands in addition to inter-UK contacts. Messages of a technical or purely personal nature may be passed between non-licensed operators whilst the station is under the control of the licensed amateur permitted to operate it-initial contact having been previously established with a licensed amateur station at the far end of the link. Messages are limited to two minutes. with one contact per nonlicensee allowed. No payment must change hands.

This relaxation of the rules is a concession to radio amateurs to promote goodwill towards the amateur service and demonstrate the effectiveness of amateur communication. Applications for special event callsigns should be made via the RSGB who act on behalf of the DTI. This facility is not limited to RSGB members.

### **Possible US Band**

Proposals made by the ARRL seeking expansion of the current 28MHz band section used by US Novice licence holders could, if adopted, create worldwide problems. The international beacon system mainly operates within the agreed sub-band 28-2-28-3MHzthe ARRL proposal is to allow multi-mode Novice operation down to 28-1MHz (the current US lower phone limit is 28-3MHz). The use of c.w., s.s.b. and RTTY within this sub-band will obviously affect the beacon system and it should be remembered that if the Novice allocation goes through US General and higher licence classes will automatically be allowed use of the same frequencies, with up to full legal power.

It is further understood that ARRL, in recognition of this fact, would initiate proposals to reorganise and move the beacon network



### **BT Faraday Lecture**

**British Telecom** commenced the 1985/6 series of Faraday Lectures, on behalf of the Institution of Electrical Engineers, during October. Entitled "Beyond the Telephone: the Intelligent Network" the

lecture will tour 16 towns and cities playing to an estimated audience of more than 70 000 people. The lecture explains to the layman how microchip technology is changing telecommunications. In the

words of BT's Chief Executive of Technology and Senior Faraday Lecturer "As we move into the information age it is becoming increasingly important that people understand the technology that is changing our lives"—"Our presentation is planned to stimulate a lasting interest in electronics and telecommunications". Remaining venues include: Harrogate, Conference Centre-11 December; Portsmouth, Guildhall—22 January; Liverpool, Philharmonic Hall-30 January; London, Logan Hall-4/5/6 February; Birmingham, Town Hall—12 February; Belfast, Sir William Whitla Hall—26 February; Exeter, University Great Hall-5 March; Bristol, Colston Hall-12 March: Derby, Assembly Rooms-19 March.

### **WAB** Islands Award

From 1 January 1986 the Worked All Britain Awards organisation will be operating the Worked All Britain Islands Award, A certificate will be awarded for contacts with 25 qualifying islands with further endorsements for 40, 50, 60, 70, 80, 90 and 100 islands. This should be an enlightening exercise if nothing else!

An island for WAB purposes is defined as a naturally formed piece of land lying off-shore from the mainland of Great Britain and Northern Ireland and

includes the Channel Islands, | EUROCAST all of which are at some time surrounded by the sea. Manmade bridges/causeways do not negate this status but the island must be named on the 1:50 000 OS map. Where a group of islands is named on the map and the individuals are not, then only one of the group counts towards the award.

Claims for the award certificates (cost £2) and record sheets for the purpose can be obtained from: Brian Morris G4KSQ. 22 Burdell Avenue. Sandhills Estate, Headington, Oxford, OX8 8ED. Please include an s.a.e. (sufficient IRCs for non-UK).

The European World Trade and Convention Centre. Basel, Switzerland will be the venue for EUROCAST 86, the focal point for European Cable and Satellite TV exponents. Due to a date clash with the Swiss Industries Fair, EUROCAST 86 will now be open on 11-13 February providing a comprehensive exhibition and conference facility. Further details: Cable and Satellite Television Exhibitions Ltd., 3 Barratt Way, Tudor Road, Harrow, Middx. HA3 5QG. Tel: 01-861 4877.

### **New US Band**

From 28 September 1985 the majority of the United States had access to a new amateur band. Technician and higher licence classes are allowed all-mode operation within the frequency range 902-928MHz (33cm), subject to non-interference to industrial, scientific and medical services. Stations within 240km of the White Sands Missile range in New Mexico are limited to 150W p.e.p. Initial use will probably centre on f.m. using equipment developed for the Japanese Personal Radio Service—currently understood to be struggling for existence in the land of the rising sun. On the same day US amateurs within 80km of the Canadian borders lost use of the 420-430MHz section of the u.h.f. band. Canadian land mobiles will use the vacated spectrum—a familiar story?

### HF NFD-EI Style

The South Dublin Radio Club are hopeful that their efforts during HF NFD will match the tenth place worldwide obtained in the CQWPX contest last March. Using the callsign EI7H/P during NFD and operating from the Dublin Mountains, the group clocked-up over 1000 contacts and some 114 possible multipliers. An 18m mast accommodated a TH-5 beam, 3.5MHz V dipole and slopers for 7 and 14MHz. FB one and all.

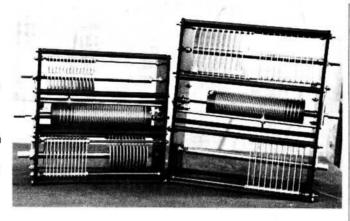
### **Antenna Tuning** Units

The latest developments in h.f. antenna tuning units have resulted in the SPC-300 and SPC-3000 modules from ATUs UK of Cap. Co. Electronics.

Both models are available in module form or installed in a cabinet and have had several improvements made to the original basic design which dates back some three years. These improvements are claimed to allow the units to tune the h.f. bands up to 28MHz over an impedance range of half an ohm to several thousand ohms.

The 300 is capable of running 1kW while the 3000 can handle 5kW. By altering links on the front and rear panels the unit can be altered into a Transmatch, PI, LC, T, C or L match.

Prices for the cabinet versions are £164 for the SPC-300C and £214 for the SPC-3000C, both incl. VAT. For further details contact ATUs UK of Cap. Co. Electronics Ltd., 63 Hallcroft, Birch Green, Skelmersdale, Lancs WN8 6QB. Tel: (0695) 27948.





### Catalogue

We have just received the latest edition of Marco Trading's catalogue which lists a wide range of electronic components. Each month Marco will be offering customers a special low price on a selected item

and there is also a special offer supplementary list and a 50p voucher. For your copy of the 1985-6 Marco Catalogue, send £1 to Marco Trading, The Maltings, High Street, Wem, Shropshire SY4 5EN.



A new hand-held digital multimeter has been introduced by Harris Electronics. The G44 is housed in a high-impact plastics case with integral tilt stand and safety sockets. Both range and function are selected by a single rotary switch and the display is a 0.5in l.c.d. unit.

Full overload protection is given by a low-capacitance spark gap for voltage, surge current limiter for resistance, fast switching high-current diodes plus fuse for current and the a.c. converter is voltage protected by a resistor diode network.

The basic ranges cover 1000V d.c., 750V a.c., 20A d.c. and a.c. and 20MQ resistance.

The G44 costs £49 from Harris Electronics (London) Ltd., 138 Gray's Inn Road, London WC1X 8AX. Tel: 01-837 7937.

### **VHF** Contest Logging Program

The computer is very useful for contest logging and scoring and GM4SZA has produced a disk-based package for v.h.f. contest operators. Written for the BBC-B, this program can deal with up to 1500 contacts during each contest. This is reduced to 1000 if the location is added to the stored information on each contact.

Duplicate checking is performed by machine code and takes typically 0-1 seconds for 1000 callsigns. If the program is used in realtime during the contest, a clock is always displayed on the screen. However, if the program is used after the contest to produce a neat log and calculate scores the time for each contact has to be entered manually. Locators can be either the old five-character European or the new six-character universal system or a mixture of both, with the program automatically sensing which is being used for each contact. Three different scoring systems are catered for—Radial Ring, Practical Wireless QRP and X points per km.

The program is supplied on a dual format 40/80 track disk formatted to Acorn standard with a set of comprehensive instructions. Available direct from GM4SZA, 7 Ashgrove Road West, Aberdeen AB2 5BB, the program costs £6.50, incl. p. & p.

### **UHF** Converter

Do you want to increase the frequency coverage of your scanner into the u.h.f. bands? If you do, then ARE Communications have a converter which will add 800MHz to the frequency range of any scanner. This means that if your scanner covers the range 25 to 550MHz then using the converter will enable it to cover 825MHz to 1.35GHz.

The converter requires a 12 to 14V d.c. supply at 80mA and is simply connected between the scanner's ANTENNA socket



# **PRODUCTS**

and a suitable antenna.

A double balanced mixer is used to reduce reception problems, although the use of the scanner's RF GAIN control should reduce any breakthough effects. Some reduction in performance may be evident above 1GHz, but it is claimed that good results have been obtained at frequencies as high as 1-47GHz.

The converter costs £89 from ARE Communications Ltd., 28 Bridge Street, Earlestown, Newton-le-Willows, Merseyside. Tel: (09252) 29881.

### Handhelds

A new range of v.h.f. and u.h.f. f.m./handheld transceivers has been introduced into the UK under the Kenpro name by Hi-Tech Worldwide. The two models at present available cover the 144 and 430MHz bands and feature re-chargeable NiCad battery packs and a mains charger as an introductory offer. The 144MHz model, designated KT200EE is priced at £169 while the KY400EE for the



430MHz band costs £189 incl. VAT. Further technical details are available from Hi-Tech Worldwide Ltd., 584 Hagley Road West, Oldbury, Warley B68 0BS. Tel: (021-421) 6001.

# Computer Control

G3LIV has entered the market for software written specifically for the new generation of receivers and transceivers. The first package is for the Yaesu 757GX transceiver and allows complete control of the rig from the computer keyboard. The computer chosen is the popular BBC-B, and it can be interfaced to the rig using either the Yaesu supplied interface unit or G3LIV's own design unit.

The keyboard controls the frequency of the A and B v.f.o.s in steps of 10Hz, 100Hz, 1kHz, 10kHz and

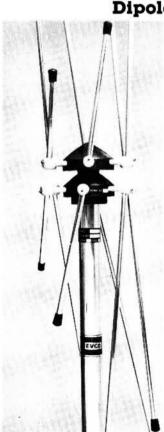
1MHz, as well as allowing direct keyboard frequency entry. A storage capacity of 300 frequencies has been allocated for allowing that number of stations to be checked in seconds.

The program is available on disc at £9.50 and ROM at £12.00, incl. p. & p., direct from G3LIV, 2 Salters
Court, Gosforth,
Newcastle, Tyne & Wear
NE3 5BH. Tel: (091)
2843028.

Other programs in the pipeline are for the FT-9600, FRG-8800, FT-980 and for some of the Trio range. Readers are asked for their interest so that the most popular can be catered for.



### Dipole Nest



The demands by scanner users for suitable antennas to cover the ever-increasing range of their sets has been met by a new British made wide-band v.h.f./u.h.f. antenna from Revco.

Produced after concentrated development, the new designs are based on a modified "nest of dipoles" concept. Of interest to the radio amateur is the fact that up to six specific bands may be specified as transmit frequencies, thus allowing the amateur to use the antenna on all the available amateur bands from 28MHz to 430MHz.

At present the frequency range of the antenna is 25 to 500MHz and the elements are arranged in a radial configuration, offering a compact antenna with low wind resistance. The antennas are distributed by Garex Electronics, 7 Norvic Road, Marsworth, Tring, Herts HP23 4LS. Tel: (0296) 668684, and are priced at around £30.

# The Smallest

Lascar Electronics have just introduced a range of digital panel meters which they claim will be easy to use by both low or high volume users.

All the models in the range are designed and made in the UK and utilise the latest surface mounting techniques to greatly reduce the overall size.

Standard features include auto-zero, auto-polarity, 200mV f.s.d., programmable decimal point and "low battery" indication.

The l.c.d. incorporates a range of useful engineering symbols and three different character heights are available—10,12·5 and 15mm and the version with the 10mm high digits is claimed to be the smallest off-the-shelf d.p.m. in the world. At a one-off price of £16.95 Lascar reckon that it is also probably the cheapest.

Further details from Lascar Electronics Ltd., Module House, Whiteparish, Salisbury, Wilts SP5 2SJ. Tel: (07948) 567.

### Scanning Information

Antennas for Scanners, Choosing a Shortwave Receiver, and What Kind of Antenna do I Need for Shortwave? are free information sheets available from Grove Enterprises, PO Box 98A, Brasstown, NC 28902, USA, for an s.a.s.e. from USA readers or \$1.50 equivalent IRCs for airmail to non-US readers. Also just released is their latest free catalogue of products for the serious listener. Grove also publish *Monitoring Times*, a monthly tabloid on all aspects of monitoring the radio spectrum.

My pen is poised and I shall write A story that's not meant to frighten you who read this sad story Of one ill-fated licensee. For niceness sake I will not mention His callsign, name or his location But to make the story run We'll call him Mr. N. E. One.

Now Mr. One had always been Keen on the amateur radio scene. When playing cops and robbers he Was the one who called "emergency!" On a lump of wood he called his 'mike' Mounted on his sister's trike. He and some pals as they grew older Made things that worked with wire and solder And I've heard it said, 'though quietly. They even took to . . . piracy Then work and YLs played their part But the airwaves still retained his heart. So, at the earliest opportunity He took and passed the RAE. He sold his camera, bike and stamps. Even his antique railway lamps. Then he borrowed some more from sister Sally And rushed along to the nearest rally.

He bought himself a lovely rig Complete with microphone and 'twig'. (For those of you who are concerned You'll like to know he quickly learned The accepted terminology Of the amateur fraternity!)

An age it seemed to him passed by 'Till his licence came from the DTI
"At last!" he cried, "I can transmit!— -If I can decipher it!" (Of course he managed eventually To read his call sign) and then he Jumped in his car, put her in gear And took to the road with a full-throated cheer.

# Tale

Now most of you I am sure will have known How he felt as he first used the microphone-The nervous dry mouth, the intense concentration, Cautionary

The strained shaky voice and the sense of elation

When from nowhere an answer comes back to your call

And the strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shaky voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation

The strained shake voice and the sense of elation shake voice and the sense of elation shake voice and the sense of elation shake voice and t And you know you're an amateur, once and for all. (How ironic the words that I've chosen appear, For from now on my story gets grimmer I fear!!)

> So, back to our 'hero' now 'feeling his feet' With a helpful G4 on the local repeater. He found it quite awkward whilst driving along And holding his fist mike to concentrate on His gears or his speedo, his wipers or brake But his QSO progressed without a mistake. A few other contacts came in with congrats. And he lit up a cigarette, much more relaxed.

He waved to a friend with the mike in his hand, Reached for a packet of Polo-mints and The last thing he said-or the last that was heard-Was, "the price that he asked was quite franky absurd So I'll go to a rally and pick one up there . . Then it all went quite quiet—at least, on the air!

> He avoided the oncoming coach and the tractor But immovable trees were a different matter.

He lay there half in and half out of the wreck With the lead from his microphone wrapped round his neck. You've dropped out of the box." Said a voice from afar. But then, with a thud, he dropped out of the car!

> He's still lying prone in his hospital bed, With plaster and bandages wrapped round his head And 'though he can't talk yet he thinks quite a lot Of what he will do and of what he will not. 'If only's' and 'What if's' spin round in his brain-But with luck he may take to the air once again-And of course if he does I'm quite sure he won't fail To tell new licensees of his caution'ry tale. PW



by Derry Parker G1MBC

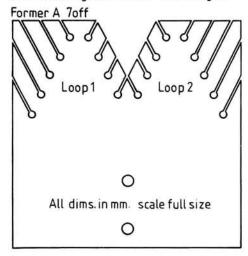
## ERRORS & UPDATES

### The W-Q MW Loop Antenna, November 1985

We are sorry that, in trying to simplify the drawings for this project, the details given in Fig. 1 did not make sense. The Perspex plates are of two types, drilled and slotted as shown here.

Also in Fig. 6, C10 and C11 should have been connected across the right-hand half of bridge D1 as C8 and C9 are connected across the left-hand side. Capacitors C7 and C12 should be 1000µF in Fig. 6 and the components list. The output of Fig. 6 is 18V 125mA.

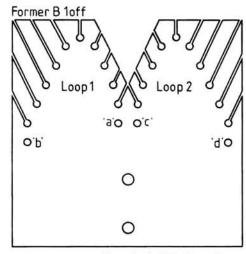
Material: 3mm Perspex 60×60 8off Coil mounting holes 2dia on 0.1in grid



### PW Meon, October 1985

Trimmer padder capacitors C31/39 shown dotted on the circuit diagram are only required on the 50MHz version. Increased i.f. output and improved stability of the post-mixer stage, if found to be necessary, can be obtained by adding a 1nF ceramic capacitor across the source resistor R43. Inductor L7 is tapped at one turn from the "cold" end. The Cirkit OM1 relay (Stock No. 46-70060) is a direct replacement for RLA.

> Start half winding at 'a' to 'b' then'c' to'd' repeat 24 times



WRM432

# Computing Constructional

# RTTY/Morse modem



Radio amateurs with computers will find this modem, designed by N. Allen-Rowlandson G4JET, a very useful piece of equipment. It can handle Morse and RTTY transmissions as well as computer data.

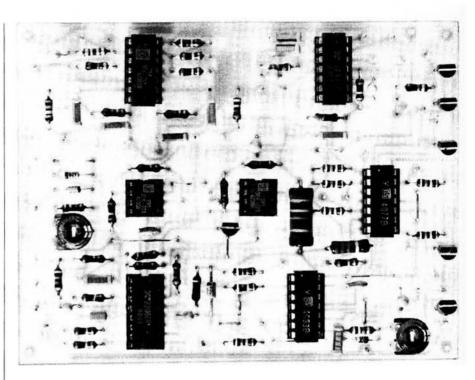
Although several designs for modems have been published for the amateur builder, none has so far offered the flexibility to cope with the wide variety of data transmission formats. This modem has been designed to cope with a wide range of data rates and tones by the use of plug-in modules, each one set up for a particular mode of operation. As a spin off from using the Exar i.c.s, it is possible to obtain clean Morse data from the relatively noisy signals expected on the h.f. bands.

The inputs and outputs are provided to interface with any home computer so that operation of the transceiver can be done from the keyboard. The prototype has been used by several amateurs with Commodore 64 and VIC 20 computers mainly because of the availability of the RS232 facility on the user port. If your computer does not have RS232 or similar, then you will have to write your own.

Program listings for the Commodore 64 and VIC 20 have been included, in which the information on connecting to the user port is given. The listing for the RTTY program is available from the PW Editorial Offices on receipt of a large s.a.e.

### **Description**

First, a quick look at the i.c.s used. The Exar XR2211 and XR2206 have been designed specifically for this type of application and have proved to give superior performance to any of the alternative methods tried by the au-



thor, albeit some of them were crude!

The XR2211 consists of the usual phase-locked loop with two separate signal conditioning sections, one for data and the other for carrier detection. The component values for various data rates and tones can be calculated from the design rules (taken from the manufacturers application notes\*), but with some compromises, the values given in this design seem to cover the majority of formats used on the air.

The XR2206 generates low-distortion sinewaves whose frequency is dependent on the values of R12, 16 and the logic level on pin 9. The two potentiometers are completely independent which makes the frequencies very easy to set up. The i.c. is also capable of driving a line isolation transformer without buffering.

The output amplitude is determined by the value of R10 and is given to obtain the correct level of output to suit a standard audio line. For the transceiver microphone input, an attenuator is required. In practice, most transceivers have good audio signal handling (a.g.c. and filtering) and will tolerate gross input overload but it is worth experimenting with the value of R6 to get the best results.

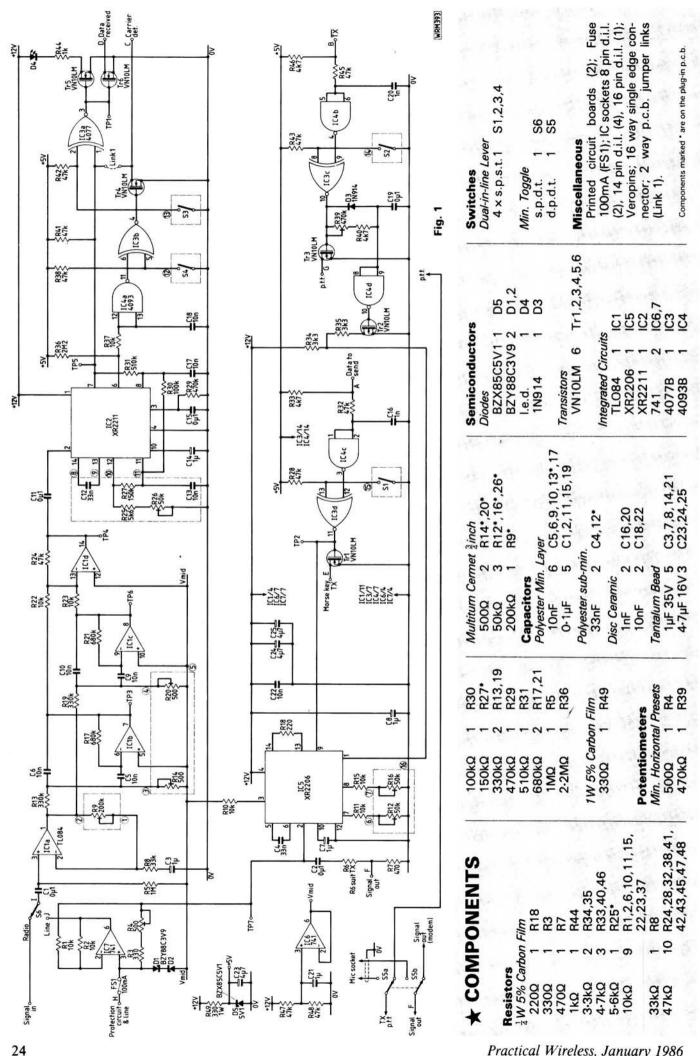
The modem circuit (Fig. 1) itself is very straightforward. Tones are applied to the buffer amplifier and then to the active filters whose values are calculated to give a Q of 10 around 1.5kHz, the outputs of the filters are summed before being applied to the XR2211.

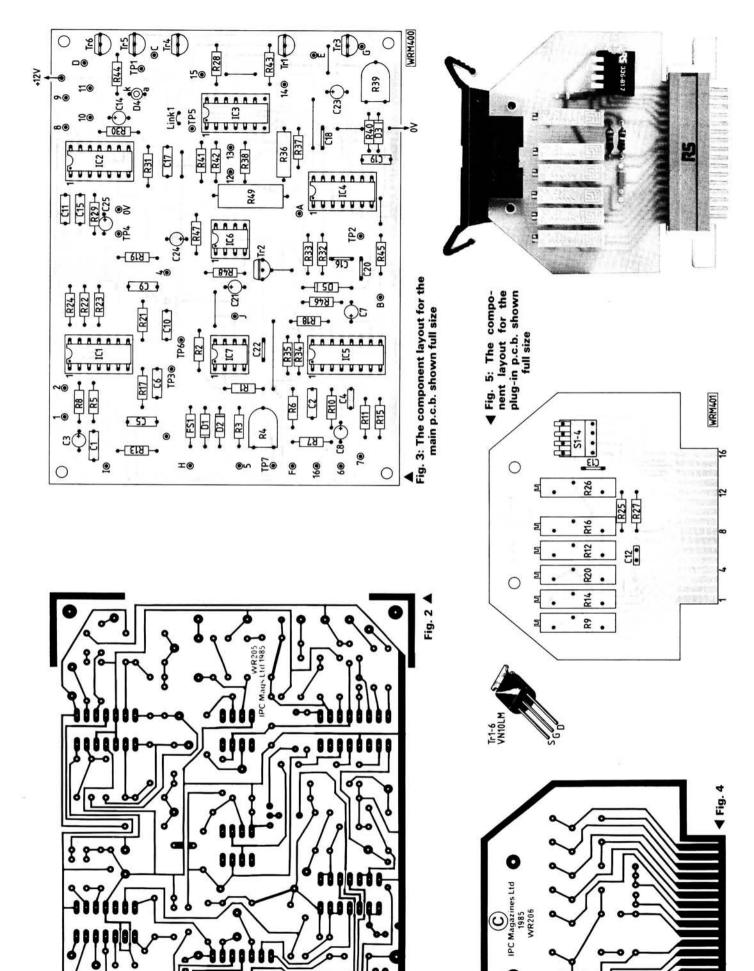
Two outputs are taken from the XR2211. The first is the decoded data which is taken through an exclusive NOR gate to allow data inversion by operating switch. The data is sent to the computer by an open collector transistor. If you prefer, the base resistor and capacitor can be replaced by a link and the output transistor can be a v.m.o.s. device like the VN10LM.

The second output, carrier detect, goes through another filter before going to the computer. This output is primarily for Morse decoding but if Link 1 is made then data is inhibited if a tone is not detected. Remember that if you wish to look at the data at the output without being connected to a load, add a pull-up resistor of about  $10k\Omega$  from the collector to +5V.

Data from the computer is first filtered, then fed to the exclusive NOR gates and then either operates driver transistors or modulates the tone generated by the XR2206. Transistor Tr3 is used to turn the transmitter on via the p.t.t. line and Tr1 is used to operate the key input. On the prototype, the p.t.t. and key lines were driven directly using v.m.o.s. switches, but if interfacing is required then reed relays could be used.

"The data from the application notes has been used in the program listing "XR2211 DESIGN PROGRAM" written again for the Commodore, but should be easily transferred to any other machine.





Practical Wireless, January 1986

The isolation amplifier (IC7) is only used with a wire data link and is adjusted to prevent the transmitted frequency swamping out the received frequency and is best set up on the actual line where the modem will be used. N.B. This modem is not BT approved, and it is illegal to connect the modem to a BT telephone line under any circumstances. It is worth making the line isolation transformer an approved type even so, first to provide the required electrical isolation and secondly because an inferior transformer stands a good chance of saturating due to any d.c. flowing through it when on line. This will not cause any great embarrassment, it just won't work!

A switch (S5) is also provided to switch between the modem and the transceiver microphone. This saves a great deal of time plugging in and out the microphone which seems to be done endlessly in the early days of using the modem!

### Construction

There is nothing special to watch out for when constructing the modem other than the usual anti-static precautions that should be followed when assembling semiconductor devices. The main p.c.b. (Figs. 2 and 3) has been laid out to allow all connections to be made to it including all the inputs, outputs and transceiver lines.

### Setting up

The best way of setting up the modem is with a frequency counter and an oscilloscope, but just an oscilloscope is adequate. The general principle is to set up the transmitted tones, feed them into the demodulator, set that up to decode the data and then reset the transmitted tones if they are different.

Monitor pin 2 of the XR2206. The sinewave amplitude should be 1V peak-to-peak and its frequency set by R12 or R16 depending on the state of S1. Make a temporary connection between TP7 and I and adjust R4 to obtain 3V p-p at the output of IC1a.

Monitoring the output of IC1b, adjust R14 to obtain a maximum output, change S1 and repeat for IC1c adjusting R20. Next connect the computer to D and adjust R26 so that the demodulated signal on A is the same as the data in from the computer.

Remove the temporary connection and reset R12 and R18 to the required transmit frequencies. The modem is now ready for use.

### In Use

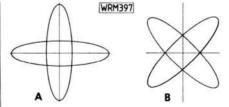
One of the problems encountered using any radio in close proximity to a computer is interference. As already mentioned, the prototypes have been used with Commodore 64s and VIC 20s. Both of these machines have a screen inside them and have a filter on the supply lead, but it was found that a great deal of noise still escaped from

### MODEM PROGRAM

```
10 PRINT"(CLR)(CUR DN)(CUR DN)(CUR DN)(CUR RT)(CUR RT)(CUR RT)(CUR RT)GENERAL PU
RPOSE MODEM PROGRAM(CUR DN)(CUR DN)(CUR DN)"
20 PRINT"(CUR RT)(CUR RT)(CUR RT)(CUR RT)OPTION MENU"
30 PRINT" 1.....50 BAUD"
                 2.....75"
40 PRINT"
50 PRINT"
60 PRINT
                 4.....134.5"
   PRINT"
                 5.....150
BO PRINT"
                 6.....300"
                 7.....600"
   PRINT"
                  8.....1200"
9.....1800?"
100 PRINT
120 PRINT"
                  10....
                          . 2400
     INPUT"
                  ENTER OPTION": A
140 A=INT (A)
                                                   ( 31 spaces )
                                                                                   ": GOTO130
                  1.....NO PARITY BIT"
2.....ODD PARITY"
3.....EVEN PARITY"
160 PRINT
170 PRINT"
180 PRINT"
190 INPUT"
                  ENTER OPTION":P
200 P=INT(P)-1
210 IFP<ODRP>2THENPRINT"(CUR UF)
                                                                          ": GDTD190
220 INPUT"1 OR 2 STOP BITS?":B
230 B=INT(B)-1
240 IFB<OORB>1THENPRINT"(CUR UF)
                                                   [ 22 spaces ] ":GOTO220
270 S$=CHR$(S$128+(32+A))+CHR$(32*P)
280 OPEN2.2.0,S$
290 PRINT"(CLR)"
300 PRINT"
305 PRINT" (CUR DN) (CUR DN) (CUR RT) (CUR RT) MODEM RX (CUR DN) (CUR DN) "
310 GETA$
315 IFA$=""THENA$="A"
320 IFASC(A$)=133THEN600
325 IFASC (A$)=134THENCLOSE2:GOTD10
330 GET#2.B$
335 IFB$=""THENB$="($^)"
340 IFASC(B$)<320RASC(B$)>90THEN310
350 PRINTRS.
600 PRINT"
     PRINT" (CUR DN) (CUR DN) (CUR RT) (CUR RT) MODEM TX (CUR DN) (CUR DN) "
610 POKE56579.64:POKE56577.(255-64)
620 FORT=1T0200:NEXT
630 GETA$:IFA$=""THEN630
     IFASC (A$)=136THEN700
650 PRINTAS:
670 GOTO630
     IFPEEK (669) <> PEEK (670) THEN700
710 POKE56577.255
```

### XR2211 DESIGN PROGRAM

```
10 PRINT"(CLR)"
20 PRINT"(HOME)(CUR DN)(CUR DN)(CUR DN)(CUR RT)(CUR RT)(CUR RT)XR2211 DE
SIGN PROGRAM"
40 INPUT"(CUR DN)FREQ OF HI TONE HZ":F1
50 INPUT"(CUR DN)FREQ OF LO TONE HZ":F2
60 INPUT"(CUR DN)BAUD RATE ":BR
70 FO=(F1+F2)/2
80 CO=INT(1/20000/F0*10^12)/1000
90 R1=INT(20*(F0/(F1-F2))*1000)/1000
110 CF=INT(3/BR*10^6)/1000
110 CF=INT(3/BR*10^6)/1000
110 CF=INT(3/BR*10^6)/1000
110 PRINT"(CUR DN)(CUR DN)CO= (CUR L)(CUR L)(CU
```



720 FORT=1T0500:NEXT 730 GOT0300

200 GOTO20

Fig. 6: The displays to be expected when an oscilloscope is used for tuning purposes. Fig. 6a shows the display when the receiver is properly tuned while Fig. 6b is typical of an out-of-tune receiver

the computer down the supply lead and the cure for this is to wrap the whole of the supply lead round a ferrite rod or if possible, a large toroid as near to the computer as possible.

When using the modem off-air, it is sometimes difficult to tune the receiver in on the tones without some sort of tuning aid. The l.e.d. (D4) on the data line can be monitored for clean data, but if an oscilloscope is available, the outputs of the filters can be monitored.

If the oscilloscope is set up with one input on the X axis and the other on the Y axis, the display gives a clear view of what is going on. If the receiver is correctly tuned, the display is as Fig. 6a. As the signal becomes detuned, the display rotates and reduces in amplitude as shown in Fig. 6b. The nice thing about this display is that the direction in which the display rotates indicates whether the frequency has increased or decreased.





1239.00

1239.00 898.00 135.00 259.00 36.50 469.00 399.00

# 01-422 9585 FOR FAST DELIVERY

lcom

IC751 HF Transceiver IC745 HF Transceiver

PS15 P.S. Unit





### ANTENNA COUPLERS

Aut I Eldier Cool Emile	
THP HC200 1.8-30MHz 20w pep	82:95
THP HC400L 1.8-30MHz 350w pep	149:00
THP HC2000 1.8-30MHz 2.5kw pep	T.B.A.
AMTECH 300B 1.8-30MHz 300w pep	STAR + 54:00
ICOM IC AT500 AUTOMATIC	399:00
ICOM IC AT1000 AUTOMATIC	Phone
YAESU FC 757 AUTOMATIC	245:00
YAESU FC 102 WARC 2Kw	Phone
WELZ AC38 1.8300MHz	73:95
VAT included. Amtech 300B 1.50 other	ers £6 Securicor.

Prices may be subject to change due to currency fluctuations

PS15 P.S. Unit PS30 Systems p.s.u. 25A SM6 Base microphone for 751/745 IC290D 2m 25w M/Mode IC290E 10w M/Mode Mobile IC271E 2m 25w M/Mode Base Stn. IC271H 100W version of above IC25H 2m 45w FM IC27E 25W FM mobile. IC45E 70c 10w FM IC47E 25w 70cm FM mobile. IC48E 70c 10w FM IC47E 25w 70cm FM mobile. 699.00 889.00 359.00 359.00 345.00 449.00 24.50 ICBU1 B/U Supply for 25/45/290 ICR70 General Coverage Receiver ICR71 General Coverage Receiver 599.00 699.00 259.00 IC02E 2m H/Held 259.00 199.00 69.00 259.00 269.00 56.35 18.55 IC2E 2m H/Held ML12m 10w Linear IC4E 70cm H/Held IC4E 70cm handheld IC04E 70cm handheld BC30 Base Charger HM9 Speaker mic HM9 Speaker mic IC3 Carry Case ICBP3 Std Battery Pack BP5 High Power Battery Pack EP1 Car Charging Lead 27.50 52.80 5.50 DC1 12v Adaptor Icom 735 New HF Transceiver...... 69.50 115.00 109.95

**Aerial Rotators** Aerial Hotators
95028 3 core Light Duty
AR40 5 core Medium Duty
KR400 Med H Duty
KR500 6 core Elevation
KR400RC 6 core Medium Duty
CD458 core Heavy Duty
KR600RC 8 core Heavy Duty
HAM1V 8 core Heavier Duty
T2X 8 core Very Heavy Duty
Hirschman 250 \*\* STAR BUY \*\*
EMOTO - all models POA 132.50 189.95 189.50 299.00 365.00

### SWR/POWER METERS

OTTICL OTTEN INC. TENO	
WELZ SP200 1Kw	9:00
WELZ SP300 1Kw	29:00
WELZ SP400 150w	39:00
WELZ SP15M 200w	19:00
WELZ SP250 2Kw	55:00
TOYO TM1X 3.5 150MHz 120w	18:80
TOYO T430 145/430MHz thru line	
watt meter 120w	4:65
TOYO T435 145/435MHz thru line	
watt meter 200w	19:35
VAT included. Add £2 per item carriage.	

### VHE LINEAR AMPLIFIERS

VIII EINTEAN ANN EN IENO	0.00
THP HL30V 0.5-3w in 30w out	45:00
THP HL82V 10w in 85w out	144:50
THPHL110V 10w in 110w out	204:00
THP HL160V 10w in 160w out	244:52
THP HL160V 25w in 160w out	209:73
MML 144/30LS	
MML 144/50S	
MML 144/100S	
MML 144/100HS	
MML 144/100LS	
MML 144/200S	

### **UHF LINEAR AMPLIFIERS**

MML 432/30L	145:00
MML 432/50	145:00
MML 432/100	299:00
THP HL20U 1-3w in 20w out	82:00
THP HL45U 10w in 45w out	152:77
THP HL9OU 10w in 90w out	268:59
ALINCO ELH250C	114:95
B.N.O.S. complete range also in stock	
VAT included. Add £2 per item carriage	e.

CLOSED MONDAY HOURS: 10:00 - 5:30 SAT. 10:00 - 5:00

# \* NEW \* YAESU FRG 9600 L MODE VHF/UHF SCANNER

\* £429.00 \*

60-905MHz, Wide and Narrow AM/FM with 5, 10, 12<sup>1</sup>/<sub>2</sub>, 25 and 100 steps on FM + 1KH/100Hz AM and 1KHz/ 100Hz SSB and much, much more including optional interface unit for computers and video IF unit for TV reception. Call or Write.

Call or write now for Prices and Literature

### **HEIL ACCESSORIES**

TIETE ACCESSORIES	
HEIL HC3 Microphone Element	22:85
HEIL HC5 Microphone Element (Icom SM5/6)	25:40
HEIL HM 5 Desk Microphone (300Hz-3KHz)	cardoic
fwd	59:00
HEIL MM5 Hand Held Mic with HC3 Capsule	37.00
HEIL SS2 SPEAKER see page 10	65:00
HEIL EQ300 Mic Equaliser	65:00
HEIL BM10 80Z HEADSET/BOOM MIC	65.00
Carriage and VAT included.	

14:95 15:46 16:60 29:65 14:00 25:65 8:95 79:00
53.95 69.95
799.00 P.O.A 299.00 899.00

VAT included. Add £1 carriage per item.



VHF CONVERTERS \* Star Buy

The following frequencies from any HF Receiver. FRV 7700 A 118-150MHz
B 118-130, 140-150, 50-59MHz
C 140-170MHz
D 118-130, 140-150, 70-80MHz
E 140-150, 150-160, 118-130MHz
F 150-180, 180-170, 118-130MHz

All Models £49.00 inc VAT and Carr

Goods normally despatched by return.



SERVICES LTD., 194 NORTHOLT ROAD, SOUTH





HARROW, MIDDX. HA2 0EN. ENGLAND. (Opp. South Harrow Underground Station)

E.&.O.E.

TEL: 01-422 9585. TELEX: 24263

# Valved Communications A substitution of the ARP34/EF39, and V2 the AR21/EBC33, with the suffix denoting the circuit location. For some odd reason C was not used, being

In Part 4 Chas Miller looks at the R107 Communications Receiver

In reviewing the R107 in August 1945, Wireless World described it as being one of the Army's best communications receivers. Nearly 40 years on the claim still appears to have been valid. It might be said that the R107 was to the Army what the R1155 was to the RAF and the B28 to the Royal Navy.

Its frequency coverage was not as great, admittedly, but this is explained by the different conditions of service. Generally speaking, land forces required relatively short distance twoway communication for battle orders in the field and fairly long-distance reception facilities for messages from base, whilst direction-finding and very long range working were not an essential. Thus the extremely low and high frequency coverage needed by the other two services could be dispensed with by the Army. The coverage of the R107, 1.2MHz-17.5MHz was perfectly adequate for its job and made it complementary to such transmitters as the WS12 and WS33. It still offers a satisfying performance to the shortwave listener who does not wish to tune below the 16m band, or who has an alternative receiver for the higher frequencies.

Externally the R107 is most impressive. Its cabinet is of rugged design and the front panel carries an array of no fewer than 14 controls, plus a number of sockets for connection of antenna, earth, power supplies, headphones, etc. Within, it is an eight valve plus rectifier superhet with many interesting features. It is built up of three separate chassis interconnected by tag-panels and leads. On the right of the cabinet, behind the semi-circular dial, is the r.f. and frequency-changer unit; in the centre is the i.f./a.f. chassis, and to the left is the power supply. A preliminary examination of the circuit diagram reveals two immediate points of interest: an extensive use of twin-coupled tuning circuits in both r.f. and i.f. amplifiers, and the fact that, apart from the h.t. rectifier, only two different valve types are used for all functions. The two types are the r.f. pentode ARP34 and the double-diode-triode AR21.

The commercial (Mullard) equivalents of these are the EF39 and EBC33 respectively. Inevitably one speculates as to the reason for this-was it to simplify the spares requirement? If so, was the designer asked to work around those two particular types, or did he decide upon them for himself? Certainly the use of the AR21/EBC33 in r.f. oscillator positions was innovative and has possibly never been repeated. One useful aspect of the two types is that their heater rating of 6.3V at 0.2A each lends itself to a simple series/parallel arrangement drawing a very moderate total of only 0.8A at 12.6V. Economy of this kind was highly desirable when the R107 was used on 12V battery supplies. The alternative a.c. mains input could be from 100V-250V, a somewhat unusual versatility.

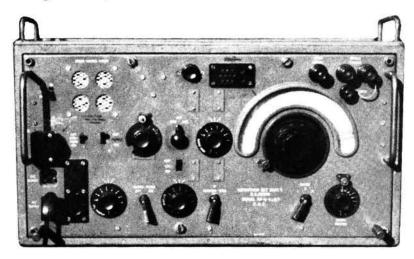
### Circuit description

Preliminary notes: Although the official workshop manual for the set has been drawn on for much information, it has been felt advisable to change the valve/component numbering to a certain extent to avoid possible confusion. Originally the valves were designated V1A, V2A, V1B, V2B, etc., the premise being that the prefix V1 would

V2 the AR21/EBC33, with the suffix denoting the circuit location. For some odd reason C was not used, being replaced by an acute accent on B. For this article, the normal numbering V1, V2, V3, etc., has been adopted. A similar original component numbering has been retained because it does in this case aid the reader. The system is that all components marked, say, R1A, B, C, etc., will be of the same value. The same applies to C3A, B, C, etc. The components lists are therefore simplified and the recognition of values aided. Transformers, however, have been re-numbered in order of location, starting at the first i.f. transformer as T1. The same has been applied to the tuning coils, as L1, L2, and so on.

The frequency coverage of the receiver is split into three bands as follows: Band 1, 17.5MHz-7MHz; Band 2, 7.25MHz-2.9MHz and Band 3, 3MHz-1·2MHz. Antenna input is to tuned transformers L1, L2 and L3, via primary windings for dipoles and to tappings on the secondaries for openwire types. Signals are fed to V1 (AR-P34/EF39) operating as r.f. amplifier. This valve is controlled by a.g.c. and by the manual gain control VR1, which also acts on the two i.f. amplifiers. Amplified r.f. signals are passed on via the band-pass coils L4/L5, L6/L7, and L8/L9, tuned by the second and third sections of the ganged capacitor. This arrangement ensures good pre-frequency-changer selectivity and effectively protects against second-channel interference (images).

An ARP34/EF39 is used for V2,



The Army R107 communications receiver

operating as a mixer with suppressor grid injection. It operates at two levels of fixed bias, with no a.g.c. or manual adjustment. The control grid receives -1.5V and the suppressor grid -20V. The Local oscillator is provided by V3, an AR21/EBC33 triode section in a Hartley configuration, a rather unusual choice for the job in both respects. The cathode of the valve here is live as regards r.f., rather than the anode, which is decoupled to earth by C10A, 0.01µF. Oscillations are fed from the cathode via C13D (200pF) to V2 suppressor grid. With the cathode/ heater capacity in mind, the two electrodes are strapped on the earthy side of the heater, and thus the heater current flows through the oscillator coils. To prevent r.f. losses on the other side of the heater, it receives its voltage via an r.f. choke. The anode of V3 is supplied via R4B (25kΩ) and R8B  $(80k\Omega)$ , the latter being shorted out on Band 1. The i.f. is 465kHz.

A band-pass transformer T1 passes the i.f. signals from V2 to the first i.f. amplifier V4 (ARP34/EF39) operating in conventional manner. They are then transferred to the second i.f. amplifier (ARP34/EF39) V5 by a dual band-pass system consisting of T2 and T3. All i.f. transformers up to this point have two levels of selectivity available at the turn of a switch. In the WIDE position the passband is 7-5kHz, and in NARROW 3kHz.

The final i.f. transformer, T4, has fixed selectivity. Its secondary feeds the demodulator diode section of V6 (AR21/EBC33) directly, whilst C14A (100pF) couples it to the a.g.c. diode. This arrangement is unusual in this class of receiver since there is likely to be severe shunting of the demodulator diode load, and a reduction in a.g.c. voltage. (The preferred system is to have the a.g.c. diode fed via a small capacitor from the anode of the final i.f. amplifier. It should also be noted that informed opinion suggests that the

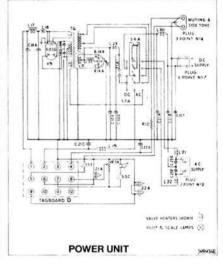
final i.f. amplifier should be operated at fixed bias, which makes it function as a virtual a.g.c. amplifier. In ignoring these precepts, the designer of the R107 may have been justified by special considerations brought about by the unusual tuning system and valve complement).

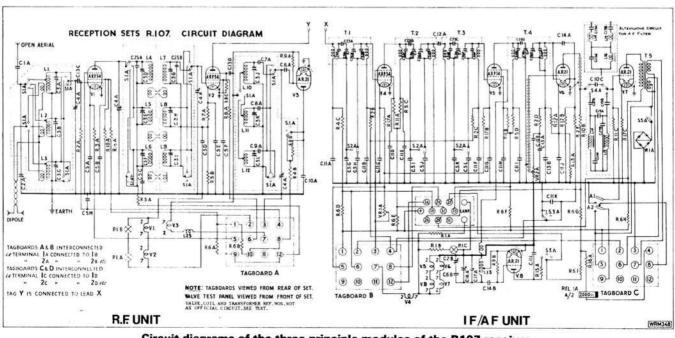
Audio signals are filtered by R2D (250kΩ) and C13A/C13B (200pF) before going to the volume control VR2A  $(500k\Omega)$  and thence to the control grid of V6. This latter receives a bias of -3V due to the cathode resistor R13A (1kΩ). This also provides a 3V delay for the a.g.c. system. A selector switch allows the a.g.c. to be disabled at will and automatically when the b.f.o. is switched into use. A fairly low value of load resistor (R10B, 20kΩ) feeds the anode of V6 and the amplified a.f. is then coupled to the grid of V7 (AR21/EBC33) via an optional a.f. bandpass filter switched into circuit for difficult c.w. reception. It passes 900Hz, ±150Hz and with the b.f.o. adjusted to provide this frequency it alone will be heard in the headphones/ LS-all other frequencies being suppressed. When not used it is by-passed by C10C (0.01µF). Valve V7 operates as a low-power a.f. output valve, the diodes again being unused. It is transformer-coupled to either the built-in loudspeaker or up to three sets of headphones, or to a telephone/intercom line. A separate low-impedance volume control is provided for the last function. Provision is also made for the introduction of a side-tone (monitoring facility) from an associated transmitter. This is at a.f. and taken directly to the loudspeaker or headphones via relay contacts which are made when the transmitter is keyed or its microphone switch depressed. At the same time another set of contacts shorts the grid of V7 to earth to mute the receiver. A "crash" (noise) limiter consisting of metal rectifiers connected back to back may be shunted across

part of the output transformer secondary if required.

The b.f.o., V8, is another AR21/EBC33 again operating in a Hartley circuit with the same cathodelive-to-r.f. mode as with V3. This time a small secondary winding on the oscillator coil couples the b.f.o. to the suppressor grid of V5. No extra bias is provided for the electrode in this case. The b.f.o. may be continuously tuned around its centre frequency of 465kHz by a front-panel mounted control.

Power Supply Unit. Only one power transformer is employed for both mains and 12V d.c. operation. In the first mode a normal tapped primary accepts the input voltages of between 100V and 250V. An h.t. secondary provides 250-0-250V for the fullwave rectifier V8 (6X5G) anodes, and an l.t. winding supplies its 6.3V heaters. A second l.t. winding supplies 12.6V for the receiver valve heaters. For d.c. operation a selector switch S7 disconnects the 12.6V winding and takes the heaters directly to the 12.6V input. At the same time a second primary winding is brought into use. Its centre tap is connected to battery positive line and the outer ends to the





Circuit diagrams of the three principle modules of the R107 receiver

fixed contacts of the Mallory G650 vibrator. Each is therefore taken to battery negative line alternately via the moving contact as it vibrates at around 100Hz, inducing the same secondary voltages as on a.c. operation. The rectifier works in the same manner as on a.c. mains but, as mentioned before, the 12-6V winding is not used. Blocking r.f. filters are fitted in both a.c. and battery input circuits, and in the l.t. and h.t. outputs from the power pack.

### Testing and Servicing

Provision is made in the R107 for initial voltage and valve testing without the necessity of dismantling. Just above the left hand side of the main tuning dial is a small panel having three large sockets and nine small ones. The large socket on the left carries the full 250V h.t., which may be checked with a meter from this point to chassis. The other two large sockets carry the 12.6V l.t. (via a  $100\Omega$  resistor to enable a 6.3V operator's lamp to be plugged in and powered) and its presence or otherwise may also be checked. With no lamp in use the full 12.6V will be registered on a high-resistance test meter.

Eight of the smaller sockets (the exception being the one marked 1E, which is blank) are for testing the h.t. feeds to the valves. For this purpose an extra  $3k\Omega$  resistor has been fitted in each feed so that when the valve is drawing its correct h.t. current a certain voltage will be developed across it. The lower end of each resistor is brought out to a socket on the test panel, and the voltage is checked with a meter connected between it and the h.t.+ socket. Although the maximum voltage that will be recorded is around 20V, it is important to remember that both meter leads will be at h.t.+ with respect to chassis. The expected test voltages as given in the official manual are shown in Table 1. These were taken with the aid of the once ubiquitous AVO Model 7, which had a sensitivity

TABLE 1

Valve	Function	Test Panel No.	Voltage
V1	r.f. amplifier	V1A	15V
V2	Mixer	V1B	11.5V
V3	Local osc	V2A	11V (Band 1)
			5V (Bands 2 & 3)
V4	1st i.f. amp	V1C	16.5V
V5	2nd i.f. amp	VID	16.5V
V6	1st a.f. amp	V2B	9.5V
V7	2nd a.f., amp		20V
V8	b.f.o.	V2A'	9.5V

of 500 ohms per volt and, as the book says, other meters may produce different readings. The AVO 7 was to be used on its 100V range, which would have the effect of placing a  $50k\Omega$ resistor in parallel with each  $3k\Omega$  in turn. This would result in an effective resistance of  $2.83k\Omega$ . The same result may be obtained with a modern  $20k\Omega$ per volt meter (such as the AVO 8) on a 25V range by shunting it with a  $56k\Omega$ resistor. The readings quoted in the manual should then be obtained, subiect to normal tolerances. Bear in mind that the shunt resistor too will be at h.t.+ with respect to chassis.

The test voltage readings shown in Table 1 should be taken with the antenna terminals shorted to chassis to prevent any signal input, with the r.f. gain control at maximum and with the b.f.o. switched on. Low readings point to valve(s) having low emission. A cross-check can be made by interchanging two of the same type. High readings could mean a leaky decoupling capacitor.

No reading at all on one socket probably indicates a valve having no emission at all, but it might just be a break in the h.t. supply. Substitution should clear up this point. If zero is still obtained with the substitute the voltages at the actual valve socket will have to be investigated. Note that all the valves must be plugged in for tests at all times due to the series/parallel heater wiring. This also means that should one valve heater go open-circuit, its companion in the chain will be

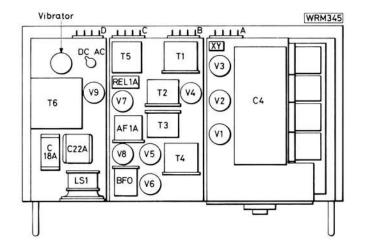
extinguished. The valves are paired as follows: V1/V2, V3/V4, V5/V8, V6/V7. If zero readings are obtained on any pair of valves there is a distinct possibility of one of them having an open circuit heater.

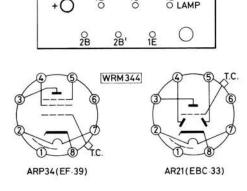
If all voltages appear to be in order but the set remains completely silent, it is worth checking that the muting switch is operating correctly. It may seem an obvious point, but one that could be overlooked.

# Alignment and Calibration

The specialised nature of the bandpass tuning circuits calls for a great deal of skill in re-alignment and, as in the case of some other sets, it is suggested that this work should not be attempted on the R107 unless the operator possesses the necessary knowledge and equipment. It would be folly to disturb any of the i.f. adjustments, or that of the r.f. intervalve coupling, without these essentials. It will therefore be assumed that if these are available no further information will be required. It is permissible to make small adjustments to the local oscillator trimmers, and of the antenna coils if the dial calibration is slightly out, using either a good signal generator or known broadcasting stations as frequency standards. Band 1 trimmers C3A and C3J should be adjusted for maximum at approximately 17MHz; Band 2 trimmers C3B and C3K at 7MHz and Band 3 trimmers C3C and

WRM347





The internal plan view of the R107 indicating locations of principle components

The valve test panel layout and valve base diagrams (viewed from the pin end)

C3L at 2.5MHz. Should any range have its calibration wildly out the padder capacitors C7A, C8A and C9A for Bands 1, 2 and 3 respectively should be suspected. Their values are, in order, 5000pF, 1630pF and 750pF. The second will almost certainly have to be made up of two new capacitors in parallel (e.g., 1500pF and 130pF). Note that close tolerance components are required. With the padder capacity correct the oscillator trimmer should be capable of bringing the dial into line. If there is still inaccuracy it may be possible to eliminate it by using a slightly smaller padder value, and shunting it with a trimmer so that the total capacity may be varied about the quoted value.

Check the antenna coil trimmers after the oscillators have been trimmed, first setting the main antenna trimmer to its half-way mark.

### Suggested Modifications

One of the stated aims of this series is to assist in the restoration of receivers to as near as possible original condition and not to encourage unnecessary or inappropriate modification. In certain cases, however, some alteration to the original specification of an ex-Government set may be needed to make it suitable for civilian use. The R107 is a case in point as regards its output stage. It is fine if the user wishes to use headphones only, but it is felt that many owners will require reasonable loudspeaker volume, necessitating a more powerful output valve. The problem here is to find one that will not be incongruous in the set, will suit the existing heater circuitry, will not be too heavy on h.t. current (since the R107 power pack is limited in this respect) and will not need a lot of modification to the set mechanically. Fortunately a valve exists that fulfills these requirements admirably. It is the Mullard EL32, also known in the Services as the VT52 or CV1052. It is very similar in shape to the AR21/EBC33 it is to replace, but just a little larger. It has exactly the same heater rating, draws only 37mA maximum and is virtually a plug-in replacement—only slight alterations to the wiring being necessary, plus the provision of a new output transformer to match it to the loudspeaker. It is of course long obsolete, but little difficulty should be experienced in obtaining one from a dealer in vintage valves.

Fitting the EL32. The heater, cathode and anode pins on the base are the same as the AR21/EBC33, so these are used as before, except that the existing lead to the anode pin (3) must be removed and insulated, being replaced by a connection to the new output transformer. Pin 4 is the g2 (screen grid) connection of the EL32 and needs to be taken to h.t.+. It is suggested that the existing  $3k\Omega$  resistor R6H should be used as it will not now be needed to

feed the old output transformer. It can still continue in its role as a test resistor, but now for the EL32 g2. The voltage dropped across it will be 14·15V using the 20kΩ/volt meter and  $56k\Omega$  shunt as mentioned earlier. The recommended anode load for the EL32 is  $8k\Omega$ , and the transformer ratio must be calculated with the aid of the wellknown formula which states that the turns ratio equals the square root of the anode load divided by the speaker impedance. As a guide the old type of loudspeaker with a  $2-3\Omega$  impedance needs a 55: 1 ratio, and an  $8\Omega$  speaker approximately 30:1.

The cathode bias resistor for the EL32 is  $500\Omega$ , the same as the valve it replaces. The grid connection is also by top cap, so no change is required for these two electrodes. It is a remarkably efficient valve, delivering no less than 3-6W at a maximum distortion of 10 per cent. The output could conveniently be connected to a good external speaker via one of the three standard jack sockets on the front panel.

Improving the valve test system. The existing test system in the R107 lends itself admirably to modification to the constant voltage arrangement described in an article entitled A Versatile

Valve Monitor and S-Meter, by the present author. If this method is adopted the test meter has no need of accurate voltage calibration, a simple 0-1mA scale being sufficient. This will indicate at a glance if each valve is drawing its correct current or not, no reference to the manual being necessary. The S-meter facility would also become available.

### Component References

The Army numbering system is intended to simplify the recognition of component values. Instead of each resistor or capacitor having its own individual number, they have a figure which identifies them as being of a certain value, plus a suffix letter locating them on the diagram. For instance, all resistors having the type no. 9 (R9A, R9B, etc.) will be  $50k\Omega$ . Likewise all capacitors numbered C10, A, B, C, etc., will be 0.01 µF. In a few cases two figures are allocated to one value where there is a difference in the type of capacitor, e.g., mica or paper. All resistors are 0.5W unless otherwise annotated.

### COMPONENT NUMBERING SYSTEM

### Resistors

- **1** 100Ω
- **2** 250kΩ
- **3** 300Ω
- **4** 25kΩ
- **5** 5kΩ
- **6** 3kΩ
- **7** 400Ω
- **8** 80kΩ
- **9** 50kΩ
- 10 20kΩ11 100kΩ
- 12 500kΩ
- **13** 1kΩ
- 14 150Ω
- 15 30kΩ
- 16 15kΩ, 3W
- 17 500Ω
- 18 25kΩ, 1W

VR1 4kΩ r.f. Gain

VR2 500kΩ a.f. Gain

VR3 500Ω headphone vol

no soos neadphone v

### **Transformers**

- 1 1st i.f.
- 2 2nd i.f.
- 3 3rd i.f.
- 4 4th i.f.
- 5 Audio output
- 6 Power (mains/12V d.c.)

### Capacitors

- 1 20pF
- 2 50pF variable
- 3 25pF trimmer

- 4 4x300pF tuning gang
- 5 0.05µF
- 6 80pF
- 7 5000pF, 5%
- 8 1630pF, 2%
- 9 750pF, 2%
- 10 0·01μF, mica
- 11 0·01μF, paper
- 12 2·2pF
- **13** 200pF
- **14** 100pF **15** 5000pF
- 15 5000pr
- 16 100pF trimmer
- 17 1000pF 2%
- 18 8+8µF electrolytic
- 19 50pF variable 20 0·01µF buffer, 800V a.c. wkg
- **21** 1μF **22** 4μF
- 23 1000pF, 300V a.c. wkg
- 24 \*
- 25 10pF
- 26 .

\*Fixed and trimmer capacitors fitted in i.f. transformers, no values stated.

### Switches

- 1 BAND selector
- 2 SELECTIVITY
- 3 AGC/BFO on-off
- 4 AF FILTER in/out
- 5 CRASH LIMITER in/out/L s on/off/ SIDE TONE on/off
- 6 MAIN POWER on/off
- 7 AC mains/12V d.c. power switch

# Braille Circuit new method of reading theoretical circuits in the hope of better understanding and co-operation between the sighted and non-sighted.

Although initially devised to help blind students follow circuit diagrams, George Day describes a

At first, the details outlined may appear so foreign to normal practice that a short preliminary explanation of the underlying reasoning may prove to be worthwhile.

Although the blind can, as they must, master suitably modified embossed versions of normal diagrams, there are a number of reasons which prevent this approach from becoming the ideal method for everyday use by advanced students. Amongst these reasons is the need to use modified versions of particular Braille writing machines. A real benefit would, therefore, ensue if the required information could be prepared on any Braille machine. This has been achieved by modifying the presentation of normal diagrams in such a way as to make the use of graphical symbols unnecessary whilst, at the same time, avoiding the drawbacks inherent in longhand wordonly descriptions. The advantages normally provided by the graphical symbols have been retained to a marked degree in the new style diagrams. This makes it comparatively easy when reading either the traditional or new style circuits to envisage the details as presented in the alternative arrangement.

This latter point has an important bearing on the possible success of the scheme, for it means that sighted technicians will find it easier to discuss circuitry with a blind person.

This is a very important aspect as far as the blind are concerned, but before such discussions can be really meaningful, it is obviously necessary for a typescript version of the scheme to be available for the benefit of any sighted

Meeting the original requirements for this new style diagram was found to be a quite straightforward task, for the necessary language was already in common use. Before describing the new diagrams it is necessary to mention a required alteration to diagram layout.

The normal theoretical diagram is built up from a number of comparatively simple sub-circuits which are mainly presented vertically. However, since the blind have to use a machine to assist them when compiling any sort of diagram, their task would be simplified considerably if such details were given horizontally. Fortunately one has only to turn a normal diagram through ninety degrees and the required layout results. Clockwise turning of the diagram is the obvious choice as it not only provides a datum line, the chassis or ground line, but it places the input at the top of the arrangement-as is generally preferred.

If a suitable shorthand could be devised to enable each horizontal subcircuit to be individually described in one line of writing, then these individual sequences could be placed under one another to agree with the layout of a normal diagram. Then if each sequence is identified, one could gain the ability to move around a circuit as in a normal symbol type diagram.

Consequently, not only is the overall size of the symbol-less diagram quite small but the general layout resembles that of its equivalent symbol type reasonably well.

The language necessary to change these pleasant anticipations into practical arrangements has been in common use for many a year. It needs only a little augmentation and regimentation to convert it into the required shorthand, as will soon become evident.

Not only are the identification groups now in regular use ideal for present purposes but, in shorthand sequences, the wiring between components can be indicated by the relative positioning of the identification groups.

For example, the information normally given by a symbol-type diagram for a series-tuned circuit consisting of a capacitor (C1), an inductor (L1) and a resistor (R1) is given fully by the following simple sequence:

C1 L1 R1 .....

Similarly, the details for a fixed series-tuned circuit fitted between ground and an antenna can be written

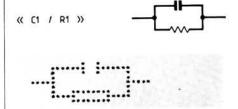
·: i---::

Although no information regarding the wiring has actually been written into the sequence, no major mental effort is needed in order to picture a lead emanating from the right-hand side of the first group to connect it to the left-hand side of the second group, which is similarly connected to the third group and so on.

However, the details can only relate to a maximum of two terminals per component, and normally to only one connection per terminal in any given sequence. Description of circuits which include either components with more than two terminals, or having more than one lead attached to any given terminal, will normally require more than one sequence, as will be shown later.

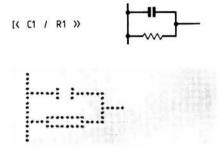
Although a similar approach to that given previously is appropriate for describing parallel circuits, the necessary procedure cannot help but be a little more complicated. Not only has one to show where the circuit divides and eventually recombines, but it is necessary to have a distinct sign to mark the end of one branch and the start of another. So, three shorthand signs become necessary.

For the first two requirements, the signs for "less than" and "greater than", doubled for emphasis, are appropriate. For the third requirement the oblique stroke makes a reasonable sign for separating the branches. So, the common arrangement of a capacitor (C1) and a resistor (R1) in parallel can be detailed by:



In practice so many circuits are connected to chassis or ground that it is worthwhile to have another special sign to indicate this-and the left-hand squared bracket sign was adopted.

So, to indicate a parallel circuit, the left-hand junction sign is modified. When the previous circuit is grounded it can be shown as:



Similarly, series-parallel circuits can be detailed by combining the previously mentioned procedures.

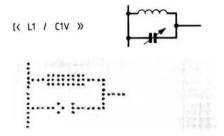
Consideration so far has only been given to fixed, non-polarised, components. It is a simple matter to modify an identification group to provide extra information when necessary.

Polarisation can be indicated by writing the normal sign for either "plus" or "minus" immediately before the group concerned. Such a modified group can then not only indicate a type of component and how it is connected, but where polarised supplies are concerned, just a specific terminal.

For example, the group +B1, when used in the midst of a sequence would indicate a battery with its positive terminal on its left-hand side. Alternatively, the same group when used as the first or final group of a sequence would then indicate just the positive terminal of the battery.

Additionally one has only to keep to long established practice in order to provide extra information, by adding an amplifying letter immediately after an identification group.

To show that a component is adjustable, one just adds either the letter "V" for variable or "T" for trimmer. Hence a normal grounded, parallel circuit can now be described by:



On the other hand a variable capacitor which is actually a section of a ganged component can be indicated by replacing the amplifying letter by one from a series commencing with the letter "a" for the whole ganged component, whilst at the same time retaining a common identifying number appropriate to the whole. The three sections of a three-ganged variable capacitor would be referred to individually by groups in the form C1a, C1b and C1c.

Another useful piece of information can be gained in a similar manner to enable one to differentiate between different types of semiconducting devices. The amplifying letters "P" and "N" can help where transistors are concerned. For example, a *pnp* transistor can be specified by the group Tr1P.

Similarly a tunnel or Zener diode can be clearly specified by groups of the form D1T and D1Z respectively.

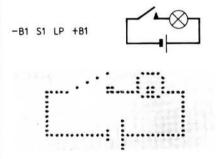
The next type of component to consider is the one with named or numbered terminals. A named terminal is identified by using a self evident abbreviation of the name concerned. This is then placed before or after the identification group of the component concerned. So, a semiconductor diode with cathode to the left can be fully described by the group K-D1AN. The relationship between a group and a name is shown by coupling them together by a hyphen which prevents mis-reading.

Components having numbered terminals are dealt with in a similar manner, the numbers replacing the terminal naming groups. Thus a "through" circuit going in at terminal 4 and coming out at terminal 13 of IC1 can be specified by the group 4IC1-13.

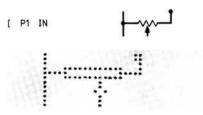
When concerned with only one terminal per component, the specification is written on the appropriate side of the component's identification group.

The stage has now been reached when it is desirable to consider another aspect of the scheme. Although the main object has been to develop a shorthand method for describing electronic circuits it is equally important for it to be possible to detail general electrical circuitry in a similar manner.

Let us consider a battery driven lighting circuit. By starting at the negative terminal the complete details for a hand torch can be given:

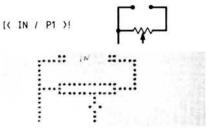


The input circuit to a potentiometer controlled a.f. amplifier can be detailed in a like manner, though a preferred alternative way is shown here. It is quite common for the input to be shown connected only to the live side of the potentiometer and, by reading in the normal way from left to right, such as arrangement can be readily described by:

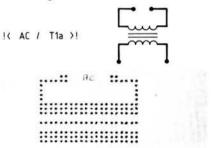


On those occasions when the input is shown strapped across the potentiometer the similarity of the whole to a grounded parallel circuit becomes quite obvious—with the exception that no output occurs at the live side of the circuit. The arrangement could therefore be treated as though it was an actual parallel circuit if only the right-hand junction sign was modified to indicate that the normal output has been sealed off.

This can be achieved by changing the sign. So a circuit can then be detailed by a sequence in the form:



Another similar arrangement is met when considering the input circuit to a power transformer, though on this occasion neither side of the arrangement would either be earthed or connected elsewhere. Such an arrangement can be treated in a similar manner provided the left-hand junction sign is now changed to become a mirrored version of that used at the right-hand side. Thus a circuit showing an a.c. supply strapped across the primary winding of a transformer can now be given in the form:



It should be noted that the shape of the torch circuit discussed previously can now be shown in an alternative description by:



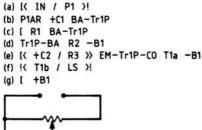
As the circuits described become more complex the need to identify each sequence in a circuit becomes more obvious.

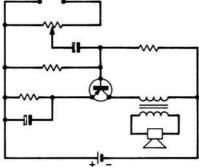
The details for an a.f. output stage consisting of a pnp transistor driving a transformer coupled loudspeaker can now be given as shown in Fig. 1 overleaf.

Note that whereas sequence (c) leads to the base of the transistor, sequence (d) leads away from the same terminal. So, they can be combined to give the sequence:

### (c) [ R1 BA-Tr1P-BA R2 -B1

It should also be noted that one is now not restricted even to circuits which consist of just one stage, provided the coupling between them is by means of a transformer. As the use of such components is now becoming so





rare this aspect will not be discussed further here.

In transformerless circuits the provision of a passage for the control signal from input to output necessitates a linking circuit from each main subcircuit to its following neighbour. Circuits such as feedback or stabilisation ones shouldn't be forgotten as they often emanate from sub-circuits.

If the symbol-less diagram is to compare realistically with its normal equivalent it must be possible to ascertain the details of an individual subcircuit and to be able to find a specific section of a complex diagram with comparative ease and speed. Hence it is not adequate just to indicate where the branch circuits come from a parent sequence.

It is necessary for the descriptions of all the interlinking circuits to show clearly not only from where they start but also where they end.

The first step towards meeting this requirement has already been introduced by identifying individual sequences.

Since sequences are read from left to right the start of a linking circuit can be detailed by commencing its description with the identifying letter of the sequence from which it originated, coupled by a hyphen to the item immediately to the left of that junction.

Similarly, the end can be shown in a corresponding manner, but on this occasion one uses the item immediately to the right of the junction. Although this approach is exact, it is not always possible to forecast the sequence where the linking circuit will actually end and so diagram compilation can be simplified by attaching the identification letter after the item.

A linking circuit which consists of a capacitor, C1, and which comes from a sequence (a), from between resistors R1 and R2, and ends at sequence (f)

between resistors R3 and R4 would be described as:

(b) a-R1 C1 f-R4 This could be modified to: (b) a-R1 C1 R4-f



Although this procedure is quite satisfactory when junctions are situated between items which do not have named terminals, whenever a junction is adjacent to such a terminal then this name should be used as the reference in the sequence concerned.

Although this approach enables the position of any junction to be detailed accurately, it is only suitable for linking or branch circuits. A different sort of indicator is required for use in sequences for parent circuits.

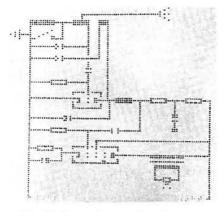
Junctions in the latter sequences could be indicated by using a series of isolated numbers per sequence, but this does not meet requirements fully. Since branch circuits may spread out on either side of a parent circuit, two types of indicator are really required in order to show whether a branch exists above or below the parent sequence. This is because the details of a branch circuit which spreads out above the sequence concerned will normally have been given already in an earlier sequence, whereas those for branches which spread out downwards will naturally have to be given in later sequences.

Hence it pays to indicate a junction caused by one of the former branches from whence it originated, and to reserve the series of numbers to mark the places from where branches emanate downwards. The latter descrip-

tion can then be given in numerical order immediately after the sequence concerned.

All this is much more easily explained with an example. An oldfashioned, two waveband, two-valve receiver has been chosen and can be detailed as follows:

- (a) L1a-TP AE
- (b) GD [( L1b 1 L1a / C1V » C1 G-V1T
- (c) [ S1 b-L1a
- (d) [ C2V L1c AN-V1T-f
- (e) [ R1 G-V1T
- (f) [ K-V1T-AN d 1 CH1 2 R2 3 R3 +HT
- (g) [ C1T f-CH1
- (h) [ R4 G1V2P-G1 C2 f-R2
- (i) [ -C1 f-R3
- (j) V2P-G2 +HT
- (k) [( R5 / -C2 » K-V2P-AN T1a +HT
- (I) !( T1b / LS )!
- (m) [-HT



Finally the author wishes to express his sincere thanks to two young acquaintances, Paul Dickinson and David Whitby for making it possible for the article to be typed by preparing the necessary computer program required for speech output.

Practical Wireless, January 1986

# Crystal Calibrator



14W 5% Carbon film 180Ω 1 R1 820Ω 1 R4 22kΩ 1 R2 33kΩ 1 R3

Capacitors

Electrolytic, miniature radial 3-3µF 2 C2,3

Ceramic Disc

1nF 1 C4 10nF 3 C5-7

Compression Trimmer, mica dielectric

250pF 1 C1

# Semiconductors

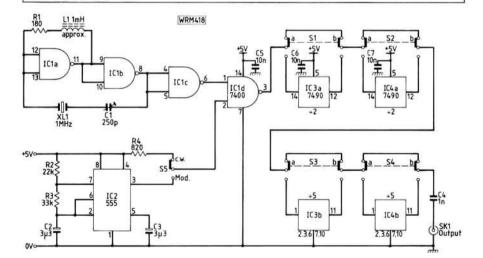
Integrated circuits 555 1 I

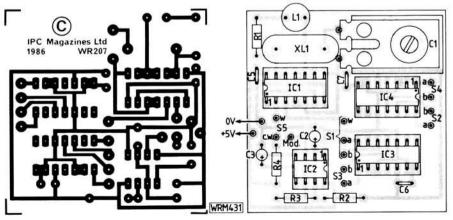
7400 1 IC1 7490 2 IC3,4

# Miscellaneous

Miniature toggle switches: d.p.d.t., S1-4; s.p.d.t., S5; 1mH inductor, L1, Toko 187LY-102; 1MHz HC6/U crystal and socket; 14-pin d.i.l. sockets (3); 8-pin d.i.l. socket (1); diecast aluminium box 114 × 64 × 30mm; p.c.b.







# by R. H. Pearson G4FHU

For those of you who do not own a calibrated signal generator this simple device, based on a crystal controlled oscillator, will provide accurate marker points throughout the h.f. bands. To allow easy identification the output signal can be modulated.

# **Circuit Description**

The heart of the crystal calibrator is the master oscillator, formed around gates (a) and (b) of IC1. Gate (c) buffers the 1MHz oscillator and gate (d) can be pulsed at about five times a second by the timing circuit formed around IC2. When S5 is set to MOD the output signal from the calibrator can be easily identified amongst the many other whistles normally picked up by the receiver.

Sub-divisions of the 1MHz oscillator are provided by divider circuits, IC3, 4. By the appropriate selection of toggle switches S1-4, divide-by-two and divide-by-five functions are brought into operation. Resulting outputs occur at 10, 20, 40, 50, 100, 200, 250, 500 and 1000kHz. For example, by depressing S1, S2 and S3, the output frequency will be:

1MHz + 2 + 2 + 5

= 1MHz + 20

= 50kHz.

For ease of construction a p.c.b. layout is shown in Fig. 2. The output is taken from the wiper of S4b via C4 which is mounted between S4 and SK1.

▼ Fig. 1: Circuit diagram of the crystal calibrator. Inductor L1 is noncritical and could be based on a toroid core. With S5 set to MOD the output carrier is pulsed to allow easy identification. Useful outputs can be obtained well into the v.h.f. region

▼ Fig. 2: Full p.c.b. track pattern and component location details. The 5V d.c. supply should be well regulated to within ±0.25V—current consumption will be approximately 100mA. Setting of the master oscillator is accomplished by adjusting C1 for "zero beat" with a receiver calibrated against a standard frequency transmission. In practice with C1 at half-value the oscillator should be within a few hundred Hz of nominal





At this special time of year, when Christmas Greetings will be jamming the airwaves worldwide, Thanet Electronics send this message to you. During 1986 the ICOM range of equipment will continue its upward trend in the design and production of sophisticated amateur radio equipment.

Typical of the innovation one expects from ICOM is the new 'ultimate' receiver the IC-R7000. To whet your appetite, a

brief specification is featured here.

You can visit our premises at 95 Mortimer Street, Herne Bay, telephone (0227) 369464 for demonstration, advice & sales of ICOM Amateur equipment. No matter what your requirements, base, mobile or handheld, ICOM have the answer.

Attention all Amateurs & SWL's. If you are thinking of buying an ICOM radio call us. Just pick up the 'phone and dial FREE Linkline No. 0800 521145, for retail enquiries about ICOM Amateur equipment & the address of your nearest authorised ICOM dealer. N.B. No trade enquiries via this special free link, thank you.

The ICOM IC-R7000 is the receiver that every discerning amateur would love to receive at Christmas. The IC-R7000 is able to give high frequency coverage up to 1300MHz without sacrificing SSB stability, which is maintained throughout the IC-R7000's entire frequency range, another example of ICOM's superb design.

For simplified operation & quick tuning, the IC-R7000 features direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob. FM/AM/SSB modes, frequency coverage 25 – 1000MHz and 1025 – 2000MHz (25 – 1000MHz and 1260 – 1300MHz guaranteed specification).

The IC-R7000 has 99 memories available to store your favourite frequencies including the operation mode. Memory channels may be called up by simply pressing the memory switch, then rotating the memory channel knob, or by direct keyboard entry.



# IC-R7000

# IVE AT CHRISTMAS HE NEW YEAR



A sophisticated scanning system provides instant access to most used frequencies. By depressing the Auto-M switch. The IC-R7000 automatically memorises frequencies in use, while the unit is in the scan mode. This allows you to recall frequencies that were in use. Scanning systems include, memory selected frequency ranges or priority channels scanning speed is adjustable. Narrow/wide filter selection. Five tuning speeds: 10Hz, 1.0KHz, 5KHz, 10KHz, 12.5KHz and 25KHz.

All functions, including memory channel readout are clearly shown on dual-colour fluorescent display with dimmer switch. The IC-R7000 has dial-lock, noise blanker, S-meter & Attenuator. Options include RC-12 infra-red remote controller and a voice synthesizer. Range extender also available.

For a more detailed specification of the competitively priced IC-R7000 contact your authorised ICOM dealer or telephone us direct on **0800 521145**, our **FREE Linkline** service for Amateurs and SWL's.

Alyntronics, Newcastle, 0632-761002.

Amateur Radio Exchange, London (Ealing), 01-992 5765.

Amcomm, London (S. Harrow), 01-422 9585.

A.R.E. Comms, Earlestown, Merseyside, 09252-29881.

Arrow Electronics Ltd., Chelmsford, Essex, 0245-381673/26.

Beamrite, Cardiff, 0222-486884.

Booth Holding (Bath) Ltd., Bristol, 02217-2402.

Bredhurst Electronics Ltd., W. Sussex, 0444-400786.

Dressler (UK) Ltd., London (Leyton), 01-558 0854.

D.W. Electronics, Widnes, Cheshire, 051-420 2559.

Hobbytronics, Knutsford, Cheshire, 0565-4040. Until 10pm daily.

Poole Logic, Poole, Dorset, 0202 683093.

Photo Acoustics Ltd., Buckinghamshire, 0908-610625.

Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.

Radio Shack Ltd., London NW6, 01-624 7174.

Ray Withers Comms. Warley, West Midlands, 021-421 8201.

Scotcomms, Edinburgh, 031-657 2430.

Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-2043.

Reg Ward & Co. Ltd., S.W. England, 0279-34918.

Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

# Broadside and Endfire Antenna Systems – 2

by F. C. Judd G2BCX

The function of broadside and endfire antennas is perhaps a little difficult to understand mainly because of the number of variables e.g. the phase relationship of the currents in the radiators, the spacing between them, the height of the system above ground and whether it is horizontal or vertical.

Part 1 dealt with the general principles of such arrays using as an example a simple arrangement of two  $\lambda/4$  vertical radiators with different spacing between them and the phase relationship of the r.f. current in one radiator with respect to the other. Both determine the radiation pattern and gain of the system relative to a single radiator or dipole.

Broadside and endfire systems are by no means confined to the use of vertical radiators and there are numerous combinations using  $\lambda/2$  radiators or elements each being directly driven with r.f.

# Endfire Systems with Two λ/2 Elements

Two commonly used endfire systems are illustrated in Fig. 2.1 in horizontal mode, although they can be used vertically. The elements in both are  $\lambda/2$  and driven out of phase with each other i.e., the phase difference between the currents in each element is 180 degrees. The instantaneous direction of the currents is indicated by the arrows. Spacing between the elements may be up to 5λ/8 although maximum gain is obtained when the spacing is  $\lambda/8$ (refer to Fig. 1.2). As the spacing between the elements is increased the bi-directional patterns begin to break up. Indeed it will be seen from the G. H. Brown patterns that with element spacings greater than  $\lambda/2$  the radiation patterns become more complex, with up to as many as five separate lobes.

Broadside or endfire systems for amateur radio applications rarely have element spacing in excess of  $\lambda/2$ . For endfire systems the gain over a single radiator is directly related to element spacing, as shown in the graph Fig. 2.2.

With spacing of  $\lambda/8$  between the elements the gain in each main lobe is a

little over 4dB relative to that from a single radiator or dipole. The comparatively high gain obtainable with close spaced driven radiators offers a number of possibilities in antenna design and are even used very effectively in certain types of parasitic arrays with doubled driving elements, such as the ZL special and the G2BCX 16-element v.h.f. antennas<sup>1</sup>.

# Endfire Array Radiation Patterns

The radiation patterns illustrated in Fig. 2.3 have been included to further clarify the similarity of the bi-directional radiation with close-spaced endfire arrays regardless of whether they are operated vertically as (a) or horizontally as (b). Note: These are "freespace" patterns as would be obtained without the presence of ground beneath the antenna. With all antennas at low height, which is the norm with amateur radio antennas, the presence of ground effects the vertical angle of radiation as a whole which, were it not for the ground beneath, would be maximum in two directions along a line at 90 degrees to the antenna as indicated in Fig. 2.3.

We must therefore, regard the ground as the reference for the vertical angle of radiation. This reference is

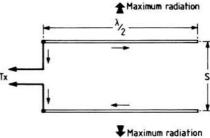


Fig. 2.1: Two alternative twoelement horizontal endfire arrays with element currents in phaseopposition (plan views)

zero degrees i.e., an angle parallel to ground. Ground beneath the antenna may also modify the radiation pattern by causing additional lobes of radiation to be formed.

# **Broadside Arrays**

Whilst there is some similarity between the functioning of endfire and broadside antenna arrays, the most common spacing between elements for

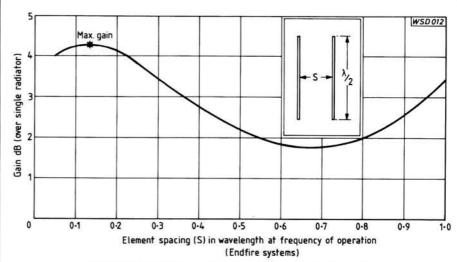


Fig. 2.2: Spacing versus gain, two-element endfire

Fig. 2.3 (Right): two-element freespace radiation patterns, (a) vertical, (b) horizontal. Angle X denotes approx. vertical angle of maximum radiation when operated above ground

Fig. 2.4 (Centre): Free-space radiation patterns, (a) horizontally polarised broadside, (b) vertical broadside. Note patterns are identical for either polarisation

Fig. 2.5 (Bottom): Radiation pattern of two  $\lambda/2$  element broadside at  $3\lambda/4$  above ground

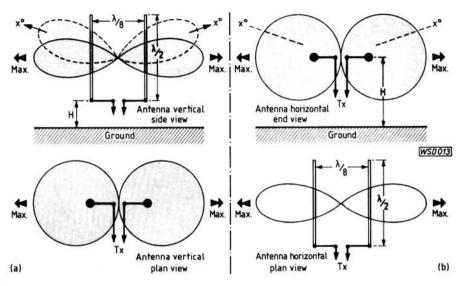
broadside arrays is  $\lambda/2$  and  $5\lambda/8$  and with the current in each radiator or element in phase (zero degrees). A simple two-element system is illustrated in Fig. 2.4 with (a) being a horizontally polarised system and (b) vertically polarised; each has two  $\lambda/2$  elements spaced  $\lambda/2$  apart. The radiation pattern is bi-directional with a gain of 4dB from each main lobe over a single radiator or dipole. The twin lobe shape is the same for either mode of polarisation. A gain approaching 5dB can be obtained with the elements spaced 0.625 to 0.7\( \text{apart as shown by the} \) graph of Fig. 1.3. With this spacing however, two minor lobes are produced at right angles to the main lobes. As the spacing between the elements is increased, toward A, what were the major lobes of radiation now become very narrow and maximum radiation is in line with the elements i.e., the

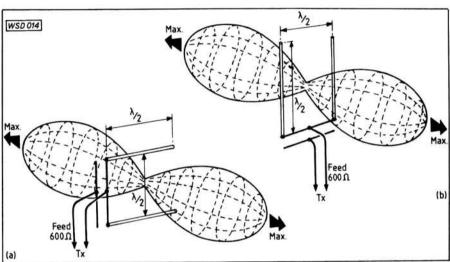
system becomes endfire (Fig. 1.2). Under "free space" conditions maximum radiation, from both endfire and broadside antennas, is either in line with the array or at 90 degrees to it. However, the vertical angle of maximum radiation from the main lobes for both vertical and horizontal antennas at various heights above ground is changed. With ground of average conductivity the vertical angle for a horizontal antenna can be derived from  $\arcsin \frac{A}{4H}$  where A = 1 and H =antenna height in A. A typical example of the vertical angle of radiation from a horizontal two-element broadside array at a mean height of 0.75λ is shown in Fig. 2.5. The equation gives a close approximation to this:  $\arcsin \frac{1}{4 \times 0.75}$ 

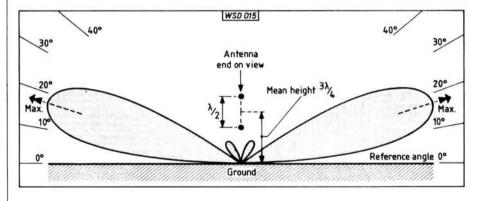
= 19 degrees. In practice the angle may vary slightly e.g., around 18 to 20 degrees, depending on ground conductivity, but is reasonably low enough for DX operation.

# Uni-directional Endfire Arrays

We have seen that with two element close-spaced arrays with the current in the elements in *phase opposition*, bi-







directional radiation is obtained and the system is "endfire" as in Fig. 2.1. With two elements suitably spaced, but fed with equal currents 90 or 135 degrees out of phase, the radiation pattern will be in one direction only, at right angles to the plane of the array. In the opposite direction the fields from the two radiating elements cancel.

Radiation pattern is cardioid (heart-shaped) as shown in Fig. 2.6 and may be obtained with an element spacing of  $\lambda$ 8 and with a current phasing of 135 degrees or, with a spacing of  $\lambda$ 4 and a current phase difference of 90 degrees. The former close-spaced element method provides the greatest gain and is the basis of the popular HB9CV and ZL Special two-element 144MHz antennas.

# Array Feed Impedance-Broadside Systems

The elements of a broadside array must be connected by a transmission line system that supplies power in the correct phase to each element. Two methods of interconnection are shown in Fig. 1.4 (a).

The main transmission line is connected to the phasing line at its centre which brings the array element currents in phase. Although no specific data is available with regard to feed impedance, it will in most cases be below 100 ohms at the point where the transmission line joins the phasing line, assuming this has a self-impedance of about 600 ohms. The array

# Working with the Ethodyne Receiver

John D. Heys G3BDQ could not have written this article without the invaluable help of Mr. J. L. Beech who was formerly an employee of the Burndept Wireless Company. His photographs and reminiscences have allowed the description of a time when there was great competition in the wireless manufacturing industry. J. L. (Jack) Beech has for many years been a personal friend of the writer and it has been a privilege to set to paper a little of what went on in the mid-20's.

In 1926 there were 120 manufacturers of radio receivers in Great Britain, but only seven of these made sets using the superhet principal. An American, Major E. H. Armstrong invented the superhet whilst serving in France during the First World War, and his patent application was filed in December 1918.

From the birth of broadcasting in the early 1920's and right up to the mid-30's straight receivers were in general use and it was only later that the superhets superseded them. Although they exhibited their usual characteristics of great sensitivity and good selectivity, superhet receivers were not popular because they were expensive and difficult to operate. The oscillator and first detector tuned circuits were not ganged which made tuning a two handed operation. In addition their oscillator radiation could give rise to strong heterodyne interference and was a serious problem. The large number of valves employed in most designs, usually between six and eight. greatly raised production costs, for until 1928 very high Royalties had to be paid for each valve holder used in commercially made receivers.

In 1921 a firm called Burnham and Co. was manufacturing high quality coils and other wireless components in their Deptford factory. The company prospered, changed its name to Burndept, and soon became one of the leading British receiver manufacturers. In 1926 they were producing ten different models. These included a simple crystal set, a special short wave receiver and various other models of t.r.f. or

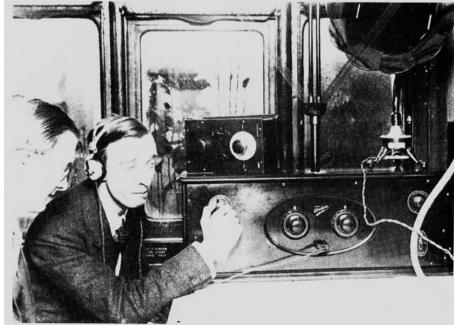
Jack Beech at the controls of the Ethodyne aboard a GWR train somewhere between Bristol and Cardiff. Colleague Lomax is looking on. The heterodyne wavemeter standing on the receiver cabinet was essential and was used to locate the exact wavelength of wanted and perhaps very weak stations

"straight" design. The model at the top of the range however was a magnificent 7-valve superhet called the "Ethodyne". Much of this narrative concerns the "Ethodyne" and its promotion.

# The Ethodyne Receiver

The chief engineer at the Burndept Blackheath works was Mr. Frank Phillips. He worked closely with Ralph Bloxam, a licenced amateur holding the call G5LS. (This call has since been re-issued). The Ethodyne was very much the "brainchild" of Phillips, and it first appeared on the market in 1924. At this time it was far ahead of most available receivers and had few serious rivals in this country or in the USA. Triode valves were used in every stage and a rotatable frame antenna was mounted on to the top of its solid mahogany cabinet. The oscillator coils were within a screened compartment only very very loosely inductively cou-

pled to the first detector (mixer) which had an adjustable regeneration control. This was a novel feature which really enhanced receiver sensitivity and selectivity and did much to put the Ethodyne head and shoulders above its rivals. There were two stages of i.f. amplification at about 125kHz and then a second detector which was in turn followed by an a.f. amplifier. This a.f. stage was RC coupled to the power output valve, a DE5A. The valve filaments were run from a 6 volt lead-acid accumulator and there were individual dropper resistors which allowed 5 volts on the filaments of the first six stages. The valves used were not manufactured by Burndept but were sold under their name. An h.t. battery supplied 120 volts for the anodes, and the receiver had two tuning ranges; 545 to 1200kHz (520 to 250m) and approximately 150 to 300kHz (2000 to 1000m). Coils had to be changed when changing waveband and they were of the "plug-in" type. Burndept i.f. trans-





Burning the midnight oil at CNR London Headquarters when tuning for the station CNRA in Canada. Jack is at the controls with other Burndept representatives and a number of CNR officials having their first taste of DX

formers in circular metal screening cans were a special feature and their excellence contributed much to the overall receiver performance.

A separate loudspeaker could be supplied as an "extra" and it was named the "Ethovox". The basic price of an Ethodyne receiver was £80 in 1926. Batteries and loudspeaker, if obtained from Burndept added another £15 or so to the total. Almost £100 for a wireless receiver at that time was a staggering price and only the well-to-do could afford such superb apparatus. Most "straight" receivers then cost between £10 and £20 which was far from cheap at that time when such amounts represented one month's wages or salary.

# Working for Burndept

Mr. J. L. (Jack) Beech was about 22 years old when he joined the Burndept Company and his first position was concerned with Showroom Sales and Customer Information, Jack worked at the London HQ of the firm in Aldine House, Bedford Street, Strand, and he does not remember ever visiting their parent factory at Blackheath. His considerable abilities and energy soon caught the eye of the chief of the sales Department, Colonel Ball, and he was quickly promoted up to the Publicity and Demonstration section of the company. This new work took him away from the London premises on numerous occasions and he demonstrated the Ethodyne to many very famous personages. Perhaps the most notable of

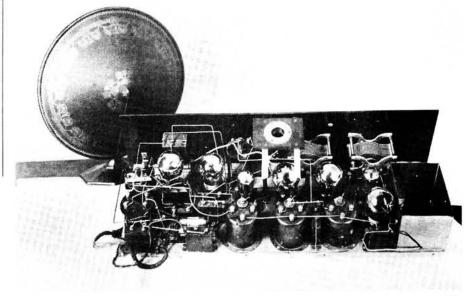
A rear view of the "Chinese Copy" of the Ethodyne which was built by Jack Beech, used successfully on board ship. The three cylindrical components are special Burndept i.f. transformers and the circular metal object mounted behind the panel at its centre is the connector for the frame antenna

these was H.R.H. The Prince of Wales, later to be King Edward VIII, who had an Ethodyne set up in St. James Palace. Jack Beech also still treasures a signed photograph and a personal letter from Sir Seymour Hicks, then one of our most outstanding and respected actors. On one occasion when Jack and chief engineer Phillips were in Paris to demonstrate the Ethodyne there was some misunderstanding of identity and Phillips was arrested as a suspected "spy". Jack Beech was warned in time and fled back to the UK on the first available ferry! There was even a question asked in the House of Commons regarding the short arrest of engineer Phillips and the affair was taken most seriously.

We regard in-car radio as a fairly recent development, but Burndept were successfully demonstrating the technique in 1925. By arrangement, the Editor of *Motor* magazine, Jack Beech, a colleague Mr. Lomax and a chauffeur all set off in a large saloon car from central London. Inside the car was an Ethodyne superhet, its loud-

speaker, the frame antenna and the sets of batteries! Heavy London traffic gave much motor ignition interference and reception was noisy, but once the vehicle was out in the more open countryside eveything became perfect. The car used for the experiment had been fitted with a supressor on each of its spark plugs and the background noise was minimal. As might have been expected, when the frame antenna was used outside the car the reception improved enormously; but of course this was only possible when stationary.

The tests received an enthusiastic "write-up" in Motor and they came to the notice of the Canadian National Railways. This company approached Burndept and asked if good reception was possible from a moving railway train, so another notable experiment was set up by the Sales and Demonstration section. A normal production sample of the Ethodyne was installed in a GWR carriage with the full cooperation of that progressive Railway Company, and it was arranged that the carriage should be part of a train travelling from Bristol to Cardiff. The trip would take the train and the Ethodyne through the Severn Tunnel. Jack Beech and Mr. Lomax were again involved and their task was to impress two officials from the CNR. Good loudspeaker reception was achieved when the frame antenna was alongside the largely wooden wall of the carriage, but results were nil when deep under the Severn! This now seems hardly surprising, but at that time it was a major experiment which proved that reception on the broadcast bands was impossible when the receiver and its antenna were under sea water. This is a problem which still besets the submarine flotillas of all navies.



# Canadian National Railways

The success of the railway tests had impressed the CNR officials and led to further dealings with their organisation. The Canadian National Railways operated ten private broadcast stations in Canada. These stations were strung along in a chain astride the transcontinental railway route from Halifax in the east to Vancouver in the west. The intention was to provide a radio programme service to the train passengers as they journeyed across Canada and also to serve their local communities. The CNR Company contacted Burndept and asked for another demonstration of the Ethodyne. This time it was to be a stern test. for the intention was to receive the Moncton station CNRA on the first anniversary of its opening with a receiver situated in the Company's London HQ in Cockspur Street. Early in November 1925 the test took place. Although the receiver was within a large London office building fine reception was achieved in the early hours of the morning, and the bevy of CNR officials were very impressed. Jack Beech was Burdept's chief agent in this demonstration and he once told me (whilst a wry smile flickered across his face) that he expected reception problems that night, so on the way to Cockspur Street he purchased a small bottle of beer. He then drank the beer and slipped the empty bottle into his raincoat pocket. On arrival at the CNR office he tied one end of about 18 metres of wire to the neck of the bottle and slid it carefully out of a convenient window high up in the building where the test was to take place. The free end of the wire was connected to the Ethodyne and this extra bit of antenna ensured really solid signals from New Brunswick!

Fig. 1. The circuit of Jack Beech's superhet which is very similar to that of the Ethodyne. This diagram was used to illustrate an article in the American magazine *Popular Radio* for May 1927. "A" batteries were for the filaments, "B" batteries supplied h.t. and the "C" batteries were for bias

So impressed were the CNR by the way that Jack Beech had so efficiently set up the receiving demonstration that he was invited to join their organisation and go to work for them in Canada. His task would be to install and supervise the operation of receivers on the transcontinental trains. These receivers would be able to pick up programmes from the ten NCR broadcast stations along the route, and it was hoped that passengers in the rear observation cars would so be helped to pass away the time on a rather long and tiring trip. Jack accepted the offer and prepared to leave.

# A Chinese Copy

For some unknown reason the Canadian National Railways did not buy any Ethodynes for use in Canada. Jack sought for, and received permission to build his own superhet similar in design to the Ethodyne and containing many of the specialised Burndept parts. This receiver was physically rather smaller than the Ethodyne but it used a seven valve circuit with the Burndept frame antenna, valves, coils and i.f. transformers etc.

On Saturday November the 6th, 1926, Jack left Southampton Docks in the RMS Ascania bound for Canada. He had with him the homemade superhet, and surprisingly the Canadian National Railways had arranged that this receiver could be used on board during the trip. At first Jack tried it from his cabin but found that the metal plating and fixtures limited the effectiveness of the frame antenna. The "bottle-on-the-end-of-a-wire" technique was again used and helped greatly with reception. After a few days the receiver was removed to a more advantageous position on an upper deck and immediately reception became very good. On November 10 when some 1000km out the first American broadcast stations on the medium waveband came through strongly. The next day Jack became quite cross when the Manchester BBC station 2ZY heterodyned and spoiled reception from the American WGY in Schenectady, New

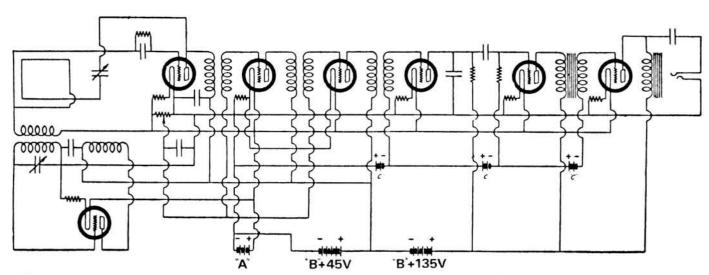
York. On this occasion the path to Britain was in full daylight. Other stations in Europe and especially Spain seemed to be "beating their heads" against the many American transmissions. In all thirteen European and twenty four USA and Canadian stations were logged during the voyage, all being received at distances exceeding 625km. The enormous advantages of the superhet as against the then usual "straight" receiver had been amply demonstrated.

The full details of Jack's operations on board the *Ascania* were written up in the May 1927 issue of *Popular Radio*, an American publication, and in the March 1927 issue of the CNR house magazine.

# Conclusion

Jack Beech worked for the Canadian National Railways for about two years, and then he went to the United States to take up employment with General Motors. He remained with that company until his retirement in 1963 when he returned to live in England again. Photography had long been another of Jack's "passions" and for many years both before and after the last War he broadcast on that topic each Saturday from WKAR, the station run by the Michigan State College.

Perhaps the Ethodyne receivers were too good and too expensive for their time, for they failed to ensure the success of Burndept. The company was in great financial difficulty a few years later and they eventually found themselves in the hands of the Official Receiver. A report in Wireless World dated August 1928 states that the company had been reconstructed under a new management and directorship. From that time Burndept stopped production of complete receivers and became component specialists once more. The only serious rivals to the Ethodyne were the superhets made by the American RCA and Western Electric companies. Its performance put it years ahead of its time.



# DEWSBURY ELECTRONICS

# (D) ICOM

IC751	1299.00 899.00 849.00 145.00 297.85
IC735 New HF Transceiver PS15 P.S. Unit	849.00 145.00 297.85
PS15 P.S. Unit	145.00 297.85
	297.85
SM6 Base microphone for	751/745 40.25
IC290D 2m 25w M/Mode	479.00
IC290E Low Multi-Mode Mot	
IC271E 2m 25w M/Mode Bas	
IC271H 100W version of above	
IC25H 2m 45w FM	359.00
IC27E 25W FM mobile	379.00
IC45E 70c 10w FM	345.00
IC47E 25w 70cm FM mobile	
ICBU1 B/U Supply for 25/45/	290 29.90
ICR70 General Coverage Re	ceiver 629.00
ICR71 General Coverage Re	ceiver 729.00
IC02E 2m H/Held	269.00
IC2E 2m H/Held	199.00
ML1 2m 10w Linear	79.35
IC4E 70cm H/Held	259.00
IC04E 70cm handheld	279.00
BC35 Base Charger	62.10
HM9 Speaker mic	18.56
IC3 Carry Case	5.50
ICBP3 Std Battery Pack	27.50
BP5 High Power Battery F	
CP1 Car Charging Lead	5.50
DC1 12v Adaptor	13.75

# MUTEK

	The state of the s	
LNA 50	50MHz Switched preamp	44.90
LNA 144s	144MHz Low noise switched preamp	39.95
LNA 145sb	Preamp intended for 290	29.90
LNA 432e	70cm Mast head preamp	149.90
PCB 144ub	Front end FT221/225	79.90
PCB 251ub	Front end IC251/211	84.90
BA 500u	20-5000MHz Preamp	34.90
FBA 144e	2m Mast head preamp	149.90
BLA 144e	2m Mast head preamp	89.90
PCB 271ub	Front end for IC271	89.90
VHF 230c	2M-FM Transverter	334.90
BPF 144v	Bandpass Filter	22.40
BPF 432u	Bandpass Filter	22.40
VVF 50c	6M Converter	199.90
LNA 433e	70cm Pre-amp	79.90
VVF 144a	2M Transverter	239.90

SSSGRRBGSRTLLTGT

# **MET ANTENNAS**

70cms	5-05/V	
432-5B	5 Ele	16.95
432-19T/ATV	19 Ele	35.60
432-17X	17 Ele Crossed	49.17
432-17T	17 Ele Long	39.20
2M		
144-5	5 Ele	19.55
144-7T	7 Ele	24.15
144-8T	8 Ele Long	31.26
144-14T	14 Ele	46.71
144-19T	19 Ele	55.88
144-6X	6 Ele Crossed	39.75
144-GP	Ground Plane	14.41
4M		
70/3	3 Ele	30.12
70/5	E File	AE 74

# SWR/POWER METERS

130-470MHz PWR/SWR	69.00
1.8-150MHz PWR/SWR	34.00
1.8-160MHz PWR/SWR	89.00
1.8-60MHz PWR/SWR	65.00
1.8-500MHz PWR/SWR	129.00
	79.00
130-500MHz PWR/SWR	89.00
	1.8-150MHz PWR/SWR 1.8-160MHz PWR/SWR 1.8-60MHz PWR/SWR 1.8-500MHz PWR/SWR 1.8-500MHz PWR/SWR

# DAIWA

3.5-150 Mhz mobile cross needle	48.00
140-150 Mhz mobile cross needle	52.00
1.8-60 Mhz mini cross needle	39.00
1.8-60 Mhz cross needle	19.50
	2.10
	66.21
	98.11
	129.50
	159.64
	233.09
1.8-30 Mhz 200W general coverage ATU	104.99
	1.8-60 Mhz mini cross needle 1.8-60 Mhz cross needle 1.8-150 Mhz cross pointer. Up to 1KW 140-450 Mhz cross pointer. Up to 200W 12-2.5 Ghz cross pointer. Up to 20W 18-30 Mhz 200W tuning unit 2M Power meter and antenna tuning-unit 3-30 Mhz 8 band hi power tuner

# ICS

We now have in stock the full range of ICS RTTY/ASCII/AMTOR/ CW products and the remarkable ALM-203E. This keypad operated handheld 2M transceiver has a host of features yet costs much the same as limited facility thumb

# TRIO

Tono 9000E Tono 550

TS940	HF General Cov	1695.00
TS940S	9 Band TX General Cov RX	1695.00
TS930S	General Cov RX	1295.00
TS830S	160-10m Transceiver 9 Bands	832.75
AT230	All Band ATU/Power Meter	157.99
SP230	External Speaker Unit	47.73
TS530S	160m-10m Transceiver	698.00
TS430S	160m-10m Transceiver	720.00
PS430	Matching Power Supply	138.00
SP430	Matching Speaker	39.50
MB430	Mobile Mounting Bracket	13.17
FM430	FM Board for TS430	45.00
TS130S	8 Band 200W Pep Transceiver	633.06
SP120	Base Station External Speaker	30.74
AT130	100W Antenna Tuner	108.62
MC50	Dual Impedance Desk Microphor	e 36.19
MC35S	Fist Microphone 50K ohm IMP	17.01
LF30A	HF Low Pass Filter 1kW	24.68
TR7930	2M FM Mobile	329.00
TR9130	2M Multimode	499.00
TW4000A	2M/70cm mobile	522.00
TM201A	2M 25W mobile	296.00
TM401A	7cms FM 12W	316.00
TR2500	2M FM Synthesised Handheld	258.00
TR3500	70cm Handheld	270.00
TR2600	New 2M FM Synthesised Handhe	eld 275.00
ST2	Base Stand	60.36
SC4	Soft Case	15.92
SMC25	Speaker Mike	18.66
PB25	Spare Battery Pack	29.10
MS1	Mobile Stand	37.31
R600	Gen. Cov. Receiver	299.52
R2000	Synthesiser 200KHz-30MHz Rece	iver 479.47
HC10	Digital Station World Time Clock	78.99
HS5	Deluxe Headphones	26.88
SP40	Mobile External Speaker	16.46
TH21E/41E	2M/70cm Mini-Handhelds	170.00/199.00
TM211E/411E	2M/70cm FM Mobiles	365.00/399.00
TS711E/811E	2M/70cm base stations	768.00/895.00
TR3600	70CM Handheld	292.00

# **BNOS**

6 amp	58.00 25 amp	148.00
12 amp	99.00 40 amp	296.00
LINEARS		
LPM 144-1-100	2m, 1W in, 100W out, preamp	181.00
LPM 144-3-100	2m, 3W in, 100W out, preamp	181.00
LPM 144-10-100	2m, 10W in, 100W out, preamp	157.00
LPM 144-25-160	2m, 25W in, 160W out, preamp	217.00
LPM 144-3-180	2m, 3W in, 180W out, preamp	247.00
LPM 144-10-180	2m, 10W in, 180W out, preamp	247.00
LP 144-3-50	2MN 50W out, preamp	108.00
LP 144-10-50	2M 10W in, preamp	108.00
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00

# CW/RTTY/TOR

Reader/Sender Reader

HI-MOUND M	ORSE KEYS	
HK702	Straight keyer marble base	30.95
HK703	Straight keyer	29.35
HK704	Straight keyer	19.95
HK705	Straight keyer	15.49
HK706	Straight keyer	16.96
HK708	Straight keyer	14.95
HK802	Straight solid brass	86.30
HK808	Straight keyer	39.95
MK704	Twin paddle keyer	13.50
MK705	Twin paddle keyer marble base	25.65
VIBROPLEX		
Vibroplex lami	bic Standard	63.98
Brass Racer		54.59
Vibrokeyer Sta	andard	63.98
Original Vibro	plex Standard	70.54
The Presentati	on	129.62
MISC		
AFR8000	TOR/RTTY/CW Decoder	684.57
AFR2010	TOR/RTTY/CW Decoder	496.80
AFR2000	TOR/RTTY/ASCII Decoder	427.00
AFR1000	Low cost version of above	P.O.A.
Video module	for above	85.00
CW module for AFR2000		124.00
Telereader	CWR610E CW/RTTY/ASCII	195.00
STAR		
MASTERKEY	Electronic lambic keyer	49.95
Junkers	Straight key	45.00
GW Morse Ke	ys	34.99

# YAESU W

	YAESU YAESU	
FT690	6m Multimode	269.00
FT980	HF Transceiver	1450.00
SP980	Speaker	78.95
FT77	Mobile HF Transceiver	479.00
FP700	PSU	150.00
FC700	Tuner	105.00
FT77s	10w. version	449.00
FMU77	FM Board for FT77	28.35
FL2050	Linear Amplifier	115.00
FT290	2m M/Mode Port/Transceiver	315.00
FT290	With Mutek front end fitted	345.00
FL2010	Linear Amplifier	69.00
MMB11	Mobile Bracket	30.00
NC11	Charger	11.50
CSC1	Carrying Case	5.00
YHA15	2m Helical	7.65
YHA44D	70cm ½wave	9.95
YM49	Speaker Mike	20.20
MMB15	Mobile Bracket	14.55
FT203R	NEW 2m H/Held/C/W FNB3	195.00
FT209R	NEW 2m H/Held/C/W FNB3	239.00
MMB10	Mobile Bracket	8.80
NC9C	Charger	9.60
NC8	Base/station Charger	64.80
PA3	Car Adaptor/Charger	18.00
FNB2	Spare Battery Pack	27.02
YM24A	Speaker Mike	23.75
FT726R	2m Base Station	775.00
430/726	70cm Module for above	255.00
FRT7700RX	A.T.U.	49.85
MH1B8	Hand 600 8pin mic	15.70
MD1B8	Desk 600 8pin mic	64.80
MF1A3B	Boom mobile mic	18.00
YH77	Lightweight phones	14.95
YH55	Padded phones	15.35
YH1	L/weight Mobile H/set-Boom mic	14.95
SB1	PTT Switch Box 208/708	15.70
SB2	PTT Switch Box 290/790	13.80
SB10	PTT Switch Box 270/2700	14.95
QTR24D	World Time Clock	33.35
FF501DX	Low Pass Filter	29.90
NEW MODE		
FRG8800	HF Receiver	475.00
FRV8800	Convertor 118-175 for above	80.00
FT703R	70cm H/Held	235.00
FT709R	70cm H/Held	259.00
FT270R	2m 25W F.M.	315.00
FT270RH	2m 45W F.M.	365.00
FT2700R	2m/70cm/25W/25W	499.00
FRG9600	60-905MHz Scanning RX	449.00

# **ROTATORS**

P.O.A. 329.00

$\overline{}$		-
MR750E	Multitorque, round controller	193.00
MR750PE	Round and preset controller	217.64
MR300E	High speed VHF rotator	193.00
MR750U	Additional motor unit	64.64
MR300U	Additional motor unit	64.64
DR7600X	Heavy duty. Preset control	189.37
KS065	Deluxe bearing	27.30
KR500	Elevation rotator (not Daiwa)	144.90

# Scanners

		_
AR2002	25-550MHz and 800-1,300GHz	37
FRG9600	60-905MHz Continuous Coverage	44
<b>ICOM R7000</b>	25MHz-2.0GHz The Best Yet!	P.O.A
Fairmate	8 Band Scanner (55-469MHz)	16

# Miscellaneous

DRAE	Wavemeter	27.50
L30	30W Dummy load	8.05
L100	100W Dummy load	35.20
L200	200W Dummy load	42.55
CT300	300W Dummy load	69.00
DRAE	2m Pre-set A.T.U.	14.50
TOKYO HI-	POWER	
HC200	10-80 HF Tuner	82.50
HC400	10-160 HF Tuner	176.00
SWITCHES		
Sigma	2 way 'n' Skts	19.95
Welz	2 way SO239	22.95
Welz	2 way 'n' Skts	41.90
Drae	3 way SO239	15.40
Drae	3 way 'n' Skts	19.90

# SPECIAL OFFER FOR THE FESTIVE SEASON



VISA

The STAR MASTERKEY has proved to be extremely popular with our customers and now, for the Christmas period only, we will be giving one away to every customer who buys a new h.f. transceiver from us. This is a limited period offer but it applies to any h.f. transceiver thay you buy.

Wishing you a Merry Christmas and a happy New Year - Tony G4CLX

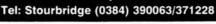


Allow Ten Days for Delivery Open Monday thru Saturday. Instant H.P. subject to status. Access, Barclaycard and real money.



**DEWSBURY ELECTRONICS** 176 Lower High Street, Stourbridge

**West Midlands** 



# PW RADIO PROGRAMS CASSETTES

Each cassette costs £3.75 (including p & p and VAT)

# FOR THE SINCLAIR SPECTRUM (16/48K)

# Cassette 3

QRA Locator/Contest Score Calculator
Distance & Bearing Calculator
Spurious Mixing Product Calculator
Callsearch File
Radio Logbook
Orbits Calculator (RS3-RS8 and OSCAR 8)
TV Colour Test-pattern Generator

## Cassette 5

Antenna & Feeder Calculator
Radio Range Calculator
Single-layer Coil & Resonance Calculator
QSL Card Printer
Meter Shunt & Multiplier Calculator
Reactance/Impedance Calculator

# FOR THE BBC Model B

### Cassette 6

Transmission Lines Calculator Tuned Output Stage Design

### Cassette 7

Universal Locator/Contest Score Calculator Bearing & Distance Calculator ATV Test Card Generator Logbook Satellite Tracking

# FOR THE SINCLAIR ZX81

# Cassette 1

Morse Tutor\*
QRA Locator/Contest Score Calculator\*
Distance & Bearing Calculator\*
Spurious Mixing Product Calculator\*
Morse Tutor
Callsearch File
Radio Logbook
Orbits Calculator (RS3-RS8 and OSCAR 8)

### Cassette 2

Structured Morse Learning Course

# Cassette 4

Antenna & Feeder Calculator
Radio Range Calculator
Single-layer Coil & Resonance Calculator
QSL Card Printer
Meter Shunt & Multiplier Calculator
Reactance/Impedance Calculator

\* These programs will run in 1K. Remainder require 16K of RAM

# **FOR THE DRAGON 32**

# Cassette 6

Transmission Lines Calculator Tuned Output Stage Design

# Send your order, asking for **PW Radio Program No.** (followed by the cassette number as quoted above) to:

Practical Wireless Cassette Tape Offer Department PWC1 ROCHESTER X Kent ME99 1AA

Please make cheques payable to IPC Magazines Ltd

# "Now why didn't I think of that?"



Wherever you are, a postal subscription could solve your problem of ensuring regular delivery of PRACTICAL WIRELESS. Complete the order form below and post to PRACTICAL WIRELESS, Subscription Dept., Oakfield House, 35 Perrymount Road, Haywards Heath, West Sussex RH16 3DH.

Annual subscription rates: UK £13 Overseas £15

PRACT	TICAL	WIF	RELES	SS S	SUBS	CR	IPTI	ON	OR	DEF	? FI	OF
Annual s UK £13												
To Pract 35 Perry											ЭН.	
Name_				11000				2000000	1111111			
Address.												
☐ I encle		ment	of £			che	que/l	PO pa	ayab	ole to	Pra	CI
	ess)										Pra	Cti
Wirele	ess)										Pra	ct

# No.35 Roger Hall **G4TNT**

IMPORTANT—The ideas presented here are suggestions only, and as they are untried by this magazine, we cannot accept responsibility for any resultant damage, however caused. Before alterations are attempted, care should be taken to ensure that any guarantee is not invalidated, and it should also be borne in mind that modifications usually have an adverse effect on resale prices. In cases where specialist skills or equipment are needed most dealers will undertake the work for a reasonable fee.

If you have a mod that you would like to pass on or if you have a request for a mod that you would like to carry out, please write to me at this address: R. S. Hall, Practical Wireless, Room 204B, Hatfield House, Stamford Street, London SE1 9LS.

# YAESU FRG-7700

George G4RNI has sent in a selection of interesting mods for this very popular receiver. He is on his second one and has found that both suffered from various image and crossmodulation problems. However, he has managed to greatly reduce these problems on all but the 1-2MHz range and all for a total cost of approximately 50p.

To carry out the mods it is necessary to completely remove the main p.c.b.-but this is quite a simple job. Start by disconnecting the mains supply and then remove the six screws securing the top cover. Loosen the screws that hold the handle and take off the top cover.

Now take off all the flying leads from the main board and from the f.m. board. These should all be marked with code numbers, which match the numbers on the boards, so it should not be too difficult to replace them later. Undo the two screws that hold the screen behind the digital display and remove this screen.

Next, remove the nine screws that hold in the main p.c.b. and take the board out, taking care not to damage the digital display. Locate the bandpass filter section, which is near to the antenna terminals, and then cut the tracks as described in the following section.

16-30MHz Filter: Find R04 and L04, cut the copper track that connects them and then solder a miniature 27pF capacitor across this cut on the p.c.b. Carefully remove capacitor C10 (12pF) and replace it with a 4.7pF one.

8-16MHz Filter: Cut the track between C17 and L09 and solder a 39pF capacitor across the cut.

4-8MHz Filter: Cut the track between C26 and L14 and solder a 68pF capacitor across the cut.

2-4MHz Filter: Cut the track between C35 and L19 and solder a 100pF capacitor across the cut.

0-15-1MHz Filter: Remove the two 120pF capacitors C51 and C54 and replace them with 1000pF ones. Solder two more 1000pF capacitors onto the underside of the board, one in parallel with C52 and the other in parallel with C53.

These mods help to prevent cross-modulation. George says that he lives just 3km from a BBC medium wave station and even with his long wire antenna he experiences no breakthrough at all now.

# Improved FM Selectivity

Start by removing the two plastic pins holding the f.m. board metal cover to the back panel of the set and then withdraw the panel and the board. Remove the two screws that hold the panel to the board and then unsolder and take out the CFU455E ceramic filter. Replace it with a CFU455H (for 6kHz bandwidth) or a CFU455G (for 8kHz bandwidth).

# Brighter FM Audio

While the f.m. board is out of the set, remove capacitor C13 (0.22µF) and replace it with 0.1µF or 0.01µF, depending on the quality of audio that you prefer.

# Improved Bandwidth (AM WIDE)

George thinks that the manufacturer has made this setting too wide for serious use on the broadcast bands so he suggests the following change.

With the main board out of the set, remove CF04 (LFH12) and replace it with an LFH8, which is available from Cirkit. A CFW455G could be used instead but if it is, it will have to have its third earth lead bent over and soldered to the second one before installation

After modification the bandwidths will be: NARROW <3kHz @ -6dB, 8kHz @ -50dB; MEDIUM 6kHz @ -6dB, 15kHz @ > -50dB; WIDE 8kHz @ -6dB, 18kHz @ < -50dB.

I have not yet tried out these mods on my own FRG-7700 but I certainly intend to and I'll pass on my comments when I do. Meanwhile, thanks for sending them in George.

# **ICOM**

David G6MOE, has written in with a very simple mod that will convert any Icom pre-amplified microphone into a switchable "noise cancelling" one. He has modified his Icom HM-11 mic and has been using it in the cab of his noisy lorry with good results.

All that is involved is the insertion of a single-pole switch in the negative leg of the 4.7µF capacitor, as shown in Fig. 1. When the capacitor is switched in, the microphone works normally but when it is switched out of circuit, negative feedback is increased and the gain of the pre-amplifier is reduced enough to cut out most background noise. David says

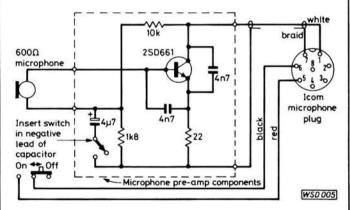


Fig. 1

that there is no need to adjust the deviation inside the rig and the microphone will not need to be "talked up".

The HM-11 microphone has a slide switch that is used for defeating the SCAN buttons but as this can be done by flicking the p.t.t., it can be used for this mod. Other microphones may not have a spare switch so one will have to be added. If long lengths of wire are used to connect the switch into the circuit, it may be a good idea to run them through ferrite beads.

This method of reducing the gain of Icom pre-amplified microphones makes them more versatile as they can now be used wherever there is background noise. Thanks for sending in the mod David and thanks for the clear diagram.



Need a compact 144MHz band array? PW's antenna constructor extraordinaire John M. Fell GOAPI evaluates a likely contender

Regular readers of PW may well have read about the results of past antenna exploits and gather that I place a very strong emphasis on the "fundamental transducer". As an old timer once said to me "the more metalwork—the more signal".

Over the years I have endeavoured to follow this basic concept with the largest constructed array currently standing at 400 elements on 1·3GHz (for contest operation/e.m.e.). So it was not without some second thoughts that I was persuaded to remove all the normal metalwork from the top of my Western Ultimast. This action was necessary in order to both accommodate and evaluate the Halbar QDX—the results obtained surprised me.

Those who have read the often excellent DJ9HO UHF Compendium will recognise the QDX as a developed version of the Twin-quad—seemingly much loved by our German friends. Sound British engineering has resulted in a compact and sturdy array which can be seen to comprise a double-quad driven element and twin-boom director/reflector assembly.

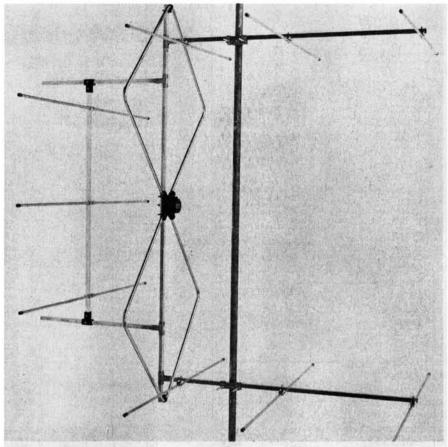
The distance between the Yagi director booms and the overall length of the array is virtually equal at 1.27m (0.64λ) which may lead you to conclude that such a short structure will be low gain. My measurements indicate that the 14dBi (approx. 12dB over λ/2 dipole) quoted by the manufacturer is realistic and is equivalent in forward gain terms to a 10-element (2.2λ or 4.4m long) NBS Yagi.

Nothing is really for free so where does the gain of the antenna come from? Well go back to the "max metalwork" theory and it becomes clear that the QDX could be thought of as a 13-element system—four  $\lambda/4$  components in the double-quad driven element, three in the stacked reflector and six directors.

Further measurements taken also confirm the quoted front-to-back ratio of 23dB, which also coincides with the NBS value for a triagonal reflector. Horizontal beamwidth is quoted as 40 degrees, but does not state the refer-



# Halbar QDX 144MHz Double Quad Yagi



ence. Assuming this to be at the 3dB points (the beamheading either side of the peak forward gain at which the signal level has dropped by 3dB i.e. to half its peak value), my measurements indicate the actual figure to be at approximately 50°. The fall-off in forward response is very smooth with the first real nulls (-27dB) occurring at  $\pm 70$  degrees, rising again before a further -33dB null at  $\pm 140$  degrees.

In practical terms these figures indicate the directional "selectivity" to be somewhat less than the equivalent Yagi and with current 144MHz activity levels system selectivity at whatever point in the receiving (and transmitting) system is of importance. Conversely the vertical beamwidth (not measured) of the stacked system should be narrower than the Yagi, which will lead to reduced noise pickup from ground based QRM and an enhanced system noise figure.

Construction of the QDX as mentioned previously is sturdy and should allow survival even on the west coast of GM—the boom is of 15mm × 1·5 wall square section, parasitic elements 10mm diameter and the driven element 12mm diameter.

Setting-up was accomplished on the tilted-over mast at 2m above ground.

The reflector stack is adjustable over a horizontal distance of 520mm and was optimised at 270mm behind the driven element on the review sample. A plot of the resulting v.s.w.r. shows 1·15:1 at 145MHz, rising to 1·2:1 at 144 and 146MHz—no problems here. The QDX is quoted at  $50\Omega$  impedance—as the system is inherently balanced a 1:1  $\lambda/4$  balun should be used with an unbalanced coaxial feeder. However in practice direct connection can be made and will result in an approximately six degree skew of the polar pattern.

So to conclude this review the QDX can be recommended for those with neighbour/planning sensitive locations, will provide very respectable forward gain but does occupy more vertical space on the mast than a conventional Yagi. You could fit rear mounting antennas for higher frequencies between the booms—but may impair the performance to a degree. At an all-up weight of 2-3kg this antenna could be the answer to a lot of peoples problems.

Thanks for the loan of the review QDX go to Halbar Aerials, Unit 1, Bury Walk, Bedford, MK41 0DU, Tel: (0234) 44720. The QDX currently costs £26 inc. p&p.

Practical Wireless, January 1986

# REALISTIC® SCANNERS The Professional Choice

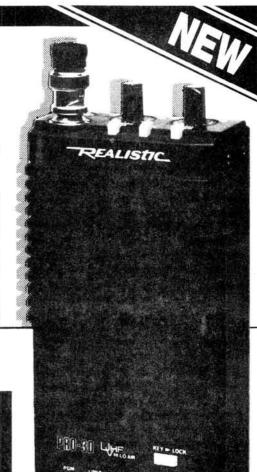


16-Channel Direct Entry System

£23995

- 68-88 MHz VHF-Lo
- 108-136 MHz (AM) Aircraft
- 138-174 MHz VHF
- 380-512 MHz UHF

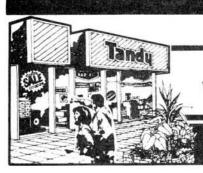
Realistic PRO-30. Scan up to 16 channels continuously, in two speeds. Two second scan delay. Squelch control, built-in speaker, jacks for earphones and long-range external antenna. Requires 6 "AA" batteries or AC/DC adapter. Memory requires 4 silver-oxide batteries. 20-9131 ..... £239.95



10-Channel Direct Entry System

£19995

- 68-88 MHz VHF-Lo
- 138-174 MHz VHF
- 380-512 MHz UHF



# TAKE A LOOK AT TANDY, TODAY

Visit your local store or dealer and see these and many more bargains.

We service what we sell - over 2,600 exclusive lines!



**OVER 9,000 STORES & DEALERSHIPS WORLDWIDE** 



Known As Radio Shack in The U.S.A.

Prices may vary at Dealers
Offers subject to availability

Simple Continuity

Tester

by R. H. Pearson G4FHU

How many times have you needed to do a simple check for electrical continuity (below a few hundred ohms), reached for a multimeter and found the battery exhausted?

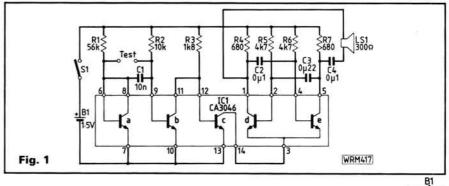
This simple indicator needs only a single cell for its d.c. supply and consumes 0.6mA on standby and less than 4mA on "bleep". The circuit works happily with cells that are too tired for most other uses and forms a convenient last resting place for such items!

In operation the item under test is subjected to less than 150mV potential difference, leaving transistor and diode junctions inoperative during tests

Inspection of the circuit diagram, Fig. 1, will show that the indicator is based on a CA3046 i.c. transistor array, IC1. The left-hand device IC1(a) produces a voltage reference of about 0.6V, whilst IC1(b) is biased about 100mV higher so that it saturates and holds IC1(c) "off" disabling the astable multivibrator formed around IC1(d)/(e).

When a sufficiently low resistance is connected across the test terminals, between the first two bases, IC1(b) comes out of saturation and allows the multivibrator to function. A 10nF capacitor, C1, is included to prevent any tendency to spurious oscillation.

Construction of the indicator is noncritical and a suggested layout based on Veroboard is shown in Fig. 2. **PW** 



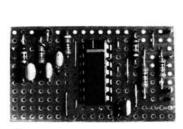


Fig. 2



## Resistors

# Capacitors

Monolithic ceramic

10nF 1 C1 0·1μF 2 C2,4 0·22μF 1 C3

# Semiconductors

Integrated Circuits
CA 3046 1 IC1

## Miscellaneous

14 pin d.i.l. socket; 300Ω Telephone earpiece, LS1; Test terminals (2); s.p.s.t. miniature toggle switch; 0-1in Veroboard; Plastics case.



# **BENNY**









# Avon

City of Bristol RSGB Group: C. R. Hollister G4SQQ (Bristol 508451). Meets 7.30pm in the Small Lecture Theatre, University Walk, University of Bristol, Clifton. Dec 16—Xmas Celebrations.

North Bristol ARC: Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol. Meets Fridays, 7pm at the SHE Centre, 7 Braemar Crescent, Northville. Dec 27—Xmas Party.

South Bristol ARC: Len Baker G4RZY (Whitchurch 834282). Meets Wednesdays, 7.30pm in the Whitchurch Folk House, East Dundry Road, Whitchurch. Dec 11—h.f. Activity; 18th—Families Xmas Evening.

# Bedfordshire

Dunstable Downs RC: Phil Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, High Street South, Dunstable. Dec 6—Constructors' Competition; 13th—"A Backwards Look at '85"; 21st—Xmas Party; Jan 3—"Idiots" Construction Competition.

Leighton Linslade RC: Ian Jardine G1ACQ (Leighton Buzzard 376741). Meets 1st and 3rd Mondays, 7.30pm in Room A64, Vandyke CC, Vandyke Road, Leighton Buzzard.

Shefford & District ARS: Alan Little G4SP0 (Hitchin 57946). Meets Thurdays, 8pm in the Church Hall, Ampthill Road, Shefford. Dec 12—Constructors' Contest; 19th—Chairman's Social Evening.

# **Berkshire**

Reading & District ARC: Chris Young G4CCC, 18 Wincroft Road, Caversham, Reading. Meets alternate Tuesdays, 8pm at the White Horse, Emmer Green, Reading. Dec 10—AGM; 17th—Xmas Social.

Buckinghamshire

Maidenhead & District RC: Bob Fowler G3IQF (Marlow 6421). Meets 1st Thursdays and 3rd Tuesdays, 7.30pm at the Red Cross Hall, The Crescent, Maidenhead.

Cambridgeshire

Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursdays, 7.30pm in Southfields Junior School, Stanground, Peterborough. Dec 12—Social.

# Central

Falkirk & District ARC: Brian Waddell GM4XQJ (Falkirk 31258). Meets 1st and 3rd Wednesdays, 7.30pm in the Grange Centre, Brightons, nr Falkirk. RAE and c.w. on Tuesdays.

# Cheshire

Chester & District RS: Alan Warne G4EZ0 (Chester 40055). Meets 2nd, 3rd, 4th and 5th Tuesdays, 8pm at Chester RUFC, Hare Land, Vicar's Cross, Chester. CW from 7.15pm. Dec 11—Construction Contest; 17th—Xmas Buffet.

Clywd

Alyn & Deeside ARS: G. C. Cook GW4RKX (Deeside 660066). Meets alternate Mondays, 8pm in Shotton Social Club, Shotton Lane, Shotton. Dec 16—Xmas Party.

Conwy ARC: Nigel Vicars-Harris (Conwy 636376). Meets 2nd and 4th Thursdays, 8pm at Green Lawns Hotel, Bay View Road, Colwyn Bay. Dec 12—Talk by N. Wales Police Crime Prevention Officer.

# Cornwall

Cornish RAC: Tony Bevington G4ZUI (Stithians 860572). Meets 1st Thurdays, 7.30pm in the Church Hall, Treleigh. 1st Thursdays—General Meeting; 2nd Mondays—Computer Club; 3rd Mondays—Constructors' Practical Wireless, January 1986



# Compiled by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell, 57 The Kingsway, Ewell Village, Epsom, Surrey KT17 1NA PLEASE MARK "CLUB NEWS"

Workshop; January 2—"Beetling around Africa" by G3WKP.

Plymouth ARS: John Veale G4SCA (Plymouth 337980). Meets alternate Mondays, 7.30pm at the Plymouth Albion RFC, Beacon Park, Peverell, Plymouth.

# Cumbria

Carlisle & District ARS: Tony Leach G4W00 (Scotsby 500). Meets Mondays, 7pm in the Scout Hut to the rear of Trinity School, Carlisle.

Eden Valley RS: Alison Telford G4XPO, Ivy House, Culgaith, Penrith. Meets 3rd Thursdays, 7.30pm in the Kings Arms, Temple Sowerby, on the A66. Dec 19—Buffet/Dance.

Westmorland RS: Gordon Chapman G1IIE, 61 Rusland Park, Kendal. Meets 2nd Tuesdays, 8pm at the Strickland Arms, Sizergh, nr Kendal.

# Derbyshire

Bolsover ARS: David Fleetwood G1GNC (Chesterfield 824061). Meets Wednesdays, 7.30pm in the Black Bull, Bolsover.

Glossop & District ARG: G. Sims G4GNQ, 85 Surrey Street, Glossop. Meets last Thursdays, 8pm in the Nags Head Hotel, Charlestown Road, Glossop.

# Devon

Axe Vale ARC: Bob Newland G3VW (Lyme Regis 5282). Meets 1st Fridays, 7.30pm in the Cavalier, West Street, Axminster. Dec 6—Annual Dinner; January 3—Construction Contest.

Exmouth ARC: Des Thompson, Four Winds, 131 St John's Road, Exmouth. Meets alternate Wednesdays, 7.30pm in the Scout Hut, Marpool Hill, Exmouth. Dec 18—Next Meeting.

Tiverton (SW) RC: G. W. Draper G4ZNV (Crediton 235). Meets Tuesdays, 7.30pm in the Half Moon Inn, Fore Street, Tiverton.

Torbay ARS: Brian Wall G1EUA, 48 Pennyacre

Road, Teignmouth. Meets Fridays and last Saturdays, 7.30pm in the ECC Social Club, Ringslade Road, Highweek, Newton Abbot. Dec 21—Xmas Party.

## Dyfed

Aberporth RAC: Frank Thomas GW6RDR (Cardigan 87274). Meets Thursdays, 7pm in Building 17, Royal Aircraft Establishment, Aberporth.

# Essex

Braintree & District ARS: David Willicombe G6CJA (Braintree 45058). Meets 1st & 3rd Mondays in Room 1, Braintree CC, Victoria Street, Braintree. Dec 16—Xmas Party. Havering & District ARC: D. St. J. Gray G0B0I (Hornchurch 41532). Meets Wednesdays, Bpm at Fairkytes Art Centre, Billet Road, Hornchurch.

# Gloucestershire

Cheltenham ARA: Tim Kirby G4VXE (Cheltenham 36723). Meets 1st and 3rd Fridays, 7.30pm in the Stanton Room, Charlton Kings Library, Cheltenham. Dec 6—AGM. Smiths Industries RS: Roger Hawkins G8UJG (Cheltenham 673333 ext 2557). Meets alternate Thursdays, 8pm in the S&SC, Evesham Road, Bishops Cleeve, Cheltenham. Dec 12—Xmas Fayre.

### Gwent

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH, 109 Croesonen Parc, Abergavenny. Meets Thursdays, 7.30pm in Pen-Y-Fal Hospital, above Male Ward 2. The club is a registered centre for the RAE.

Pontypool ARS: Ivor Wilkinson GW4RJA (Cwmbran 72110). Meets Tuesdays, 7pm at The Settlement, Rockhill Road, Pontypool.

# Hampshire

Amateur Radio & Computer Club: Trevor Tugwell G8KMV (Fareham 43031 ext 2591). Meets every 4th Friday, 8pm in the Crown, Bishops Waltham. Dec 13—Xmas Social. Binstead ARS: A. F. Knight G4RTT (IoW 295951). Meets Wednesdays, 7.30pm at the 1st Ryde/1st Binstead Scout HQ, Binstead. Fareham & District ARC: Brian Davey G4ITG (Fareham 234904). Meets Wednesdays, 7.30pm at the Porchester CC, Westlands Grove, Porchester. CW at 7pm. Dec

Three Counties ARC: Keith Tupman G0BTU (Petersfield 66489). Meets alternate Wednesdays, 8pm in the Railway Hotel, Liphook. Dec 11—Quiz.

# **Hereford & Worcester**

18-The g.d.o. by G4ITF.

Droitwich ARC: Gordon Taylor G4HFP (Stourporton-Severn 3818). Meets 2nd and 4th Mondays, 8pm in the Scout HQ, Union Lane, Droitwich.

Hereford ARS: F. E. G. Cox G3WRQ, 35 Thompson Place, Hereford. Meets 1st and 3rd Fridays, 7.30pm in the County Council CD HQ, Gaol Street, Hereford. Dec 30—Annual Quiz; Jan 3—Audio/Visual Show.

# Hertfordshire

Cheshunt & District ARC: Roger Frishy G40AA (Hoddesdon 464795). Meets Wednesdays, 8pm in the Church Room, Church Lane, Wormley. Dec 6—Xmas Dinner; 11th—Video by G40AA; 18th—Social Evening. Verulam ARC: Hilary Claytonsmith G4JKS (St Albans 59318). Meets 2nd & 4th Tuesdays, 7.30pm at the RAFA HQ, New Kent Road, off Marlborough Road, St Albans. Dec 17—AGM and Social.

Welwyn Hatfield ARC: Dave Fairbanks GOAll (Welwyn Garden 326138). Meets 1st & 3rd Mondays, 8pm at the Knightsfield Scout HQ, Welwyn Garden City. CW on Thursdays. Dec 16—Workshop Evening.

# Humberside

Grimsby ARS: G. J. Smith (Grimsby 887720). Meets Thursdays, 8pm at the Cromwell SC, Cromwell Road, Grimsby.

Hornsea ARC: N. A. Bedford G4NJP, 39 Hamilton Road, Bridlington. Meets Wednesdays, 8pm in the Mill, Atwick Road, Hornsea.

Bredhurst R&TS: A. S. White G4EGH (Medway 388760). Meets Thursdays, 8.15pm at the Parkwood CC, Parkwood, Rainham. Dec 12—Construction Contest.

Dartford Heath DF Club: Peter Sharman G8DYF (Greenhithe 844467). Normally meets at the Horse & Groom, Leyton Cross, Dartford Heath, prior to hunt. Dec 17-EGM (9pm). Hilderstone RS: Annette Penfold GOBEX (Canterbury 812723). Meets Fridays, 7.30pm at the Hilderstone AEC, St. Peters, Broadstairs. SE Kent (YMCA) ARC: John Dobson (Dover 211638). Meets Wednesdays, 7.45pm at the Dover YMCA, Godwynehurst, Ley-burne Road, Dover. Dec 11—Microwaves by G8FEZ; 18th-Xmas Social.

West Kent ARS: Nigel Peacock G4KIU (Tunbridge Wells 33586). Meets Fridays, 8pm in the AC Annex, Quarry Road, Tunbridge Wells. Dec 6-Annual Dinner at the Star & Eagle, Goudhurst.

Maidstone ARS: Peter Pickering G30RP (Maidstone 29462). Meets Fridays, 7.30pm at the YMCA Sports Centre, Crip le Street, Maidstone.

# Lancashire

Bury RS: Miss C. J. Ashworth G1PKO (061-764 5018). Meets Tuesdays, 8pm at the Mosses CC, Cecil Street, Bury. Dec 10-AGM.

Fylde ARS: H. M. Fenton G8GG (Lytham 725717). Meets 1st & 3rd Tuesdays, 7.45pm in the Kite Club, Blackpool Airport. Dec 17-Hotpot Supper and Xmas Party; Jan 7-AGM. Morecambe Bay ARS: W. E. Delamere G3PER (Heysham 52659). Meets Mondays, 7.30pm in the canteen, Luneside Eng. Co., Mill Lane, Halton. Dec 9—Police Wireless Workshops Visit; 16th—Hot-pot Supper for all the family; 23rd & 30th-no

Rossendale Valley ARC: Lee Standley G1EIU (Rossendale 214411). Meets Thursdays, 8pm at the Bishop Blaize Hotel, on A56, Rawtenstall.

Skelmersdale & District ARC: Gordon Crowhurst G4PZY (Ormskirk 894299). Meets Thursdays, 8pm at the Beacon Park Centre, Dalton Lane, Skelmersdale. Dec 12-SSTV; 19th-Xmas Social and Quiz.

Thornton Cleveleys ARS: E. E. Milne G4WIC (Blackpool 821827). Meets Mondays, 7.45pm at the 1st Norbreck Scout HQ, Carr Road, Bispham, Blackpool.

# Lincolnshire

Lincoln SWC: Pam Rose G4STO c/o Club Address. Meets 3rd Wednesdays, 8pm at the City Engineers Club, Central Depot, Waterside South, Lincoln. Dec 11-Xmas Buffet. Sleaford & District ARC: Dave Beilby G2HHK (Sleaford 304454). Meets 3rd Sundays, 7.45pm at the Hale Magna Village Hall, Great Hale. A new club looking for members.

# London

Acton, Brentford & Chiswick ARC: Bill Dyer G3GEH, 188 Gunnersbury Avenue, Acton, W3. Meets 3rd Tuesdays, 7.30pm at the Chiswick Town Hall, High Road, Chiswick, W4. Dec 17—50MHz Band by G1ARQ.

Grafton RS: John Kaine G4RPK, 74 Camden Mews, NW1. Meets 2nd and 4th Fridays, 8pm at the Five Bells, East End Road, East Finchley.

Wimbledon & District ARC: George Cripps G3DWW (01-540 2180). Meets 2nd and last Fridays, 8pm at the St John Ambulance HQ, 124 Kingston Road, SW19. Dec 13—Xmas Social.

Merseyside

Wirral ARS: Cedric Cawthorne G4KPY (051-625 7311). Meets 1st and 3rd Wednesdays, 7.45pm in the Parish Hall, Heswell.

# Middlesex

Edgware & District RS: John Cobley G4RMD (Hatfield 64342). Meets 2nd and 4th Thursdays, 8pm in the Watling CC, 145 Orange Hill Road, Burnt Oak, Edgware. Dec 12-Junk Sale.

**Nottinghamshire** 

Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812). Meets 1st Fridays & 3rd Tuesdays at the Victoria Social Club, Mansfield. Dec 6-Buffet and Disco; 17th-Club

ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604). Meets Thursdays, 7.30pm at Sherwood CC, Woodthorpe House, Mansfield Road, Sherwood. Dec 19 -Xmas Party.

Oldham ARC: Kath Catlow G4ZEP (061-624 7354). Meets Thursdays, 8.30pm at the Moorside Conservative Club, Ripponden Road, Moorside, Oldham. Jan 26-1st Mobile Rally at Birch Hall Hotel.

Worksop ARS: Carole Gee G4ZUN (Worksop 486614). Meets Tuesdays, 7.30pm at the Sub-Aqua Club, The Maltkins, Gateford Road, Worksop. Dec 10-Quiz; 20th-Xmas Buffet and Disco at the Worksop Miners Welfare, Gateford Road.

Shropshire

Salop ARS: Simon Price G60MJ (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell. Dec 19-Xmas Social

Telford & District ARS: Tom Crosbie G6PZZ (Telford 597506). Meets Wednesdays, 8pm at the Dawley Bank CC, Bank Road, Dawley. Dec 11/18—Club Project a g.d.o.; 20th-Xmas Social at the Station Inn, Horsehay, Telford.

# Somerset

Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm at the Recreation Centre, Chilton Grove, Yeovil. Dec 12-Thick Film Hybrid Circuit by G3ETA; 19th—AFS Contest by G3GC; Jan 2
—Tuned Circuits G3MYM.

# Staffordshire

Cannock Chase ARS: B. Robinson G1FEC (Cannock 74521). Meets Thursdays, 8pm at the Bridgtown War Memorial Club, Bridgtown. Stafford & District ARS: Tony Bairstow G4RSW (Stafford 46306). Meets Tuesdays, 8pm in the Coach and Horses Motel, Weston

Strathclyde

Avr ARG: R. D. Harkness GM3THI (Ayr 42313). Meets alternate Fridays, 7.30pm on the Wellington Leisure Centre, Wellington Square, Ayr. Dec 13—RSGB Video.

# Suffolk

Ipswich RC: Jack Toothill G4IFF (Ipswich 44047). Meets 2nd and last Wednesdays, 8pm in the Rose and Crown, 77 Norwich Road, Ipswich. Dec 11—"Guess What" by G4HMF.

Surrey

Coulsdon ATS: Alan Bartle (01-684 0610). Meets 2nd Mondays and last Thursdays, 7.45pm in St Swithin's Church Hall, Grovelands Road, Purley. Dec 9-AGM.

Dorking & District RS: J. Greenwell G3AEZ (Newdigate 236). Meets 2nd and 4th Tuesdays, 8pm in the Star and Garter Hotel, Dorking, for informal meetings, others at Ashcombe School. Jan 28—AGM.

Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam. Meets 3rd Fridays, 7.30pm at the Downs LT Club, Holland Avenue, Cheam. Dec 20-Xmas Gettogether.

Thames Valley ARTS: John Pegler G3ENI (East Horsley 4279). Meets 1st Tuesdays, 8pm in Thames Ditton Library, Watts Road, Thames Ditton.

# Sussex

Chichester & District ARC: C. Bryan G4EHG (Chichester 789587). Meets 1st Tuesdays and 3rd Thursdays, 7.30pm in the Fernleigh Centre, 40 North Street, Chichester. Dec 19-Xmas Social.

Crawley ARC: Dave Hill (Crawley 882641). Meets 2nd and 4th Wednesdays, 8pm at the United Reform Church, Ifield Drive, Ifield. Dec 11-Xmas Supper G4TVC on Crawley 28612 for details.

Hastings Electronic & RC: Dave Shirley G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in West Hill CC, Croft Road, Hastings, and Fridays, 8pm in the Club Room, Ashdown Farm CC, Downey Close, St Leonards-on-Sea. Dec 18-Xmas Social at Ashdown Farm CC.

# Warwickshire

Atherstone ARC: Roy Fuller G6YQU (Chapel End 393518). Meets 2nd and 4th Mondays, 7.30pm in the Physics Lab, Atherstone Upper School, Long Street, Atherstone. Dec 9-Social Buffet with entertainment for members and guests at the Bull, Witherley.

Rugby ATS: Kevin Marriott G8TWH, 41 Foxon's Barn Road, Brownsover, Rugby. Meets Tuesdays, 7.30pm in the Cricket Pavillion, BTI Radio Station, "B" Building Entrance, Hillmorton on the A5. Dec 17—Xmas Party. Stratford upon Avon & District ARC, David Boocock G80VC (S-u-A 750584). Meets 2nd and 4th Mondays, 7.30pm in the Baptist Church, Payton Street, S-u-A. Dec 9—Severn Trent Telemetry System by G8TWH; 23rd—Xmas Get-together.

# West Midlands

South Birmingham RS: Tim Scrimshaw G8RGQ (021-459 8312). Meets 7.45pm in the West Heath CC, Hamstead House, Fairfax Road, West Heath. Dec 11-Xmas Party and Construction Contest.

Midland ARS: Norman Gutteridge G8BHE, 68 Max Road, Quinton, Birmingham. Meets every week night in Unit 5, Henstead House, Henstead Street, off Bromsgrove Street, Birmingham 5. Note the new venue.

Mirfield RC: C. Marks G4ZPJ, 63 Alvis Walk, Chelmsley Wood, Birmingham. Meets Mondays, Tuesdays, Wednesdays and Thursdays, 7.30pm at the Mirfield CC, Yockelton Road, Lea Village, Birmingham. Club phone number is 021-783 5898.

Willenhall & District ARS: John Phillips G4UPF (Wombourne 782076). Meets Wednesdays, 8pm at the Cross Keys, Prouds Lane, Willenhall.

Wolverhampton ARS: Keith Jenkinson G10IA (Wolverhampton 24870). Meets Tuesdays, 8pm at Wolverhampton Electricity S & SC, Chapel Ash, Wolverhampton. Dec > 66 17-Xmas Social.

Practical Wireless, January 1986

# ON THE AR

# AMATEUR BANDS

Reports to: Eric Dowdeswell GAAR, 57 The Kingsway, Ewell Village, Epsom, Surrey KT17 1NA

Logs by bands in alphabetical orde

Common complaint of readers is the continuing decrease of activity on the h.f. bands, but with the sunspot count down to almost zero it is hardly surprising! This state of affairs could last well into 1986 before any upturn manifests itself. I'm afraid the odd sunspot that does appear now and again will have little effect on the general trend. The 14MHz and 3·5MHz bands are about the only bands with much traffic on them at the moment.

# DX Bands

A first letter from **A. Topping** of Selby, North Yorks, aged 15, who runs an FRDX-400 with a CB antenna. Hope he can put up a decent antenna 'ere long! So far mainly European stations with the odd W on 14MHz.

Another newcomer is **Bruce Milburn** of Alfreton, Derbys, also aged 15, who has been doing quite well with the DX on his Realistic DX-200 receiver and a 40m-long wire and home-brew a.t.u. On the 3-5MHz band he caught CT2CB, EA8ANR, EA9NW, JR6YAH, JW0A, VK2AEA, VO1FG, 4X4VE and 9H1ED. On 7MHz it was just TF6JZ and VK2APK among the QRM. The 14MHz band produced DU9RG, LU5DKI, T77V, and a stack of W's.

Melvyn Dunn BRS86500 of Grimsby runs a Yaesu FRG-7700 with a 40m-long antenna. Among interesting QSLs received lately are ZD7CW, CN2AQ and HB0CFD. The 3-5MHz area produced just JW0A with cards to SP2HMT, while 7MHz came up with CN8ES (QSL WA3NCP), HH7PV and TZ6WC (QSL D44BC). Up to 14MHz and PZ5ES, TZ6FS, KP4BZ, ZB2EO and VP5WE plus 8P9AB with cards to POB 1213 Bridgetown, Barbados.

In New Malden, Surrey, Robert Parsey BRS85875 has an FRG-7700 with matching a.t.u. fed from a 20m-long inverted Vee or a 60m-long horizontal wire. Good ones logged around 3-8MHz were CT2CB, EA9NW, HK5ISX, TI2KD, VP2MLD V3CQ (QSL WA6VNR), and 4U1ITU. Just two on 7MHz were A71AD and J5WAD but on 21MHz he found KH0AC (QSL K7ZA), 7Q7LW (QSL POB 24 Mtakataka), and 4U1VIC in Austria.

Marcus Walden of Harrogate, using a DX-302 and 30m-long antenna copped HBO/DL1GBM and JWOA on 3-5MHz, HP1BGV and 9K2EK (QSL POB 533, Safat, Kuwait) on 7MHz and then KP2AM, PJ2HB, TR8DR, TU4BR (QSL KN4F), XE3RT and 8P6JQ, all on 14MHz band. Only logging on 21MHz was TL8CK.

In Bolton, Lancs, **Michael Sargeant** stuck to listening on the 14MHz band with his DR49 and active antenna AO370 from Datong. He logged JW5E, TF5TP, VK2QK, VQ9YR on Diego Garcia, VS6CT, VU2CDP, YB0BNB and 9M2RT.

Andy Durrant of Aldershot, Hants, reveals that one of his uncles used to be G8PL and wonders if he could take over his callsign when he gets his RAE. Stranger things have happened, and no harm in

trying, OM, but of course you'll need the c.w.! Andy is delighted with his new FRG-8800 and FRT-7700 a.t.u. fed from an



inverted Vee designed for the 7MHz band. Right, on to 3.5MHz or thereabouts and A71AD, AK9PR in Alaska, AP1Q, C31UA, FG6AOJ, HB0BJQ/P, HW4PA on Wallis & Fortuna Islands, HK5ISX, KP2AD, OY5J, and VK6IR around 2330Z, plus VK6LK, YV4DKP, ZL1BMU, ZL1VV, ZL3FM and 9Y4KB. Not bad for 3-5MHz band, eh? Anyway, on to 7MHz and CE1HBI, HC5EA, HK3MAE, LU1KHB, PY8AHA,TK/DL4FF, TK/G3KFT and VK2AJK, all in the neighbourhood of 7-050MHz and between about 0630Z and 0900Z. Still on 7MHz and VK2, 3, 5 and 7, VK9NM/LH on Lord Howe Island, VR3JR on East Kiribati islands, YC2LK, ZLOAKS, ZL1, 2 and 3, and ZL4AW, plus ZP5JCY and 9H1GY. Still with Andy on to 14MHz and EL7BA, FE5RV/TK, JW0A, JW5E, VK5YM, YI1BGD and 5X5GK a Father Jerry who, it seems, is building his own church brick by brick!

Dick Stanbridge of Leiston, Suffolk, finds the 1-8MHz band coming to life with the darker mornings. He has a Trio R-2000, AT1000 a.t.u., a half-size G5RV and Datong AD370 active antenna, and that band came up with EA6NB, IY90FGM, K5NA, UB5MVS, ZB2EO and 4U1ITU all on c.w. On 3-5MHz s.s.b. he logged HK5ISX, HP1XXO, and 9Y4NP with ZL2OM on c.w. around 0600Z. The 7MHz section produced KL7Y, JA6BSM, VK2ZC and VU2TEC all on c.w.

Brian Fields G4XDJ in Billingham, Cleveland, continues to make good use of his QRP 3W input c.w. from his PW Severn rig, plus a home-brew a.t.u. fed from a half-size delta loop on 7MHz. Brian would be glad to hear from any readers who have built the PW Severn, particularly on initial de-bugging problems. His full QTH is 122 Weardale Crescent, Billingham, Cleveland. So, to his log of stations worked with DK3GR/P, HB0/DJ1XP, RZ3AM, HA6VO, VN7NS(?), UA3SBD, EA2SG, UR2RFG and two choice bits of DX in YC2CIA and W2KF.

Also active on QRP on 7MHz was Phil Dykes G4XYX running around 2/3W output from a modified SB102 rig to a loaded vertical 8m long with a quarter wave horizontal radial to make up the half wave antenna. As one would expect with a single radial, the antenna is quite directional, so Phil moves the radial around as required! Phil needs only Australasia to complete his QRP WAC. Good luck, OM! The catches on 7MHz c.w. included KB1DA for first QSO with new vertical, N2BOG, N4MVX, UA6ADJ, W9TKV and YV1AD for a new country. With his modified CB rig and 10W p.e.p. s.s.b. and dipole, Phil worked GB4LIE on Lundy Island at a range of about 160km which seems strange for 28MHz.

Some odd prefixes reported include 8AOPPI in YB-land, JY5O for King Hussein's 50th birthday, V85HG with cards to Box 228, BSB, Brunei, CG for Canada, T47 for Cuba and 4N for YU. For the island-chasers there were I4ALU/ID9 on the Lipari Islands and I2KGM/IG9 in the Lampedusa group.

Activity by Mike Willgoss G4XRR of Weymouth, Dorset, has been on 28MHz; he worked PY7ZZ, PT7ZD and CX6BBY but 4X6FK and 3XHAB were called but not worked. All this was an FT-902 and FL-2100 linear running between 100 and 400W on s.s.b, with two-element delta quad. Mike has now finished converting a Cobra 148GT CB rig to the 29MHz band, providing both f.m. and s.s.b. facilities and one QSO was with SP9DO. Mike has also been working through the Russian RS7 satellite using the FT-902 plus FTV-90R transverter on the uplink and the Cobra rig on the downlink. He wonders why many more Class B licensees don't latch on to this mode of communication using the Russian satellites.

For those readers who want some practice in copying Morse code, why not listen in to the TOPS CW Club contest running from 1800Z Saturday, December 7 for 24 hours, between 3500 and 3585kHz, with stations calling CQ TAC or CQ QMF (QMF "Where fists make friends")? Participating stations must use only the bottom 12kHz for contacts with DX stations. Classes are single-op, multi-op and QRP up to 5W input, single-op.

# General

It has become very noticeable lately that certain special event stations have been soliciting donations over the air for specific charities and I have been wondering what the legal position may be. So it was with interest that I came across this following statement in the RSGB's News Bulletin recently. "A quick reminder for the organisers and operators of special-event stations-there's an increasing trend for special-event stations to be associated with events held in good causes for which sponsorship in one form or another is featured. It's important to stress that requests for money in the form of donations must NOT be passed over the air under ANY circumstances". It is often implied, albeit innocently, that a QSL card would follow for any donation made. Let's stamp on this practice before it becomes a habit.

A letter from Ean Retief ZS6UD points out that both South Africa and Zimbabwe have had amateur band allocations over the range 50–54MHz "for a few decades"—a rare thing for IARU Region 1 countries. However, they do not have 70MHz

The Newport ARS expedition to Lundy Island, GB4LIE, made over 2100 QSOs on all bands from 1-8MHz to 430MHz and special QSLs were sent out by the end of October. Several messages concerning the Mexican earthquake were handled, and 85 countries were worked. Trouble was experienced with the 430MHz rig and the Top Band rig "blew up" towards the end of the time on the island. An article on the expedi-



tion plus photographs is promised for the near future.

I have on several occasions in the past suggested that potential amateurs should, if inexperienced, undertake a short course at a local radio club under the supervision of an experienced amateur in order to become familiar with amateur equipment and procedures, before being issued with a licence. The PW item Eavesdroppings may seem amusing but it highlights the inexperience of many new operators of today

Two typical incidents are highlighted in the Radio Society of Harrow's magazine QZZ for October/November. A licensed amateur bought a 2m-long Yagi antenna to improve his signal on f.m. but complained to the dealer that it was no better than the colinear. It turned out that the Yagi had been installed horizontally and it was suggested that it would be better if used vertically. It was worse than ever, came the complaint, until the dealer discovered that the Yagi had been installed pointing skywards on it's end! Another licensed amateur is reputed to have bought a straight Morse key from mail order, only for the dealer to get a letter asking for instructions on how to use it!

The Border Award has been introduced by the Oswestry & District ARC for working, or hearing, 10 Shropshire stations and five in each of the bordering counties of Clywd, Cheshire, Staffs, Hereford, Worcs

The attractive Border Award introduced by the Oswestry & District ARC. Club stations are G10RA and G4TTO. Details of the award are given in the text

and Powys, plus one club member. Contacts on one single band and one mode excluding repeaters. Details of the award. which costs £1.75, from T. Parsons G6XPO, 90 Castle Street, Oswestry,

# VHF Forum

Since 1982 the RSGB's Propagation Studies Committee has been running an international project "aimed at providing sufficient raw data in the form of reliable signal reports to establish the extent and movement of the areas of ionisation responsible for long-range ionospheric propagation at v.h.f.". Amateurs refer to this mode as "Sporadic-E" but the professionals, it seems, have pointed out that the currently accepted theories cannot apply at frequencies such as 144MHz and be-"It is possible, then, that what we have been observing and reporting for well over a quarter of a century is evidence of a different propagation process from that which leads to Sporadic-E at h.f.'

The Committee says that the results of the amateur studies will be of use to the planners of commercial and broadcasting services for whom long-range v.h.f. propagation is a source of annovance by the QRM caused to these services. The information is also welcomed by such bodies as the CCIR. Observations are needed of the duration of long-range Sporadic-E type signals from distance stations that are very close together, within about 100km of

The project is being carried out in close co-operation with the IARU and all reports go eventually to F8SH, the Region 1 IARU Spor-E Co-ordinator. Reports on transmissions above 50MHz will be welcomed provided that positive locations can be given. Report forms are available from R. Flavell G3LTP, 174 Finchampstead Road, Wokingham, Berks, to whom completed forms should be sent

To show what can be done with QRP on the 144MHz band, Doug Warner (Swansea) GW1DTX sent a log showing 11 French stations worked plus I4NYN in a recent contest, using 2.5W output from his FT-290R into a five-element Yagi. From his remarks it seems he is very



A shot of one of the several tents at the Wimbledon & District ARC's summer camp near Chessington, Surrey. The main rig is a Heathkit SB101, but the smaller rig in front is a war-time suitcase transceiver run-ning 25W. At the far end is white stick operator G3ILU, with G3DWW in the centre and G3ESH nearest the camera

interested in meteor shower communication.

Mike Newall of Kenilworth, Glos, used to report on h.f. matters but now that he is G1HGO he has concentrated on 144MHz. He also has the FT-290R, plus a 30W linear feeding an HB9CV antenna in the loft space with a pre-amplifier. So far he has worked 51 counties, 10 countries including OZ and HB, and 31 squares, but now awaits the avalanche of QSL cards before he can claim any awards.

I often get requests for information on the four Russian satellites and OSCAR-10 as well as the two University of Surrey satellites UOSAT 1 and 2, also know as OSCAR-9 and 11. The idea of communicating around the world by means of, say, OSCAR-10, at a maximum range of some 36 000km is very intriguing and it can be done with quite simple equipment. The source of all knowledge, as far as we are concerned, is AMSAT-UK, the radio satellite organisation of the UK, and there are similar organisations in other countries around the world. Applications to join AMSAT-UK should be sent to the secretary, Ron Broadbent G3AAJ at 94 Herongate Road, Wanstead Park, London E12 5EQ. Don't forget to read Pat Gowen's column Space and Satellites in On The Air every month for news, too.

This is the point at which I offer my sincere Christmas greetings to one and all and to your families. Don't forget to keep the reports and photographs coming once you have got over the Christmas binge!

Don't forget the 15th of the month is the copy deadline with more details of this to be found at the end of Club News.



Reports: as for VHF Bands, but please keep separate.

Writing about his RTTY log covering September 12 to October 10, Norman Jennings in Rye says, "The only call of note seems to be HK, Colombia, most of the others are the good old faithfuls." He copied two countries on 3.5MHz, 5 on 7MHz, 29 on 144MHz and 2 on 21MHz. The monthly chart, Fig. 1, was compiled using Norman's computer-produced log, Len Fennelow's and my own.

Len G40DH in Wisbech managed to log 7 counties on 3-5MHz, 5 on 7MHz and 44 on 14MHz. He also copied plenty of AM-TOR signals as can be seen by Fig. 2. With 50 prefixes in his data communications log Len has chalked-up a new record for himself. He received new countries with Bangladesh, The Ivory Coast and Philippines

on RTTY with Sudan and West Malaysia on AMTOR, "The distribution of these stations all over the

world shows just how

universal the 14MHz band can be, despite the low level of solar activity," writes Len.

A count up on our RTTY chart shows a total of 55 countries heard on 14MHz covering 5 of the world's continents. George Haylock G2DHV in Sidcup is building terminal units for RTTY on v.h.f. using a ZX81 computer, so I look forward to his reports in the future. Dave Coggins has now entered the world of RTTY using his Spectrum computer and Trio R-2000



communications receiver. He finds the results very interesting.

While operating at the Chalk Pits Museum station GB2CPM at Amberley in Sussex on September 29, Gerry Brownlow G3WMU made his first ever RTTY QSO with HA2VB in Budapest. Gerry was testing his Spectrum computer with Scarab software and a Mike Rowe terminal unit with his TS-430S on 14MHz and is pleased with the result. I think that the museum visitors were fascinated, first by the incoming words on the upper half of the screen and secondly to see Gerry's reply being prepared for transmission on the lower half.

Among the interesting signals I received during the month prior to October 14 was QSO between IK8EEY and G4PDF at 2034 on September 19. The Italian station sent a five-figure tall "73" to send best wishes to the G station. Later that evening there was an opening to South America

Practical Wireless, January 1986

# **PHOTO**

# ACOUSTICS LTD. TEL: 0908 610625

58 HIGH STREET, NEWPORT PAGNELL, BUCKS, MK16 8AQ



KERRY, DEREK, ROY AND ANDY WOULD LIKE TO WISH YOU ALL A MERRY XMAS AND A HAPPY NEW YEAR







25W FOR ONLY £449



TRIO TS-711E



**NEW LOW PRICE £695** 

**ICOM IC-271E** 



10W VERSION ONLY £659



ICOM R-71



WITH FM ONLY £729

**AOR AR-2002** 



IT'S ARRIVED £375



**TRIO TS-430S** 



WITH FM FOR ONLY £720



TRIO TR-2600E

£275

(INCLUDING NI-CADS AND CHARGER!)



# **WE ALSO STOCK**

JAYBEAM ANTENNAS, TONNA ANTENNAS, HIMOUND MORSE KEYS, ROTATORS, B.N.O.S.
LINEARS & POWER SUPPLIES, MICROWAVE
MODULES, DRAE POWER SUPPLIES & SSTV
TRANSCEIVERS, DAIWA SWR/POWER METERS,
WELZ SWR/POWER METERS AND TELEREADERS.
REMEMBER FOR ANYTHING YOU REQUIRE
BE IT A TS940S OR A PL259,
WE ARE ALWAYS HAPPY TO HELP.

SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD. CREDIT CHARGE CARD – APPLY FOR DETAILS

PART EXCHANGE WELCOME, ASK FOR KERRY, ANDY OR ROY

Monday-Friday 9.30-5.30 – Saturday 9.30-4.30

Mail Order a Speciality

Mail Order a Speciality

	Band (MHz)							
Country (Prefix	3-5	7	14	21				
Andorra (C31) Argentina (LU) Austria (OE) Balearic Is (EA6) Bangladesh (S2)	x	X	XXXX					
Belgium (ON) Brazil (PP7, PY2) Burundi (9U) Canada (VE) Canary Is (EA8)	Х		X X X X					
Ceuta & Melilla Colombia (HK5) Costa Rica (TI) Cyprus (5B4) Denmark (OZ)	х		X X X					
England (G) Finland (DH) France (F) Gabon (TR) Germany (DF, DJ, DK, DL, DM)	X	x x	XXXX	х				
Gozo & Comino (9H4) Greece (SV) Guadeloupe (FG) Hungary (HA) Ireland (EI)			XXXX					
India (VU) Israel (4X4, 4Z4) Italy (I)		х	X X					

and I copied strong RTTY signals from Argentina, Brazil, Panama and Venezuela. At 1619 on the 21st I logged SW2NU, the special callsign for the 2300 years of Thessaloniki. Then at 0815 on October 4 I copied, "My name is XYL Mila, QTH north YU-land," from a YU2 to an F6. The tropospheric opening on October 12 gave me the chance to look for some v.h.f. RTTY and during the evening I received

	Band (MHz)							
Country (Prefix	3.5	7	14	21				
Ivory Coast (TU) Japan (1CA, JA, JR)			X					
Kuwait (9K) W. Malaysia (9M2) Malta (9H) Maranhao (PR8) Netherlands (PA)	х		X X X					
Nigeria (5N) Northern Ireland (G1) Norway (LA) Oman (A4) Panama (HP1)			X X X					
Philippines (DU) Poland (SP) Portugal (CT1) Puerto Rico (KP4) Rumania (Y0)			XXXXXXXXX					
Sardinia (ISO) Scotland (GM) Sicily (IT9) South Africa (ZS6) Spain (EA)		x	X X X X					
Sweden (SM) Switzerland (HB9) USA (K, N, W) USSR (UA, UB, UK, UT, UZ) Venezuela (YV) Yugoslavia (YU)	X	X	X X X X X	Х				

signals from GOBRP in Sussex, G8IKF in Surrey, G6XRG in Gloucestershire, G4DIE in Wiltshire, G1LAF in Derbyshire and ON5EX in Belgium.

One way of keeping up to date is by listening to the BARTG news, it is transmitted on RTTY on the first and third Sundays of each month using the callsign GB2ATG. These bulletins are transmitted on 45 baud on 3-590MHz from Leicester

**◀** Fig. 1

Fig. 2 ▼

	Band	(N	lHz)
Country (Prefix)	3-5	7	14
Canary Is (EA8) Costa Rica (TI) England (G) France (F) Germany (DJ-DL) Italy (I)	x	х	XXXXX
Kuwait (9K) W. Malaysia (9M2) Netherlands (PA) Nigeria (5M) South Africa (ZS6) Spain (EA)	х		X X X X
Sudan (ST) Sweden (SM) Switzerland (HB9) USA (K, N, W) Venezuela (YV)	x		XXX
Wales (GW)	x		^

by G4MMQ at 1200GMT, Preston by G3VYV at 1230 and Fleetwood by G4RSA at 1900. Reception reports and items for inclusion in the RTTY news should be sent to Ken Young G3ZCG, 12 The Grange, Cubbington, Warks CV32 7LE. The Autumn 1985 issue of *DATACOM*, BARTG's quarterly journal, has around 100 pages of info packed with articles about RTTY, using computers, technical and constructional items, AMTOR, FAX and packet radio to mention only a few.

As usual there are details about BARTG and its activities, in my view it's well worth the membership fee of £7 (£10 for Europe). More details can be obtained from Pat Beedie GW6MOJ, "Ffynnonlas", Salem, Llandeilo, Wales SA19 7NP.

# MACE & MATELLITE

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

# Phase IIIc

The loss of the ARIANE carrying two major satellites on September 12 was a further set-back to the space programme, following the total failure of the u.h.f. transponder of SYNCOM-4 launched by the 51-I shuttle mission only the week before. A problem exists for Phase IIIc, as the insurance premiums have escalated to enormous proportions, probably well beyond that which can be found by non-commercial funding. AMSAT was unable to afford to insure Phase Illa, and its loss was almost the loss of AMSAT itself. Had it not been for the generosity of the world community of radio-amateurs, OSCAR-10 would never have flown.

On the happier side, work is progressing at great speed on the Phase IIIc with AMSAT-DL. The prototype of the "RUDAK" processor (see PW July issue, page 61) built by DF8CA, worked perfectly. DL2MDL and DG2CV developed a simple initial operating system that tested the RAMs of both transponder interfaces and the on-board computer. Using the AMSAT command station of DK1YQ, a successful command dialogue was established, similar to that of OSCAR-10. Using "IPS" (Interpreter of Processing Structures) DJ4ZC developed and installed the main RUDAK operating system to successful completion by 0300 on September 7. The engineering model of the Mode "L" transponder built by DJ5KQ already contains the RUDAK receiver and downlink beacon,

so now effort will be concentrated on the electrical and environmental testing as well as on the two flight versions. Ground



stations will now be simultaneously developed with RUDAK interfaces and 145/1269MHz up converters with b.p.s.k. modulators. Schematics suitable for home-brew constructors will be provided well in advance so that all enthusiasts can be ready before the launch, and detailed information on the entire experiment with required equipment will be released soon.

# STS-61A

Despite rumours of further delays the STS-61a/D1 Space Lab mission carrying the three European Radio Amateur Astronauts lifted off only 7s after their 1700UTC launch window on Oct 30. The propagation experiment run by PE1LFO and VERON came up for one orbit only transmiting a three-letter code group, sent every fifteen seconds. The letter group related to the spacecraft position, and the observer should have recorded the maximum number of different code status points heard, the RST, the exact frequency and the precise time when heard. This should be sent to VERON, P.O. Box 1166, Arnhem, Holland, marked "VERON Jubilee experiment". You must include your Universal Locator, antenna and station equipment details, as these will be correlated to indicate any propagational abnormalities, and prizes and awards are offered for the best entries received.

In the 1 watt level auto-QSO mode, the call "CQ DPOSL record on tape K" was made, and to help to avoid blocking no uplink frequency was given. Stations should have given their callsign only, as any call heard more than three times in the course of a pass was **NOT** be QSLed.

On the normal 10 watt two-way QSO mode, full conversations were encouraged, but few took place except with the command station DFOVR. Again, to reduce QRM, no uplink frequency was notified.

Yet a further "ham-in-space" possibility is to arise on shuttle flight 61-K, scheduled for a September 1986 lift-off, as Dr. Owen Garriott W5LFL is one of the crew members of that mission.

# Shuttle Frequencies

In a letter to keen space watcher Martin Ehrenfried of South Wales, Robert Overmyer, commander of the 51-B mission, confirms Martin's findings that the frequencies 259.7 (not 259.4 as earlier listed) and 296-8MHz a.m. are used for communications during launch and final stages of landing, although their basic use is for 'EVA" (Extra-Vehicular Activities) in duplex mode. "By the way," adds Robert, we often just leave the u.h.f. on in orbit so even when we are talking to Houston via the "S" band TDRS (Tracking Data and Relay Satellite) we are still going out on u.h.f.". Martin found that the u.h.f. transmissions were detectable long before any 145MHz transmissions were evident from the 51-F flight carrying W5LFL. He



Signed photograph of the STS-51-B shuttle mission, sent by Commander Robert Overmyer to Martin Ehrenfried

has been copying good signals from SALYUT-7 on 142-420 f.m., although with slightly muffled speech, which he feels to be due to a different pre-emphasis characteristic.

# Weather and NAVSATS

Graham Smith G1JVZ telephoned to say that he has been studying the satellites for some time, and lists the weathersats on 137-620, with 136-77 and 137-77 for direct broadcasting satellites and vertical profile temperatures. He finds all the Russian NAVSATS audible from 149-910 to 150-030 when in range, but has never yet heard the SALYUT supply automatic docking PROGRESS rocket on 166-0MHz. He further reports the Ocean Reconnaissance sats on 466MHz, and locates the navigation sats on u.h.f. by multiplying the v.h.f. frequency by 8 and then dividing by 3, e.g.  $149.910 \times 8/3 = 399.760MHz$ . John Branegan GM4IHJ reports the very useful set of 5 American Transit and 9 Russian CosNav satellites that provide navigational data to ships and submarines, which transmit simultaneously on two frequencies. He finds those in regualr use are on:

Chan. 1 Chan. 2 Chan. 3 Chan. 4 Chan. 5 149-910 149-940 149-970 150-000 150-030MHz 399-762 399-842 399-922 400-002 400-082MHz

John finds them superb for simultaneous Doppler experiments, but points out that some care is needed, as the Doppler shift on 399MHz (where only the continuous carrier is sent) is ±9kHz and very fast indeed! On 149MHz the signals consist of continuous carrier plus RTTY giving orbital data. Each satellite has an orbital period close to 104 minutes. John has heard four separate satellites on channel 4, and tells us that there are other satellite signals on 399MHz, in particular a very noisy family on 399-968 sending out a very rough 400Hz pulsed note sounding like a continuous mobile aurora, about which he promises us more information later.

# **AMPTE** now Empty

Because of poor official results in the early tests of this series in December '84 and January '85 (see PW April '85 page 63 and May '85 page 75), the mission controllers decided to shoot the lot in the recent July test. This was done by simultaneously exploding two cans of Barium to produce an eight minute duration artificial comet. This could be seen by telescopes, and the results were felt to be "moderate", invisible to the naked eye despite excellent viewing conditions.

# **OSCAR-DX**

8Q7EV, 4S7EA and 4S7AG are looking for OSCAR-10 QSOs, and KL7JIZ, UD6DE

EQX	AOS	Bearing	TCA	Bearing	Elevation	LOS	Bearing	Optim	um DX
*W	mins	•	mins	3.00	800	mins		AOS	LOS
300	+17	60	+20	30	1	+23	30	VU,BY	UAO,JA
310	+13	90	+19	50	5	+26	25	VU,AP,BY	UAO,JA
320	+10	110	+18	60	10	+27	20	ET,A7	UAO,JA
330	+7	130	+19	60	20	+28	20	5Z,5X	JA,UAO,KL7
340	+5	150	+18	80	30	+29	18	Z2,5X	JA,KL7,UAC
350	+4.5	165	+17	80	45	+29-5	15	9J2,5H3	JA,UAO,KL7
0	+4	180	+17	90	70	+30	15	ZD7,ZD8	JA,UAO,KL7
10	+4.5	195	+17	270	85	+30-5	15	ZD7,ZD8, TR	JA,UA0
20	+5	210	+17	280	50	+31	15	9G1,PY,FY	JA,UAO,BY
30	+7	225	+18	290	40	+32	20	PY,FY,8R	JA,UAO,BY
40	+9	240	+19	300	25	+33	20	PY,YV,KP4	JA,UAO,BY
50	+11	260	+22	325	20	+34	25	HI8,CO,HK	UAO,JT,BY
60	+14	280	+23	330	15	+35	30	XE,W5,VP2	UAO,JT,BY
70	+16	290	+27	340	10	+37	35	W5,W0,W7	AP,EP
80	+20	310	+29	355	10	+39	45	W5,W0,W7, VE7	UI8,UL7,UM
90	+21	320	+31	10	10	+42	60	W7,W0,VE7	UAO,JT
100	+24	330	+35	25	10	+45	75	KL7,VE7, VE8	VU,BY
110	+26	340	+37	30	15	+48	90	KL7,W0	VU,HZ
120	+27	340	+39	40	20	+51	110	KL7,VE8	8O,ET
130	+27	340	+40	45	30	+52	125	KL7,VE8	5Z4,5X5
140	+28	345	+42	70	45	+54.5	145	KL7,VE8	9X,9J2
150	+28-5	345	+42.5	80	70	+55.5	160	KL7,UA0	9U,CR6
160	+29	345	+44	240	85	+56	175	KL7,UA0	TR8,CR6
170	+30	345	+44	270	55	+56	185	KL7,UA0	9J2,TU
180	+30	345	+43	270	40	+55	205	KL7,UA0	ZD7,ZD8
190	+31	345	+42	290	25	+54	220	VE7,W7, KL7	PY
200	+32	340	+42	290	15	+52	240	KL7,VE7, VE8	PY,YV,8R
210	+33	335	+41	300	7	+48	260	W1-0,VE1-	XE,W5
220	+36	330	+41	310	1	+45	290	KL7,W7,W5	XE,W5

Table 1

Optimum DX is the furthest land areas available in line at mutual horizon. All areas en route are also mutually accessible. Orbits emanating between 220° and 297° EQX are sub-horizon and not normally accessible from Eastern G

and UI9IWA were worked on RS-5 by your scribe. **Bill Kelly** monitored RS-5 and 7 to hear JNOADP, RA1AAX/3, UR5ZN, UL7RAV, KO5I, LZ1NA, and a host of European stations. He is still copying the "55" and "5015" sent by the venerable RS-1.

# Our Series for the Beginner

Last month we covered the basic circular satellite orbit, and the terms that are used in reference to orbits such as those performed by the Phase II RS and UoSAT spacecraft. This month we shall pursue the means of interpreting the orbital path to the means of finding those times when the satellite is within range and tracking the path.

Most satellite followers now use computers for tracking, especially for the more complex elliptical orbits such as OSCAR-10 (more on this topic later). However, it is quite simple to calculate an approximate position, to determine the azimuth (bearing of the spacecraft in degrees relative to North) and to determine the elevation (angle of the satellite above the horizon) by tabular means.

First we start with the reference orbits, that give the first orbit of the UTC (Universal Time Co-ordinated, alias GMT) day by the time that the northbound spacecraft crosses earth's equator called "EQX" (Equator Crossing) and the longitude in degrees west of the Greenwich meridian at the equator. These are given out on the AMSAT International net each Sunday at 1900 on 14-282MHz, each Saturday on 14-280/290MHz at 1015 and 1100 on the AMSAT and SPUTNIK nets, and at 1015 each Sunday via the AMSAT-UK Net on 3-780MHz. They are also sent via the bulletin board of the RS Satellites them-

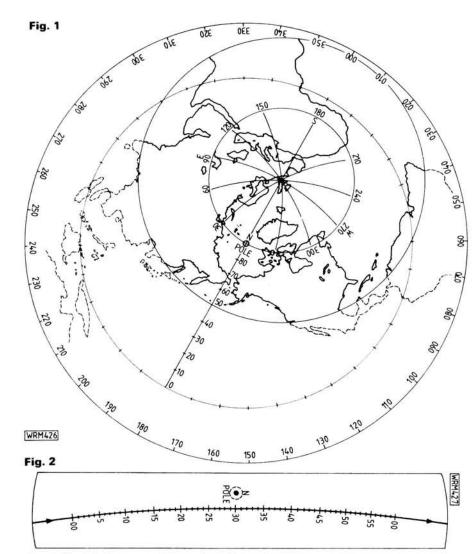
selves each Saturday and Sunday on 29-330MHz (RS-5) or on 29-340MHz via RS-7, and on the UoSAT bulletin board.

We have picked for our references Sunday, 15 December 1985, as the satellites are then out of eclipse, there should be lots of week-end activity, and UK readers at least should all have their PW by then.

Satellite	Time as hours/mins UTC	EQX in degrees west at EQR
RS-5	0000-00	236
RS-7	0008-00	244

The period (between northbound equator crossings) of RS-5 is 119·55530925 minutes, and the increment (degrees west longitude added each equator crossing) is 30·01573185. For RS-7 it is 119·19617095 minutes and 29·92588942 degrees, respectively. If we take RS-5, and round up the figures, we can say that this satellite takes roughly two hours less half a minute between EQXs, and each EQX is some 30 degrees further west, giving us a table of times and positions of equator crossings. By adding these to our original RS-5 reference orbit we get Table 2.

Note that when we get to greater than 360°, we start again by subtracting 360, as 360 is the Greenwich line, equal to 0° W. Further note that after twelve orbits, our time for the next day is only six minutes earlier, and the EQX longitude almost the same. Had we used all the figures precisely, and said 24 hours × 60 minutes minus 119·55530925 × 12, e.g. 1440 – 1434·6637 = 5·33628 minutes, we actually have the satellite crossing the equator 5 minutes 20·1768 seconds earlier the following day. The exact crossing longitude would be (30·01573185 × 12) – 360, giving us 0·1886772 degrees that



the satellite is further west the next day, all this giving us a new reference rounded up to 2355UTC at 235-8 degrees west.

If we look at Fig. 1 we see the earth as the inner circle, and the satellite path around it. Our observer is at point and his horizon takes his line of sight from "O" outward into space. When our satellite gets to point "A", it comes above his horizon circle and he has "AOS" (Acquisition Of Signal). The spacecraft is gaining elevation to the time of closest approach (TCA) in the middle of the period, then going down to go below the horizon at "L" to give "LOS" (Loss Of Signal). The lines from "A" to "C" and "L" to "C", where "C" is the earth centre, give us the Sub-Satellite Point (SSP) on earth, so we are able to draw a circle around our QTH to indicate where and when we shall have satellite access, and transpose this to a flat earth in Fig. 2, forming an equidistant polar projection.

The circle immediately around the UK is the capture area, and any sub-satellite point that bisects this will be above our horizon, hence audible. The circle outside this is double the radius, and shows the theoretical limits of DX stations who have common access, i.e. the maximum mutual DX possible. The inner circle centered on the north pole is the equator line, and the outermost circle of all indicates the degrees west line of the equator.

If we transpose our satellite track (curved, because the earth turns as the satellite traverses) to a piece of clear plastics sheet, and then pivot this through the points marked "N.POLE" we have a ready calculator based on the original design by Bill Browning G2AOX, to give us the satellite position from our QTH and

when in range of us. We merely set the arrow below the "OO" mark to the "EQX" and count up the minutes to be added to the EQX time from the scale. When the satellite track intersects our horizon circle we have "AOS" at a given azimuth, and can follow it across our area of capture until it leaves the circle at "LOS".

This method gives accuracy enough for the limits of any average beam, and can be used at any QTH on the proviso that the centre of the capture circle is centred on the observer's position. It will mean a southern hemisphere polar projection for those south of the equator. The actual shape of the capture circle (and the azimuth degrees) tends to be elliptical as we approach the equator, due to the distortion introduced by "flattening" the hemisphere, and it is only truly circular at the poles, but a true circle will give a good guide. Anyone needing a well-produced northern hemisphere tracker that covers the RS satellites, the UoSAT pair, as well as the NOAA weathersats, is invited to send £1 (UK) to cover p + p to G3AAJ of AMSAT-UK and ask for an OSCARLOCA-TOR. Please add extra postage if overseas. For those who prefer tabular plotting, Table 1 relates the EQX degrees west to the time lag which will occur until the satellite appears to the observer in the UK. Just add the time in minutes shown to the equator crossing time for the nearest EQX W, and you have AOS and the azimuth bearing. The next column gives the added time to the time of closest approach (TCA) with the azimuth and elevation above your horizon at this time, whilst the third gives the LOS and the bearing. The final column shows the furthest DXCC countries that are within range at AOS and LOS.



Nick Laub WOCA is a highly active satellite enthusiast and accomplished the world's first Satellite Worked All Continents. His tower supports the h.f. tri-bander and a double ten skeleton slot for 435MHz, whilst the tree is surmounted by a double four slot for 145MHz. Literally an antenna farm!

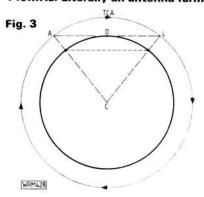


Table 2

Orbit of day	EQX in UTC	Longitude of EQX in 'W
1	0000	236
2	0159-5	266
3	0359	296
4	0558-5	326
5	0758	356
6	0957-5	386 (386-360 = 26)
7	1157	56
8	1356-5	86
9	1556	116
10	1755-5	146
11	1955	176
12	2154-5	206
13	2354	236

This table is based on Norwich, 52° 40′ N, 1° 16′ E, and will be less accurate for other parts of the UK. For Scotland, some two minutes needs to be added to both AOS and LOS times for orbits emanating from 300 through 0 to 50° W, and some two minutes subtracted from those originating from 70 to 220° W longitude. For Ireland and the West Country, add up to 6° to the EQX degrees west column to correct for geographic position.

For now, have a listen to the RS-5 beacon on 29-451MHz, or the codestore and ROBOT on 29-330MHz, and occasionally the command transponder on 29-350MHz. The downlink passband for the general communications transponder runs from 29.410 (the c.w. end) to 29-450MHz (for s.s.b.) where you will hear lots of transponded signals from the users. The RS-7 equivalent frequencies are 29-501, 29-340, 29-350 and 29-460 to 29.500MHz. If you have a high vertical, a low-angle beam or a cubical quad, you will hear signals from the start to the end of the pass, whilst if you have a simple low dipole or long wire, you may miss the lower angle parts of the pass. In the next part, we shall cover the meaning and interpretation of the signals that you hear, and then how to optimise your downlink and uplink systems to communicate.

Practical Wireless, January 1986

# 934 MHz PERSONAL RADIO

# The Nevada Range

H

Join the growing number of people discovering this exciting radio band.

Available to anyone for the cost of a current CB licence.



A. THE CYBERNET DELTA 1
934 MHz TRANSCEIVER
Has been engineered specifically for the UK market using latest "state of the art" technology. With a sensitive receiver and many additional facilities these sets have achieved contacts of over 200 miles range, under certain conditions.

Sensitive RX (0.25 µV for 12 db SINAD).

16 memories available.

Auto/Manual scan and search facility.

External 'S' meter socket.

- External 'S' meter socket.

+ £5 SPECIAL DELIVERY **£355**Ask for a demonstration of this superb set from one of the Nevada "MAIN" dealers below.

B. SWR/POWER METER
This precise and extremely accurate meter features an illuminated scale, low loss 'N' type connectors and twin meters for both power and SWR measurement. Power 0-50 watts in two ranges. £89°95

C. HRA 900 MASTHEAD PRE-AMPLIFIER
Super low noise GaAs FET pre-amplifier that mounts at the masthead. Low insertion loss and noise (typically 0.8 dB) coupled with 15dB gain enable this unit to double the resided. to double the received range of many sets. £139.95

D. HRA 934 L IN-LINE GA AS FET PRE-AMP
A super new ultra-low noise pre-amp which fits in line on any base or mobile installation. Guaranteed to give a staggering increase in received range. Extremely low noise 0.7 DB NF.

E. REMOTE ANT. SWITCH High quality weatherproof mast head mounting switch. For switching 2 antennas with one cable feed. i.e. Beam/Colinear i.e. Beam/Conne. ('N' type sockets).

£59.95



# HAS-2

Remote DC switch for E

Many two way contacts have

already been made from 10

location and weather

miles to 250 miles according to

€6.00

conditions.

G. ANTENNAS

Manufactured to the highest possible specification

PA7-E BASE COLINEAR

PA7-E BASE COLINEAR
- our top of the range base antenna supplied with mounting brackets, weatherproof tape, and 'M' connector. Gain 7.14 dBi stacked % array.

P7-ME High gain mobile magnetic mount antenna with unique 1/4 wave matching system incl. p&p £44 7.14 dBi gain.

P7-RE High gain gutter mount mobile antenna fully adjustable 7.14 dBi gain. incl. p&p £44

### Tc 12L MKII **NEW 12 ELEMENT BEAM**

A new aluminium version of our successful 12 element loop quad - This beam is now better than ever.

\* We guarantee this antenna has more

gain than any similar 12 element Yagi

array.

Designed by Mike Walters one of the UK's leading microwave antenna

Built in low noise feed system to a high quality 'N' socket.

SPECIFICATIONS:
Gain: 18 dBi. Front-Back ratio 25 dB.

Weight: 0.7 Kg Length: 53.5 ins. £49

I. POWER SPLITTER
Enables the co-phasing of any two 934
MHz antennas to give an
additional 3 DB gain. £24\* £24.50

### Aeriai Supplies (Liverpool) Limited Atherton Liverpool

Tel. (051-525) 1006

"Agrimotors" Merton CB Radio Centre Merton, Okehampton, Devon EX20 3DZ

Tel: (08053) 200

Charlie Bravo

82 Broadway, Bexley Heath, Kent. Tel: (01-304) 0467

Chat Back East Hill, Camborne, Cornwall

Tel: (0209) 715773

CB City 64 Waterloo Road, Stoke On Trent, Staffs. Tel: (0782) 814952

Centre Base 1

433 Wilmslow Road, Withington, Manchester. Tel: (061 445) 8918

Green Electronics

6 Short Street, Lowestoft, Suffolk

Tel: (0502) 513960

**Guildford Communications** 

# **NEVADA 934 MHz MAIN DEALERS**

## G W M Radio

40-42 Portland Road, Worthing, West Sussex.

Tel: (0903) 34897

Henry's 404-406 Edgware Road, Paddington, London W2 1ED Tel: (01-724) 0323

Horsetrader

1424 Leeds Road, Thornbury, Bradford, Yorks Tel: (0274) 663928

H & R Watson

24-26 Forest Hall Road, Newcastle On Tyne NE12 9AL Tel: (091268) 4609

Hull C.B. Centre

194 Hessle Road, Hull N. Humberside

Imagefree Limited 1-3 Station Road, Rainham, Kent.

Tel: (0634) 373960

Imec. Marine Systems Ltd. (Head Office) Parkside C.B. Centre

Baldovle Industrial Estate, Dublin 13 Tel: 393132/393065

8 Marine Court, St. Leonards-On-Sea, E. Sussex. Tel: (0424) 443185

Lincs & S. Humberside 201 Freeman Street, Grimsby, S. Humberside. Tel: (0472) 360037

Maggies C.B.

63 Fleet Street, Keyham, Plymouth, Devon. Tel: (0752) 59237

Marshion Electronics

366 Spring Road, Ipswich, Suffolk IP4 5NG Tel: (0473) 75476

Mitier Telecommunications

The Parade, Cherry Willingham, Lincoln Tel: (0522) 754279 **Modulations Communications** 

62 Wootton Road, Abingdon, Oxor Tel: (0235) 21400

Thursford, Fakenham, Norfolk Tel: (0328) 77402

Selectronics

203 High Street, Canvey Island, Essex Tel: (0268) 691481

South Coast Electronics

6 Monks Avenue, Lancing, West Sussex Tel: (0903) 753754

Square Wheels

82b Edgewood Road, Birmingham 45. West Midlands. Tel: (021460) 1581 Stadium Accessories

67 Bowman Street, Darlington, Co Durham.

Tel: (0325) 59929 Standens (Tonbridge) Limited

92a High Street, Tonbridge, Tel: (0732) 353540

Rileys T.V. Service

125 Langwith Road, Hillstown, nr Chesterfield, Derbyshire. Tel: (0246) 826578 **Tower Communications** 

11 High Street, Haddenham, Cambs Tel: (0353) 740306

Wall & Son

4 Tetbury Street, Minchinhampton, Glos. Tel: (0453) 882089

DISTRIBUTED BY: TELECOMMS, 189 LONDON ROAD, PORTSMOUTH PO2 9AE TELEPHONE: 0705 662145 TELEX: 869107 TELCOM G

Professional Series

Nevada 934 MHz Catalogue available £1.00 from Telecomms.

# Reports to: Ron Ham BRS15744, Faraday, Grayfrians, Storrington, West Sussay RH20 4HF

Although at this time of year sporadic-E is sparse and the sun as well as the 28MHz band is generally quiet, readers still note each disturbance. It all goes to prove that the sun and the earth's complex atmosphere are never totally at rest.

# Solar

"Things can only get better, but it will be a while yet I suppose," writes Ted Waring, Bristol. He recorded no sunspots in his log for the period September 15 to October 14. In Malden, Ted Owen checks the sun with image projection equipment and reports, "no sunspots visible for some weeks." From his observatory in Sevenoaks, Cmdr Henry Hatfield says, "Sorry I can't give you something more interesting." However, while using his spectrohelioscope at 1330 on September 11 and 1050 on the 26th he did see 7 and 6 filaments, respectively, on the sun's disc. Filip Rogister ON1BRL, Overijise, has been told that the minimum sunspot activity is between September 85 and February 86, which indicates that my radio telescope on 143MHz will continue recording receiver noise for a while yet. Patrick Moore, Selsey, found one sunspot during his observations on September 15 and a clear disc during later checks.

Enough of the gloom, something has been happening especially on the auroral front. "In spite of frightful cloud cover and monsoon rain in mid-Scotland, there have been some aurora sightings reported, writes Ron Livesey, Glasgow. He is auroral co-ordinator for the British Astronomical Association and his magnetometer showed smaller storm activity on September 14, 15, 17, 18 and 28 and larger storm conditions on days 19, 21, 24 and 26. The Wick Met office told Ron that they observed auroral glows and rays on the night of September 17/18 and glows on the nights of 19/20, 21/22 and 22/23. The observatory at Boulder Colorado, reported a major storm on the 16th and 19th and the Weathership Starella, at Station Lima (west of Scotland) observed auroral glows on the nights of 14/15 and 19/20. "The weathership's report for 14/15 ties up with a glow reported on the same day by Bob Evans and other observers in Invercargill, South Island, New Zealand," said Ron. After studying the July-September report from his Canadian observers, he found details of an active aurora on the night of 20/21 following the eastern Atlantic aurora on 19/20. "Both of these Canadian aurorae included active rayed structures and reported in Winnipeg, Fort McMurry further to the north and west in Alberta by Todd Lohvinenko and Peter Brown." chael Boschat also saw an auroral glow on 29/30 at Halifax, Nova Scotia. From Cornwall Karl Lewis, using a recording magnetometer, told Ron about active magnetic field conditions on September 15, 16, 20, 21, 25 and 26 and disturbances on days 16, 20, 21, 22 and 27. A final word from Ron, "My magnetometer picked up a big magnetic storm on the evening of October 5, but unfortunately the skies were cloudy at Glasgow and Edinburgh, so no confirmation of auroral light was possible.

Around 2300GMT on October 5, Dave Coggins in Knutsford noted auroral type signals from a Band I TV station on Ch. E2

48-25MHz and from GM4IPK and several other c.w. stations that were not easy to read.



# The 50MHz Band

Up to the end of September Gordon Grigg G3PRX from Rainham had received signals from 66 of the 100 British stations licensed for 50MHz and is looking forward to operating himself when the band becomes fully available. In Walsall Gordon Pheasant G4BPY heard the Gibraltar beacon ZB2VHF, 50-035MHz, at 2041 on October 11. Norman Hyde G2AIH from Epsom logged signals daily, via meteor scatter, between September 15 and October 12 from the UK beacons GB3RMK (located at Mount Eagle, 13km west of Rosemarkie) and GB3SIX. He noted that during the period October 4 to 8 inclusive the bursts from GB3RMK were very strong. Before the 50MHz operators departed, as the permit requires, at 0730GMT on October 12, Norman had crossband QSOs (50/144MHz) with G40XY in Portishead and G4BAO near Cambridge. "Unfortunately when G4BAO and I were in contact the close-down time arrived and we had to complete our QSO on 144MHz," said Norman. He uses an 8element Yagi at about 5m a.g.l. and a 2element beam at 13m a.g.l. for the 144MHz and 50MHz bands respectively. "I have changed my main antenna tower and now have an Altron AT32, with which I am very pleased," remarks Norman.

John Fell GOAPI has also been logging activity on 50MHz and has now heard 47 of the UK permit holders, using a PW Meon transverter and home-brew 5-element NBS Yagi. Dave Powis G4HUP, who designed the Meon, was contacted via 144MHz crossband-the QSO between Suffolk and Dorset involved 50MHz (28MHz i.f.), 144MHz (28MHz i.f.) and 50MHz (144MHz i.f.) versions of the transverter!

At 0815 on October 8 I noted a very "ping" large number of strong, bursts of television pictures, presumably via m.s., from Czechoslovakia, Finland, Poland and the Hungarian TV clock, on Ch. R1 49-75MHz. I also received bursts of signal from several east-European broadcast stations, between 66 and 70MHz. No doubt something to do with

the Draconid meteor shower.

# The 28MHz Band

'Most of my logs were made during a two week period that started on September 20 when the S. American skip

Fig. 2

was good," writes Filip Rogister. Within that time he logged c.w. signals from EA7FEB, EA8RL, PP5OV, PU2NPO, PY7DT and ZP5LOB in Asuncion, Paraguay and, EA8AMT, Tenerife, CX1ABK in Montevideo, Uruguay, LU2CC and PT7WZ on phone.

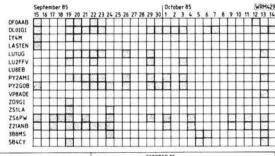
'Very little DX on the band, but have been listening to the RSGB 28MHz Activity Contests, which take place between 2000 and 2200GMT on selected days," writes Dave Coggins, having logged 8 "G" stations mainly from the Midlands, on September 16, 10 "Gs" on the 24th including Cumbria, Hereford and Suffolk, 4 "Gs" from the Midlands on October 2 and 2 "Gs" on the 10th. "It was interesting to note the effect that propagation had on these contest signals. Some were heard with slow and deep QSB while others were subject to rapid flutter and bursts of meteor scatter," said Dave, who also logged HB9CEY at 1211 and IK5FKF at 1620, during a bit of short-skip on September

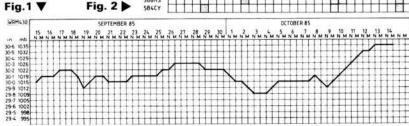
# Propagation Beacons

"Very quiet again on 28MHz this month, with the notable exception of September 19, when an opening started around 1300UTC with good signals from the Cyprus beacon 5B4CY," writes Gordon Pheasant. He also heard a new beacon EA6VQ, in Majorca, on 28-223MHz, on September 20 and 22 giving its location as JM19HO. "At 1428 on the 19th, I received strong signals from ZS1LA and weaker ones from DLOIGI (possibly backscatter), ZS6PW and Z21ANB. At 1435, I found PY2AMI competing with ZS1LA whilst my beam was still at 160 degrees and later, when I turned it toward South America I found that the beam appeared to have lost its directional properties! I also logged ZD9GI for the first time in years, said Gordon. He adds, "This opening ended rapidly around 1525 with the last signals coming from ZS1LA.

Alan Taylor G3DME from Crowborough is the International Beacon Project coordinator for the RSGB and has news of a new beacon. It was built by Tony Baldwin G6CAR and has been sent to the Solomon Islands, under the care of Peter Taylor H44PT, for installation on the site of a broadcast station. Readers can listen out for its signals on 28-287MHz using the callsign H44SI.

"I logged a new beacon on September 29, EA3VHF on 28-247MHz, indentifying itself every few seconds by transmitting its callsign and QTH in Morse code, writes Filip Rogister. He continues, "There





was a sporadic-E opening to the south on October 2, when I heard the South African beacons ZS6PW and Z21ANB coming in strong for about half an hour."

John Coulter in Winchester reports that G4VPS in Taunton managed to get his callsign stored in the memory of IY4M on September 20. Bill Kelly in Belfast headed his log on October 4 with the remark, "Very poor offering this month". However, my thanks are due to all those mentioned in this section, Dave Coggins, Len Fennelow G40DH, Wisbech, Henry Hatfield, Norman Hyde, Fred Pallant G3RNM, Storrington, Ted Owen and Ted Waring for their logs which enabled me to compile the monthly beacons chart, Fig. 2. "Could hardly believe my ears! when at 1415 on October 4, I logged ZS6PW and Z21ANB at good strength," writes Chris van den Berg from The Hague. He also reported hearing 3B8MS and 5B4CY at similar strength at 1030 on the 5th and of some cheer to us all comes the report, "First real sign of winter conditions today, with a good opening to ZS6PW, Z21ANB and 3B8MS during the morning and VP8ADE in the late afternoon," from Gordon Pheasant on October 13.

John Coulter received signals daily from the 14MHz beacons (14-100MHz), CT3B, OH2B, ZS6DN, 4U1UN and 4X6TU between September 15 and 28 inclusive and W6WX on days 17, 18 and 22. Len Fennelow observed the band from September 15 to October 12 and logged W6WX on days 27 and 29 and 1 and 2, LU4AA on October 3, 7 and 8 and the others almost daily.

'A v.h.f. beacon on 144-830MHz is installed in Malta and its locator is JM75FV," writes Walter Gatt 9H1DU. Len Fennelow reports hearing the Wrotham GB3VHF beacon 144-925MHz and the RSGB HQ beacon GB3NHQ, on 50-050MHz daily throughout this period. Both Chris van den Berg and I at distances of 381km and 67km, respectively, also received these beacons on a daily basis. Chris also logged signals from the Belgian beacon ON4VHF on 144-985MHz and the Norfolk repeater GB3NB on R1 145-625MHz, on most days between September 10 and October 9. During the lift on the 13th, Dave Coggins received signals from the beacons in Angus GB3ANG 144-975MHz, Cornwall GB3CTC 144-915MHz, GB3VHF, France FXOTHF 144-895MHz and Switzerland HB9HB 144-865MHz.

# Tropospheric

Depending on the time of year high atmospheric pressure (above 30-1in or 1019mb) usually means cold or warm fine weather and a period of improved v.h.f./u.h.f. conditions, with a good chance of a tropospheric opening when the pressure begins to fall. The readings for this month's chart, Fig. 1, were taken at noon and midnight from the continuously recording barograph at my QTH although the figures are slightly rounded for convenience. The pressure throughout this period, September 15 to October 14, was mainly above 30-0 (1015), falling just below for a relatively short time on the 19th and October 2 to 4 and on the 9th, with highs of 30-3 (1026) and above during the last few days of September and of this reporting period. In Essex, Ted Owen's barometer was high for most of the period ranging from a low of 1008mb on October 3, through 1030 at the end of September to 1036mb on October 12.

I noted several repeaters on Ch.RO at 0913 on September 22, northern G stations working through the Kent repeater GB3KN, R4, at 1155 on the 27th, GWs on RO and French through KN at 0825 on the 29th, Els on R2 and GWs on R6 at 1955 on October 13 and EA and PA stations through R4 and R0 repeaters, respectively, around 0140 on the 14th. At 1958 on the 13th, I copied both sides of a s.s.b. QSO between EI2CLB and DL4EBX, on 144-3MHz, without altering my beam direction. With his barometer well up at 30-6 on the 13th, Dave Coggins checked the 144MHz band and logged 2 Dutch and 4 French stations at good strength.

v.h.f repeater on Ch. (145-625/145-025MHz) with an output of 5W has been installed by members of the Amateur Radio League of Attard, Malta. It is in a temporary location, on an experimental basis," writes Walter Gatt. He adds, "It is also hoped to put another repeater on Ch. R7, with the hope of preparing for the forthcoming permission of the use of mobile operated equipment. Walter says that any amateur who intends to visit Malta and operate on a reciprocal basis should get in touch with the Chief Inspector of W/T Branch, Auberge de Castille, Valletta. Readers who need other radio information about Malta, should write to, The Secretary, M.A.R.L., P.O. Box 575, Valletta.

During the sporadic-E opening at 1440 on June 6 that was reported in our October issue Walter, who is the 9H-VHF Manager,

worked into north-west Europe on 144MHz using his callsign 9H1DU. He was using 10W to a 9-element beam, pointing NNE.

# Band II

During the month prior to October 14, Band II was reasonably DXy, among some very positive peaks. With the pressure at 30-2 and beginning to fall on September 18, Harold Brodribb, St Leonards-on-Sea. received signals from French stations at Abbeville, Caen, Lille, Paris and Rouen. Between the 20th and 30th, he heard the occasional and rare signals such as Musique from Amiens and Paris and Culture from Caen. On October 1, a peak day, he logged 6 transmissions of Culture, 7 of Inter and 6 of Musique, as well as Frequence Nord and a Belgian station at Egem. At midday on the 24th, I used the v.h.f. radio section of my Plustron TVR5D from a site in Ashdown Forest and with its telescopic antenna, I heard several French stations between 98 and 101MHz. From the home QTH during the evening, I found Band II in chaos. I counted at least a dozen foreign voices between 87 and 103MHz, plus inter-station "warbles" and some of the music may well have come from continental transmitters. Between the 27th and 30th Bill Kelly, trying out a friends JVC receiver, heard BBC Radios Cleveland, Clywd, Cumbria, Derby, Lancaster, Merseyside and Manchester and ILR Clyde in Glasgow, Radio City Liverpool, West Sound Ayr, Red Rose Preston, Piccadilly Radio Manchester, Radio Nova Dublin and RTE 1 and 2, all between 88 and 104MHz. In Gloucestershire, John Williams, using a Fidelity portable and telescopic antenna on the 28th, received strong French stations around 98MHz and a stronger than usual transmission from Signal Radio in Stoke. On October 1 Simon Ball in Ryde, using a Toshiba receiver, heard Arabian or Indian type voices around 104MHz. I logged strong French stations between 98 and 102MHz while portable, with the Plustron, near Alfriston in Sussex. Another big peak came toward the end of this period and on October 12, Simon Hamer, New Radnor, listened to programmes from BBC1 in the Channel Islands, BRT-11 and RTBF-1 from Belgium, British Forces Broadcasting Service with John Morten with Jazz and WDR 11 from Germany and NOS-1 from Holland, between 87 and 102MHz. At 1900 on the 13th, John Williams, using a Deccasound with rod antenna logged 6 French stations at amazing strength.

# TELEVIJON

Reports: as for VHF Bands, but please keep separate.

At this time of year Band I may well appear to be dead, but do not despair, keep a watch for DX pictures via "F1" meteor scatter and brief periods of sporadic-E, during the early mornings and around midday. Tropospheric openings during the winter can be more frequent, so watch your barometer and when it is high, take a tune through Bands III, IV and V, the results are often surprising.

# Band I

Although sporadic-E is rare at this time of year the consistent band watching by Harold Brodribb in St. Leonards-on-Sea, Dave Coggins in Knutsford, Simon

Hamer in Radnor and Gordon Pheasant in Walsall found short lived disturbances

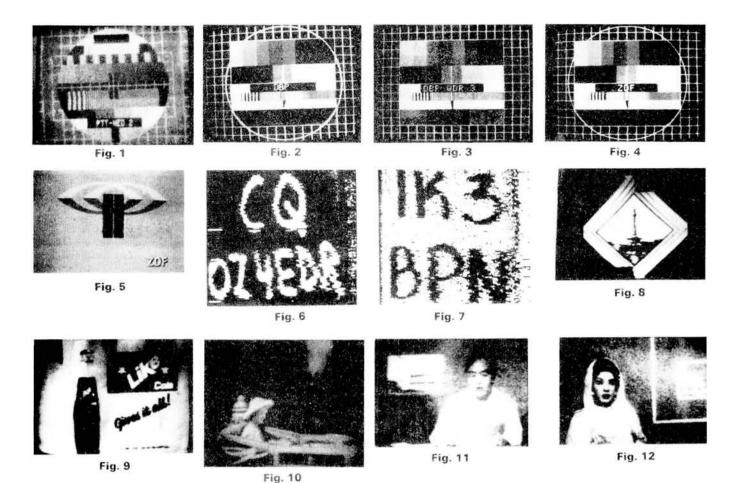
periodically on September 15, 18, 20, 26 and 30 and October 2, 3, 4 and 8. During these events they identified pictures, and/or test cards, from Czechoslovakia, Finland, Germany, Italy, Spain, Sweden, USSR and Yugoslavia. These were identified by catching a glimpse of such captiona as ARD, CST-01, GRUNTEN, RAI, RS-KH, TVE, TV1-SVERIGE and YLE-TV1. Harold heard words from the USSR on the Ch. R1 sound frequency 56-25MHz, Dave saw an



educational type programme on Ch. E2 48-25MHz, Gordon watched netball on Ch. R1 49-75MHz and Simon caught a political discussion on TSS. I saw a few bursts of picture on Ch. R1 at 0909 on the 22nd and a strong burst of test card from Poland at 1310 on the 30th.

# Tropospheric

"The weather conditions between September 14 and 17 provided plenty of good DX," writes **George Garden**, Edinburgh. After seeing signals from the Black Hill transmitter at his father's home in Laurencekirk on the 17th George promptly took his JVC CX610GB receiver to Cairn O'-Mounth, a local high spot. Between 1400 and 1630, using a stacked 4X antenna outside of his car, he found many signals throughout Bands IV and V. By carefully checking adverts, captions and channel numbers, he identified pictures from Ch. 4,



Selkirk on Ch. 65 and BBC 1 from Darvel in Ayrshire on Ch. 33.

During the afternoon of October 5, George made another trip to Cairn O'Mounth with his JVC and received strong colour pictures from Tyne Tees, Chatton on Ch. 49, BBC 1 from Darvel on Ch. 33 and Grampian TV from their Taybridge satellite at Dundee on Ch. 41. George stressed the importance of varying the antenna polarity between horizontal and vertical and reports some co-channel interference on several stations in the u.h.f. band. Adrian Butcher, Washington, using a Plustron TVRC5D and dipole antenna received test cards from Holand PTT-NED-2, Fig. 1, on Ch. 50 and news and test card from Belgium RTBF-1, Leglise, on Ch. 11 in Band III on the 24th.

Harold Brodribb received a test card from Belgium, Wavre on Ch. 8 at 1805 on the 25th and both Liege on Ch. E3 and Wavre and negative pictures from France, Abbeville and Neufchatel on several u.h.f. channels on the 28th. He also received test cards from Belgium RTBF-1, Germany ARD/ZDF and Luxembourg RTL in Band Ill and negative pictures on about 5 u.h.f. channels on October 1.

While using my TVR5D, portable at Ightom Mote in Kent on September 20, I logged negative pictures from France in Band III and some co-channel interference on u.h.f. signals was seen from the home QTH during the evening. Around 2000 on the 24th, I tuned through Band III and found a travel film in colour on Ch. E8, a picture of a post card with "IQ BRT" on it, a YL announcer before what looked like a science programme with a "LAB YRI" caption and the word "BELGICA" in front of a warship. At 0958 on October 10, I saw the Schools TV "PAUSE" caption, with analogue clock, from Holland on Ch. 4 and a Belgian test card on Ch. E10.

The big event came on the 13th, when, at 1944, I received strong colour pictures

from Radio Telefis Eireann and watched part of Murphy's Micro Quiz-In on RTE-1 and many adverts on RTE-2 in Band III. This was still open at midday on the 14th, because test cards from Belgium BRT TV1 and Holland PTT-NED 1 and a couple of negative pics from France were still coming in. During the evening of the 13th, Peter Lincoln, Aldershot, noted the heavy co-channel interference on his local station, so, into the shack, on with the Panasonic receiver-cum-video monitor and after close-down at 2330, he received u.h.f. colour test cards form the German stations DBP, Fig. 2, DBP WDR 3, Fig. 3 and ZDF, Fig. 4 and a fine ZDF logo, Fig. 5. Around 0820 on the 14th, Peter tuned around Bands I and III, using his Datong dipole, and received test cards from Holland PTT-NED-1 on Ch. E4 and from Germany NDR-1 on Ch. E7. The latter was his first ever DX in Band III and he also logged the East German test card DDR-F2 in Band V

At 1000 on the 13th, Gordon Pheasant received CEEFAX type information from RTBF-1 on Ch. E11, a full colour test card from Luxembourg RTL PLUS (a new one for him) on Ch. E7. During the evening, he saw a religious programme from DDR-1 and good colour pictures from ARD-1 in Band III. Simon Hamer did very well on October 12 and 13 when he received pictures in Band III from Belgium, Denmark, Eire, France, east and west Germany, Holland, Luxembourg and Switzerland and saw the respective captions, BRT-1, RTBF-1, DR, RTE-2, TDF, CANAL PLUS, DFF-1, ARD/WDR-1, ARD/SWF-1, NOS-1, and PTT-NED-1, RTL PLUS and +PTT/SRG-1. He also saw pictures from France on over a dozen u.h.f. channels and although negative, Simon identi-fied the captions, A2, FR3, TDF and TF1 and watched a subtitled film from BRT-2 on Ch. E46 and a test card from ZDF on Ch. E37. Among the programmes he saw in Band III were, Akuelle Kamera from East Germany, Rendezvous from France, Paganini on Violin and Elections from Belgium. Although the majority of Simon's DX was received at his home QTH, he took a trip to Penyfforest Hill on the 13th and with a rod antenna, received excellent pictures from Denmark on Ch. E7 and RTE 2 on Ch. J. In Bristol, Len Eastman, found Band III very good and after logging strong pictures from Belgium, France, Holland, Ireland and Luxembourg remarked, "We don't often get the results like this, as they do on the east coast."

# SSTV

During the month prior to October 13, Richard Thurlow G3WW, March, had 2way, 8-seconds, QSOs with G4ENA and G4ENB on 1.960MHz. He also joined in the 0815 to 0835BST daily net on 3-730MHz with stations in Sheffield. During this net, Richard had frequent 2-way, 24- and 48seconds SC2-K colour exchanges with Bert Croker G4NJI in Rotherham. On October 13, both Bert and Richard exchanged 2-way, 8-seconds pictures with G3KDD in Helston. After their QSOs Bert transmitted a 24-seconds, single frame colour picture of himself, using his colour camera and a Volker Wrasse interface board. "G4NJI can now supply all Volker-Wrasse SSTV/FAX equipment from his TV shop in Sheffield," said Richard. After seeing the 36 second colour tape made by Ron Clews G3CDK, through his Robot 1200C Luminance, SSTV converter of the pictures from *Challenger*, Richard remarked, "Simply magnificent." The contact with G3KDD gave Richard his 2093rd, first time worked, 2-way SSTV QSO and his first new one since the end of August.

In Bude, Lester Curno received signals from CT1WW, DK9KW, IY4MO, K1QBZ, Practical Wireless, January 1986



# BREDHURST ELECTRONICS

HIGH ST, HANDCROSS, W. SX. (0444) 400786





MAIL ORDER AND RETAIL MON-FRI 9-12.30/1.30-5.00 SAT 10.00-4.00p.m.

# THE COMMUNICATIONS CENTRE OF THE SOUTH-

MILE PROPERTY.	NSCEIVERS	£	(c&p)	2M FM	TRANSCEIVERS	£	(c&p)	SPEAKERS	£	(c&)
TRIO YAESU ICOM ICOM TRIO TRIO YAESU TRIO	TS930S FT980 IC751 IC745 TS430S TS830S FT757GX TS530SP	1295.00 1450.00 1299.00 899.00 720.00 832.00 739.00 698.00	IIIIIIII	TRIO ICOM YAESU TRIO YAESU ICOM ICOM	TM201A 25W Mobile IC27E 25W Mobile FT270R 25W Mobile TR2500 Handheld FT209R (FNB3) IC2E Handheld IC02E Handheld	296.00 379.00 315.00 258.00 239.00 199.00 269.00	IIIIII	TRIO         SP230 (TS830, 530)           TRIO         SP430 (TS4301)           TRIO         SP120 (TS130, 120)           YAESU         SP102 (FT102)           TRIO         SP40 Mobile speaker           YAESU         SP55 Mobile speaker	47.70 39.50 30.70 59.00 16.40 14.95	(1. (1. (1. (0. (0.
TRIO	TS130S	633.00	(-)	2M MU	LTIMODE TRANSCEIVERS			ANTENNA BITS		
	RIO DM801 DIP METER 99.0  NA TUNER UNITS  IC-AT500 Auto IC-AT100 Auto AT250 Auto FC757 Auto AT230	459.00 329.00 285.00 255.00 157.00	(-) (-) (-) (-) (2.00)	TRIO YAESU TRIO ICOM ICOM TRIO YAESU	TS780 2M and 70cm base FT726R 2m fitted (70cm optional) base TS711E 2M base station IC271E 25W base IC290D 25W Mobile TR9130 25W Mobile FT290R Portable	948.00 775.00 768.00 729.00 479.00 499.00 315.00	IIIIII I	7-1 MHz RAL-TRAPS — Epoxy — pair Self Amalgamating Tape 10m x 25mm T-piece polyprop Dipole centre Small ceramic Egg Insulators Large ceramic Egg Insulators 75 ohm Twin Feeder — light duty 300 ohm Twin Feeder UR67 Low loss coax — 50 ohm UR76 50 ohm coax — dia 5mm UR70 70 ohm coax	0.14 0.65 0.25	(1.1 (0.1 (0.1 (0.1 (0.1 (0.1 (0.1 (0.1)
YAESU WELZ YAESU	FC700 AC38 FRT7700 Short Wave Listening	105.00 85.00	(1.50) (1.50) (1.50) (1.00)	70cm TI TRIO TRIO TRIO	RANSCEIVERS TW4000A Mobile 2M/70cm TM401A 12W Mobile TR3500 Handheld	522.00 316.00 270.00	( <u>-</u> )	4mm Polyester Guy Rope, strength 400kg per metre 50 metres 16 swg hardrawn copper	0.16 6.90	(O. (O.
HF REC	EIVERS			ICOM	IC4E Handheld	259.00	()	B.N.O.S. LP144-3-50 50W linear (2M 3W drive)	***	
ICOM ICOM TRIO TRIO	R70 R71 R2000 VC10 VHF Converter for R2000	629.00 729.00 479.00	( <u> </u>	ICOM TRIO YAESU	IC04E Handheld TS-811E Base FT2700R Mobile 2M/70cm	279.00 895.00 499.00	( <u> </u>	LP144-3-90 SOW linear (2M 3W drive) LP144-19-50 SOW linear (2M 10W drive) LPM144-3-100 100W linear (2M 3W drive) LPM432-1-50 SOW linear (70cm 1W drive) LPM432-10-50 SOW linear (70cm 10W drive)	108.00 108.00 181.00 235.00 195.00	
YAESU TRIO YAESU	FRT7700 Antenna Tuner R600 FRG8800 Gen Cov Rx	49.85 299.00 475.00		HK 707 HK 703 HK 803	Straight Key "deluxe" straight key "deluxe" Brass key	15.50 28.95 75.00	(1.00) (1.20) (2.00)	6A PSU 12A PSU 24A PSU	58.00 99.00 148.00	
VHF RE	CEIVERS			MK 704	Squeeze paddle Practice Oscillator	15.95	(1.00)	COAXIAL SWITCHES		
JIL FDK FDK YAESU AOR	SX200N ATC720 Handheld Airband RX40 Handheld 141-179MHz FRG 9600 60-905MHz AR2002 up to 1300 MHz	325.00 189.00 159.00 449.00 375.00		EK 150 D 70 MMS-1 GW MK	Practice Oscillator Electronic keyer Datong Morse tutor Morsetalker morse tutor Brass Key on slate Datong morse keyboard	10.95 103.00 56.35 115.00 35.50 137.42	(0.75) (1.00) (—) (1.00) (2.00) (—)	SA450 2 Way Diecast SO239 (500MHz) SA450N 2 Way Diecast N plug (500MHz) CH20A 2 Way Web: 50239 (900MHz) CH20N 2 Way Web: 50239 (900MHz) DRAE 3 Way SO239 sockets DRAE 3 Way N sockets	14.95 19.95 22.95 41.90 15.40 19.90	(0.7 (0.7 (1.0 (1.0 (0.7 (0.7
	TRIO TL922 LINEAR £1150	0.00			AKD WAVEMETER (VHF)	£24.95		METEOR 600 FREQUENCY COUNT	ER f1	45.0
						10.7		METEORIOU THE GOENCT COUNT	-12-1	

# AERIAL TECHNIQUES 1986 CATALOGUE

AERIAL TECHNIQUES - TODAYS AERIAL TECHNOLOGY AT ITS BEST - AND WITH

We provide the consultancy and supply the equipment for ALL receiving installations in the VHF/UHF broadcasting spectra. Our EXTENSIVE RANGES of aerials, amplifi-ers, filters, rotators, diplexers, triplexers and allied components cover Europe's most respected companies. We also have our own exclusive aerial ranges for various VHF options, including Wideband Band 1 TV-DXing.

WHETHER YOUR NEED IS FOR LOCAL OR FRINGE RECEPTION, ALTERNATIVE CHANNELS, TV/FM DXING, OR FOR A DISTRIBUTION SYSTEM, AERIAL TECH-NIQUES IS THE 'ONE STOP' ADDRESS FOR ALL EQUIPMENT.

AERIAL TECHNIQUES IS UNIQUE - TRY OUR COMPREHENSIVE CATALOGUE AT 65D. Please include an SAE with all enquiries



**AERIAL TECHNIQUES (PW)** 11, Kent Road, Parkstone.

Poole, Dorset, BH12 2EH. Tel: 0202 738232.



# OSING DX?

ANTENNA TUNER, only £28.20, for outside or INDOOR antennas, end-fed LONG WIRES or dipoles, BOOST DX and reduce interference 100KHz-30MHz in 6 overlapping ranges, IDEAL for FRG7700 etc or 10W tx, BANDPASS design (not just usual low pass) with high Q coils and expensive air dielectric capacitor, also adapts to WAVEMETER field strength meter etc, get MORE DX.

RARE DX UNDER QRM? DIG it OUT with a Tunable Audio

Notch Filter, between receiver and extension speaker, BOOST your DX/QRM ratio, 40dB notch, bypassed when off, £18.80, hear WEAK DX.

Each fun-to-build kit (ready-made to order) includes ALL parts, case, pcb, pre-wound coils, instructions, by-return post-age (Europe same) and list of other kits.

# CAMBRIDGE KITS

45 (PA) Old School Lane, Milton, Cambridge.

# Universal Semiconductor Devices Ltd.

17 GRANVILLE COURT, GRANVILLE ROAD. HORNSEY, LONDON N4 4EP, ENGLAND. TEL. 01-348 9420/9425 \* TLX. 25157 usdco g



WE OFFER ONE OF THE LARGEST RANGES OF SEMICONDUCTORS AT HIGHLY ECONOMICAL PRICES. THE FOLLOWING SEMICONDUCTOR TYPES ARE AVAILABLE FROM STOCK. IF WE DON'T STOCK WHAT YOU NEED THEN WE CAN GET IT FAST FROM OUR FACILITIES IN WEST GERMANY AND USA UPON REQUEST.

TRANSISTORS - BIPOLARS - GERMANIUM AND SILICON SMALL SIGNAL

POWER DARLINGTONS - ALL SHAPES AND SIZES VHF/UHF DEVICES - ALL SHAPES AND SIZES

FETS - POWER MOSFETS UNIJUNCTIONS





DIODES - GERMANIUM AND SILICON RECTIFIERS AND BRIDGES OPTO-ELECTRONIC DEVICES

LEDS OF ALL SHAPES AND SIZES



THYRISTORS AND TRIACS - ALL SHAPES





SIZES RATINGS

INTEGRATED CIRCUITS:

CONSUMER - DIGITAL/ANALOGUE MICROPROCESSORS AND PERIPHERALS IC SOCKETS



JAPANESE COMPONENTS - VAST RANGE OF DISCRETES AND CONSUMER IC's.

MAIL ORDER CUSTOMERS: PLEASE SEND FOR OUR COMPREHENSIVE PRICE LIST. ENCLOSING 75 PENCE IN STAMPS, CHEQUE OR POSTAL ORDER. THIS SUM IS REFUNDABLE WITH A FIRST ORDER VALUE OF £5.00 OR MORE.

CATALOGUE SENT FREE OF CHARGE, WHEN REQUESTED ON OFFICIAL LETTERHEAD (WITHOUT REFUND), TO DEM'S, SCHOOLS, COLLEGES, UNIVERSITIES, GOVERNMENT INSTITUTIONS, COMPUTER FIRMS, ELECTRONIC REPAIR FIRMS AND DISTRIBUTORS.

SPECIAL DISCOUNTS AND PAYMENT TERMS ARE AVAILABLE TO ABOVE INSTITUTIONS.

PLEASE ENQUIRE FOR QUANTITY DISCOUNTS.

WE WELCOME TELEPHONE AND TELEX ENQUIRIES!

OZ4EDR, SP6BNG and YU5OZ within this period. During the evenings of September 23 and 25 he logged the caption, "ZS6BKK DE I1CEL" and on the 23rd, saw EA5FIN experimenting with colour. Like Lester, I copied strong signals, with some QSB, from OZ4DER (Fig. 6) calling CQ followed by "K" at 1530 on September 21. During the GARTG SSTV contest on October 5, I received pictures on 14-230MHz from IK3BPN (Fig. 7) and YU1NR, as well as partial captions from CT1, EA and SP, which were spoilt by both QRM from s.s.b. stations and QSB. During the afternoon of October 12, Peter Lincoln, received pictures from EA9NP working a GJ4 on 14-230MHz and adding Ceuta and Melilla to his new countries list. Dave Coggins recently added the Scarab SSTV

software to his Spectrum computer and has already copied pictures from Italy, Hungary, Poland and the USA.

# News from India

Sporadic-E disturbances during the morning of August 4 and the evenings of July 30 and August 6 were observed by Major Rana Roy. He saw cartoon and feature films and a high ranking Russian naval officer, in another programme, from the USSR on Ch. 2 in Band 1. "This year we hardly saw an Arabic station via sporadic-E. They are normally very strong and are available like local stations for 2–3 hours, but, whatever we saw this year was for a very short duration," writes Rana on

October 1. During the tropospheric openings on August 8, 10, 16 and 21 and September 4, 5 and 19, Rana received pictures in Band III from Lahore TV on Ch. 5 (Figs. 8 and 9), Jalandhar TV on Ch. 9, Mussoorie and Pakistan TVs on Ch. 10 (Figs. 10 and 11) and Rawalpindi TV on Ch. 8 (Fig. 12). While these events were in progress, Rana saw a variety of adverts (Fig. 9), news, (Fig. 12) a play in Urdu, a programme about Yoga, an American TV serial and a documentary about the ex-President of india, Dr Radhakrishanan, as well as test cards. Some of these transmissions were received in colour.

My thanks to Bill Stewart, Lossiemouth, for the translation of the Russian text in our November issue, Fig. 7 is "CANADA TODAY" and Fig. 8 is "LOOK".

# MW BROADCAST BAND DX

Reports to: Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, W. Sussex RH20 4NS

The little two-transistor, double-reflex receiver mentioned in the October '85 PW 'On the Air'', as used by John Ratcliff of Southport, Queensland, Australia, created considerable interest. John has now kindly sent along the basic circuit of this design together with a few contructional notes and I shall be pleased to send a copy of these to interested PW readers. (Please enclose a suitable s.a.e. or IRCs with your request.)

# DX Report

Note: Frequencies in kHz: Times UTC = GMT.

Transatlantic DX: Paul Logan of Co. Fermanagh was busy on October 13 late into the night looking for transatlantic DX. Newfoundland's CJYQ 930, with much fading, was noted first at 0100 from St. John's; and later at 0205 CKYQ appeared at good strength from Grandbank on 610. To his surprise he found a very strong signal from WHN 1050 at 0400, with a programme of country music called *Memory Machine*.

From South America, Paul heard Radio Globo 1220 at 0105 broadcasting from Rio de Janeiro and quite a strong signal from Radio Visión 950, located in Caracas.

"Not exactly the best month for DX," says **Graham Powell** of Pontypridd, but some good DX was heard, including most of the stations he reported last month. In addition, WNBC 660 and WABC 770 from New York were received around 0330 by Graham on his new Trio R-2000 receiver. From Boston, WBZ 1030 put in an appearance at 0355. Canada's CBGY 750 from Bonavista Bay, Newfoundland, was logged at 0307 and CKLM from Montreal was noted at 0331.

Simo Soininen of Kauniainin, Finland, says that the majority of the North American stations detailed in *PW* are also being heard in Lapland, North Finland. He has sent along a comprehensive list of m.w. DX heard by s.w.l.s in Finland during 1984/85 which makes very interesting reading.

At his listening post in Belfast, **Bill Kelly** has been hearing Newfoundland's CJYO 930 on four nights around 0100—often a good signal by 0230—and CBGY 750 at 2330. WHN 1050 was received on three nights from New York at 0230 with talks about baseball (and adverts for fertilisers!). Another good signal was WCAU 1210 at

0220 from Philadelphia. WGAR 1220 with news and weather from Cleveland



made interesting listening at 0530. WTOP 1500 was logged on three nights from Washington between 0130 and 0230. On October 2 Bill heard a three-station link up, between 0130 and 0300, relaying a football match from the USA between Detroit and New York Tigers. The stations involved were CJYQ 930 St. John's, CIYQ 680 Grand Falls and CKYQ 610 Grandbank—they all used a common callsign CIYQ. Bill says it was an exciting match and the referee was involved in an argument with a Tiger player!

# News from "Down Under"

John Ratcliff has sent along more details about DXing m.w. in Australia. He says: There are about 130 Australian, 50 New Zealand and a couple of dozen Pacific Island transmitters operating on the m.w. band. About 75 per cent are commercials and operate 24 hours a day. Each and every one has a heterodyne present, unless it is a local. With enough time and patience I could log every one of them but I confine my activities to the small hours. It is now mid-summer in Southport and by the end of December sunrise is at 0445 and sunset at 1830, the temperature is 35-37°C. In January, tropical cyclones and lots of static occur so when to listen is all important-0100-0500 is best." John offers a good tip to m.w. DXers: "Antenna height is more important than length (20 metres is long enough if it is high enough)."



# Other DX

A very interesting log from Philip Rambaut of Macclesfield details DX heard between 1700 and 1800UTC: on I.w.—Minsk (USSR) 281, Prague 272 and Tipaza, Algeria 254; on m.w.—Innsbruck 520, Cuna di Dentro (Swiss) 558, Vienna 585, Prague 639, RTE 1 (Cork) 729, Algiers 891, Turku (Finland) 963, Katowice (Poland) 1080, Bratislava (Czech) 1098, Belgrade (Yugoslav) 1134, Solvesborg (Sweden) 1179, VOA Munich 1197, Warsaw 1206, RTE 2 (Dublin) 1278, Litomysl (Czech) 1287, Kvitsoy (Norway) 1314, Kaliningrad (USSR) 1386, Leningrad 1494 and Kosice (Czech) 1521.

Programmes from Radio Polonia 1503 were received on a Vega B210 with ferrite rod antenna by **Keith Fernie** of Ossett, W. Yorks, during eight days of enjoyable listening. Other stations included BRT Brussels 1512, Radio Prague 1287 and Radio Vilnius (USSR) 666. On I.w., Tipaza, Algeria 254 was logged.

Martyn White of Edinburgh lives on the 5th floor of a 15-storey block. This is a common situation which presents antenna problems when there is no balcony. My advice is to use a m.w. loop antenna for DXing. His log includes Radio Yugoslavia 1008 and AFRTS 1080.

Bill Kelly noted SER Madrid 810 and Radio COPE Canary Is. 837. Paul Logan's log included RNE1 (Spain) on 585 and 684, Portugal 660, Marseille (France) 674, Bayerischer Rundfunk (Germany) 801, BRT 1 (Belgium) 927, Hilversum 1008, Denmark 1062 and Stavanger (Norway) 1314.

An attractive QSL showing the 135m-tall antenna masts of Radio Sweden's new Solvesborg transmitter 1179 was sent in by **Chris Hughes** of Helston, Cornwall (Fig. 2). He says, "Their programme matches the signal—very good". A free Radio Sweden poster is available for reception reports (see QSL addresses)." **Alan Merritt** of Abingdon has been enjoying their "phone-in" programme on acid rain.

Alan Williams, also of Helston, has logged Manx Radio 1368; he and Darren Taplin of Tunbridge Wells both enjoy Radio Finland's Compass North programme on 254 and 963kHz.

An amusing letter from **Phil Englehard G8UFU**, of Macclesfield describes how Radio Sevilla (Spain) 792 had a football commentary recently and each time a goal was scored the Morse letters G O L were sent! "Just imagine that on BBC Radio 1 at 20 w.p.m.," he says!

Fig. 1: An ILR Red Rose Radio sticker sent in by Paul Logan of Co. Fermanagh

Practical Wireless, January 1986

Heard by ▶ Freq (kHz) Station		Keith Fernie, Ossett	Dave Jackson, Goole	Graham Johnson, Nuneaton	Paul Logan, Co. Fermanagh	Alan Merritt, Abingdon	Graham Powell, Pontypridd	Darren Taplin, Tunbridge Wells	Derek Thomley, Birmingham	Alan Williams, Helston	Stephen Woods, Nottingham
603	Invicta Sound	$\vdash$	_			_	_				Х
630	Radio Cornwall	-			Х						
630	Radio Bedfordshire	1	Х			_	_		_	_	
666	Radio York	X			X						Х
666	Devon Air Radio	-	-	_	X						
756	Radio Cumbria	-			Х	v	_	_	_	_	
756 774	Radio Shropshire	X		X	_	Х	-		_	_	X
792	Radio Leeds Chiltern Radio	-		X		_	_	_	-	_	X
801	Radio Devon	-		^	x	_	_	_	-	-	^
837	Radio Devon	+	X	x	^	-				-	-
837	Radio Furness	+	x	^	-	_	-	_	-	-	_
855	Radio Lancashire	x	x	15	x	-				-	
855	Radio Norfolk	1^	x		^						
855	Radio Devon	+	^		-	-	_			X	-
873	Radio Norfolk		x	X			-			^	X
954	Radio Wyvern	-	^	^	X				-		^
990	Beacon Radio	+		х	^						_
999	Red Rose Radio	+		^	X				X	-	
1026	Radio Cambridgeshire	X	X	X		X					x
1035	Radio Sheffield	X		~		_					X
1107	Radio Northampton	+	X	X		X					-,
1116	Radio Derby	X	X	X		-				-	
1116	Radio Guernsey	1	-	-		х					
1152	Radio Clyde				X	-					
1152	BRMB Radio			X	-						
1152	LBC	1		1	-	Х					_

Heard by ▶		Keith Fernie, Ossett	Dave Jackson, Goole	Graham Johnson, Nuneaton	Paul Logan, Co. Fermanagh	Alan Merritt, Abingdon	Graham Powell, Pontypridd	Darren Taplin, Tunbridge Wells	Derek Thomley, Birmingham	Alan Williams, Helston	Stephen Woods, Nottingham
Freq (kHz)	Station	1									
1152	Piccadilly Radio	X								4	
1161	Viking Radio										Х
1161	Radio Bedfordshire	I		Х		X					
1161	Radio Sussex							X			
1170	Signal Radio			Х							
1251	Saxon Radio			Х							
1260	Leicester Sound			X							
1260	Radio GWR						Х				
1278	Pennine Radio										X
1323	Southern Sound							X			
1332	Hereward Radio		X						Ű		
1359	Mercia Sound	l.		X				!			X
1359	Essex Radio							Х			
1368	Radio Lincolnshire	X									
1431	Essex Radio							Х		1.	
1458	Radio WM						X				
1458	Radio Manchester				X						
1458	Radio Cumbria				X						
1458	Radio Devon									X	
1485	Radio Humberside										Х
1485	Radio Merseyside				X		X				
1485	Radio Sussex							X			
1503	Radio Stoke-on-Trent						X				
1530	Pennine Radio	X									
1557	Hereward Radio			X							X
1584	Radio Shropshire						X				

Fig. 3

Early this year Phil "dug" out of the corner of his room an old m.w. loop antenna, connected it to his FRG-7 receiver and was amazed at the results, hearing the BBC Masirah station 1413 at 1900. Recent reception of Radio Cadena (Canary Is.) 1215 has amazed him, too-this signal is heard between 2300 and 0540 ("when Radio 3 is put to bed," he says) and is often stronger than the BBC Radio 3 transmitters when they are powered in turn, until his local one comes

# Local Radio DX

Steven Woods does his local radio DXing during daylight hours, and quite successfully as can be seen in Fig. 3.

Bert Trickey of Bristol informs me that, from October 1, ILR Radio West amalgamated with Wiltshire Radio to become the new ILR Radio GWR.

Derek Thornley of Birmingham received Red Rose Radio 999 when in Stoke-on-Trent, some 110km away. Paul Logan has received their car sticker, and he is another who does his DXing during the day, Fig. 1.

Daylight DXing is obviously popular, as Dave Jackson also finds signals better then. After two years of s.w.l.ing Graham Johnson has decided to explore m.w. local radio DXing, again Fig. 3 shows the

Alan Merritt, who uses a Vega receiver, heard a live report on a helicopter crash at Silverstone Race Track via BBC Local Radio Northampton 1107 on October 8. Darren Taplin uses a DX-150A receiver and a 25m-long wire. The chart in Fig. 3 shows how all the DXers have fared this month.



Fig. 2

# QSL Addresses

Radio Sweden: S-105 10 Stockholm, Sweden.

BBC Radio Bristol: 3 Tyndall's Park Road,

Bristol BS8 1PP

BBC Radio Derby: 56 St. Helen's Street, Derby DE1 3HY.

Then place a regular order with





Dear Newsagent, please reserve/deliver my monthly copy of PRACTICAL WIRELESS

Address

Signed

# IN BROADCAST BANDS

Reports: as for Medium Wave DX, but please keep separate

# For the Newcomer SWL

One of the many interesting things about short wave radio is that it brings together the peoples of the world, hopefully to bring about a common understanding of many subjects. One of the basic essentials for this to happen—apart from overcoming the problems of different languages—is that there should be a common understanding of the language of time, for it is necessary for broadcasters to use a time system for their transmission schedules which is meaningful in every country of the world.

The thousands of tiny signals from short wave transmitters located around the world arrive at a receiving antenna and by simply adjusting the receiver tuning it is possible to select signals from different countries. The world is literally at one's finger tips! Ponder a moment upon the implications of this.

When it is nine o'clock in the evening in the UK it is afternoon tea time in New York, lunch time in Los Angeles and breakfast time tomorrow morning in Australia! These differences are not just restricted to the time of day, either, for different seasons exist, too—summer in one country and winter in another! Also, because large countries have to take into account the differences in the time of day between their eastern and western shores (or boundaries) time zones have to be introduced. The USA has four such zones, Canada has six, Australia has four, whereas New Zealand has only one.

The legal civil time in the British Isles is called **Greenwich Mean Time** (GMT). However, during periods laid down by the Government, **British Summer Time** (BST) is introduced and this is one hour ahead of GMT.

Greenwich Mean Time is derived from observations of the sun's transit over the Greenwich Meridian, located at longtitude measured East and West as 0°. Because the earth's rotation is somewhat irregular, many such observations over a period of years are necessary. These are collected and then corrected and correlated to produce a dynamic time scale, based on a



Fig. 1

variable unit.
Although there are always 60 seconds in a minute of GMT, the length of

a second varies gradually. Clocks are, in effect, adjusted to keep in step with the rotation of the earth on its axis.

by Brian Oddy G3FEX

Some idea of the relevant time of day in other countries in relation to GMT is given in Fig. 2.

Because of the problems in trying to convert from one time to another, the International Telecommunications Union established a universal time system called Universal Time Co-ordinated (UTC). This is, for most practical purposes, similar to the long used Greenwich Mean Time but is derived from an Atomic Standard. This Atomic Standard uses the Caesium 133 atom which has a frequency of radiation taken to be, by definition, 9192-631770MHz. The seconds of the UTC system are always the same length but there are not always 60 seconds in a minute for it is occasionally necessary to introduce leap seconds in order to keep UTC in step with astronomical time because of the irregular nature of the earth's rotation. Time in UTC makes use of a 24hour clock system. This UTC 24-hour clock system is used throughout the world by broadcasters when drawing up their transmission schedules. How, then, may s.w.l.s use the system?

Irrespective of where a s.w.l. lives in the world, it is a good idea to place a small clock near to their receiver permanently so that this can be set always to display UTC, independently of any other clocks about the house which may well display a local time. (Some receivers have such clocks built into them.) This little clock can have a 12-hour dial and be used in conjunction with a conversion table but it is better to purchase a 24-hour clock—these are now available in some shops and such clocks make a nice birthday or Christmas present! Once this clock is set to UTC it is never altered throughout the year. So, how do we set it to UTC?

In the UK, s.w.l.s may, during the winter months, make use of the Greenwich time signals radiated on the domestic BBC services, or use the telephone "speaking clock" to set their 24-hour clock. For although the legal winter time is GMT all these time signals are now derived from Atomic standards using UTC. No-one actually has convenient access to GMT any longer—so perhaps we should persuade our Government to call it UTC instead! During the summer months when we are using BST, clocks everywhere in the UK will be one hour ahead of UTC, so don't forget to allow for this if setting up initially the 24-hour clock.

Overseas listeners must ignore their local clock times and set the 24-hour clock to UTC using, for example, the BBC World Service time announcements. Alternatively, they may make use of the very accurate time signals transmitted from special stations around the world to provide standards against which clocks and other devices can be compared. (Incidentally, because these stations transmit on highly accurate r.f. frequencies, these, too, can provide a means of calibrating a sec-

UTC	Travelling Eastwards from UK
0001	UK
0100	C. Europe, Berlin, Geneva, Stockholm
0200	E. Europe, Cape Town, Cairo, Moscow
0300	Arabia, Ethiopia, Madagascar
0400	Mauritius, Iran, Reunion Island
0500	Central Russia, Bombay, India
0600	Calcutta, Tibet
0700	Sumatra, Thailand, Laos
0800	Philippines, Perth
0900	Japan
1000	E. Australia, Melbourne, Sydney
1100	New Caledonia, New Zealand
1200	International Date Line, Fiji
UTC	Travelling Westwards from UK
1200	International Date Line, Fiji
1300	Nome, Alaska, Samoa
1400	Hawaii, Midway Islands
1500	Eastern Alaska, Dawson
1600	Los Angeles, Seattle, Juneau
1700	Calgary, Denver, Phoenix
1800	Chicago, Costa Rica
1900	Montreal, New York, Peru
2000	Argentina, Nova Scotia
2100	Greenland, Rio de Janeiro, Brazil
2200	Azores
2300	Iceland, Canary Islands
2359	l uk

2359 UK	liand, Canary Islands
Fig. 2 🛦	▼ Fig. 3
Frequency	Standard Time Station
60kHz 2·5MHz 5·0MHz 10MHz	MSF—Rugby—England
2·5MHz 5·0MHz 10·0MHz 15·0MHz 20·0MHz	WWV—Fort Collins—USA
3-33MHz 7-335MHz 14-670MHz	CHU—Ottawa—Canada
4-5MHz 7-5MHz 12-0MHz	VNG—Lyndhurst—Australia

ondary frequency standard—see August *PW* page 55.) Where to find some of these special stations is detailed in Fig. 3.

Because all broadcasters use UTC for their schedules they expect to receive s.w.l. reports and comments about their broadcasts in terms of UTC, in return. So, remember to state the time of reception in all reports—including those to "On the Air" in PW!—in UTC. Make all entries in your log book in UTC, too—it's the "Universal Time Language".

# Conditions on the HF Bands

Note: Frequencies in MHz; Times UTC = GMT.

The 26MHz (11m) and 21MHz (13m) Bands: The 11-year solar sunspot cycle has now reached a probable minimum for there are no visible spots on the sun's surface at the time of writing (mid-October). Conditions on the higher frequency bands can therefore be expected to be poor.

The 26MHz band is very empty now, for the BBC signal on 25-650 ceased from the end of their summer schedules in late September. Chris Hughes of Helston, Cornwall, carried out regular checks on the band and confirms that no signals were heard. Bill Kelly of Belfast also monitored 26MHz and, apart from an out of band Russian programme heard on 9 September on 25-467 at 1830, found the band to be dead.

The 21MHz band is still producing some interesting signals. Radio Japan's trans-

Practical Wireless, January 1986

mission via Moyabi, Gabon, on 21-550 was heard by Darren Taplin of Tunbridge Wells at 1500, using a DX 150-A receiver plus 25m long wire antenna. "Newcomer s.w.l." Bob Taylor also heard these signals in Edinburgh, on his new Toshiba F11/L receiver and just the set's whip antennal

The signals from UAE Dubai are very strong in the UK. Graham Powell of Pontypridd, along with Bert Trickey of Bristol and Bob Taylor, have all logged them as "excellent". They beam to Europe on 21-605 between 1330 and 1400 with English News.

Radio Moscow broadcasts are targeted to Australia and Asia in the early morning and around midday to Africa and the Middle East on this band: their frequencies include 21·450, 21·545, 21·590, 21·670. 21-715 and 21-740.

Radio Berlin International's transmission to Asia was noted by Bob Taylor on 21-540: look for this between 1330 and 1415. Another one logged by Bob was Vatican Radio on 21-485—this transmits to Africa at 1200.

The BBC use a number of frequencies in this band. Their transmitters in the UK radiate on 21.470, 21.550 and 21.710, while their overseas stations in Limassol, Cyprus and Ascension Island use 21-660MHz. The signals are targeted mainly to Australia, Asia, Africa and the Middle East during the day

The 17MHz (16m) and 15MHz (19m) Bands: All India Radio from Delhi is just one of the many signals to be heard on the 16m band and was logged by Edward Stone of Kingston upon Thames on 17-705, using his FRG-7700 receiver. Listen between 0830 and 0840.

Radio Australia, 17.715, is a good signal most mornings and one for which "New-comer s.w.l.s" should listen. Michael Sargeant of Bolton, Lancs, has been hearing it well at 0805. He uses a Panasonic DR-49 receiver with Datong AD-370 Active Antenna.

In an extensive log from Keith Fernie of Ossett, Yorks, the 17MHz stations detailed include Radio Japan (via Gabon relay) 17-855 at 0700, Radio Cairo, Egypt, 17-675 at 1215 and the UAE Dubai

17-775 at 1330, which is a strong signal. "Newcomer s.w.l." Kevin Plunkett of Wembley also heard UAE Dubai but earlier, at 1045. He has a Sony 7600D receiver. His first log mentions The Voice of the Andes from Quito, Ecuador-HCJB 17-790 at 1930. This is always a popular station and their excellent DX-Party Line s.w.l. programme, hosted by John Beck, is 'must' for s.w.l.s on Mondays and Wednesdays. My thanks to Stephen Roberts of Urmston, Manchester, for his comprehensive s.w.l. DX programme notes. He says: "A special edition of DX-Party Line is broadcast live on Saturday mornings. Any s.w.l.s can ring the station in Ecuador to ask a panel of experts questions about DXing"

Radio Canada International 17-820 at 1900 was logged by Michael Sargeant. This station has a special Short Wave Listeners' Digest programme, hosted by lan McFarlane, which is broadcast on Saturdays.

A Yaesu FRG-8800 plus FRV-8800 is the receiving equipment used in Edinburgh by Martyn Whyte to listen to excellent signals from Radio Bangladesh, 17-670 at

Peter Mills of Sherborne, Dorset, noted good signals from The Voice of Turkey, 17-885 at 1330, using his Selena portable.

Radio RSA, Johannesburg, 17-780 transmits to Europe and the Middle East between 1400 and 1556-newcomers should look out for their excellent signal and listen, too, for their Mail Bag programme conducted by Shirley Veal and Kathy Fitch. They answer listeners' letters and have a personally signed QSL waiting.

Although you may not understand the language, FEBA Radio Seychelles 17-875 broadcast in Arabic and is a good signal in the UK at 1100 according to Graham Powell, who also heard Radio Pakistan 17-660 at 1100 and, earlier, Radio Afghanistan (via USSR) 17-655 at 0952.

Signals from all continents can be heard on 15MHz; the level of illegal jamming has considerably increased, however, which makes reception difficult at times.

A station located in one of the rarer DX spots—Saipan, North Mariana Islands—is KYOI 15-190. Derek Thomley of Birmingham has been hearing it from 0840 and has sent along their QSL, Fig. 1. He says: "It takes a bit of finding on the map!"

Margaret Sadler of Leeds listens to News around Asia in English, beamed to Europe from Radio Japan at 0700 on 15-235, and later logged RNB Brasilia, Brazil 15-155 at 1800 and RAE Buenos Aires, Argentina 15-345 at 2120, using just a whip antenna on her Grundig 1400SL receiver.

Africa No. 1, Gabon 15-475 has been received by Philip Rambaut of Macclesfield at 1730 and, later, by Simon Hamer of New Radnor at 2014 with "pop" music. Simon logged an s.s.b. signal from Radio Sweden 15.420 at 2030, AFRTS Greenville, USA 15-430 at 2036 and WYFR 15-440 at 2040 from Oakland, California, USA.

Radio Tirana, Albania 15-430 was heard by John Parry G4AKX of Northwich, Cheshire, at 1730 and Darren Taplin noted Radio Bucharest, Rumania 15-380 at 1747 in his log. Programmes from UAE Dubai 15-320 at 1630 and Radio RSA Johannesburg 15-185 (in German) at 1730 were enjoyed by Bill Stewart of Lossiemouth.

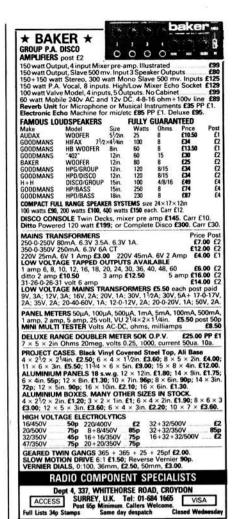
Albert Fisher G4VBH of Heston, Hounslow, has listened to RCI Montreal, Canada 15-325 from 1900, Radio HCJB Quito, Ecuador 15-270 at 1900 and BBC Ascension Island 15-260 at 2000. The Voice of Nigeria 15-120—"a strong signal with poor modulation"-was received by Peter Mills at 1800. Alan Williams of Helston, Cornwall, logged Radio Jamahiriyah, Tripoli 15-450 at 1818 and Radio Budapest, Hungary 15-160 at 1600.

During the Mexico earthquake, Bill Kelly kept a listening watch between 2000 and 0330 for signals from their 50kW transmitter on 15.430, but heard nothing.

The 13MHz (22m) Band: Radio Nederlands are now operating in this band on 13-770 with a programme in English at 1430

The 11MHz (25m), 9MHz (31m), 7MHz (41m) and 6MHz (49m) Bands: These bands are becoming more and more congested; nevertheless Radio Australia can usually be heard well on all of them! Two newcomers-Clive Powell of Southport and Kevin Plunkett-have been enjoying the thrill of hearing signals from "down under" for the first time. Clive has heard their programmes on 6.035 at 2000. Kevin listened much earlier, at 0600, to their 11-910 signal. Keith Fernie has sent along a QSL confirming his reception of their 7-205 transmission from 1530-this depicts a "chopping competition"

Another newcomer, Leighton Smart of Trelewis, Mid. Glam, received Radio Aus-





return

tria Int 12-015 at 1525, Radio Bucharest, Rumania 11-775 at 1520, Radio Polonia, Warsaw 7-285 at 1415 and Radio Sweden Int 9-630 from 1100. This station has an s.w.l. programme called Sweden Calling

DXers on Tuesdays.

All India Radio's programmes 9.910 received by John Sadler of Bishop's Stortford, Herts, were heard at 2230. Other entries in his log included Radio Afghanistan (via USSR) 7-310 at 1900, Radio Kiev, Ukraine 7-175 at 1900 and The Voice of Israel 9-435 at 2230. Bert Trickey also enjoys All India Radio programmes but listens to them on 11.620 at the earlier time of 1940. Both he and Bill Stewart tune in to the Voice of Vietnam 10-040 at 1825 and 2030, which at 2045 broadcasts answers to listeners' letters, according to Margaret Sadler. Her log mentions World News from Radio RSA, Johannesburg 11-900 at 2100 and a programme called The Land of Music from RHC Havana, Cuba 7-150 (via USSR) at 2223. At 2230, Margaret enjoys a religious programme from WYFR Oakland, California, USA, on 9.852.

Alan Merritt of Abingdon, using his new Vega receiver, has also listened to WYFR for the first time on 9-535 at 2115. Another new one for Alan was The Voice of Turkey 7-215 at 2140.

Philip Rambaut concentrated on the 7MHz band and sent along an extensive log which included TWR Monte Carlo 7-160 at 0755, Radio Austria Int 7-170 at 0900, All India Radio 7-412 at 1440 and Radio Beijing 7-055 at 1745—this station continues to operate in an international amateur hand

The 5MHz (60m), 4MHz (75m), 3MHz (90m) and 2MHz (120m) Bands: There is plenty of interest for the keen DXer on these bands. "Old Timer" Harold Buggins of Witney heard RRI Sibolga, Indonesia 5-257 at 1600. Fred Pallant G3RNM of Storrington listened to Ghana 4-915, Chad 4-904, Cameroon 4-795 and Nigeria 4-770 on a "vintage" Dynatron B129 receiver between 200 and 2100.

Margaret Sadler logged Radio Uganda 5.027 at 2050, Ecos del Torbes, Venezuela 4.980 at 0220 and SWABC Namibia 3.270 at 2300. Philip Rambaut heard

# Reports by the 13th Please

Madagascar 3-288 at 1740 and Michael Sargeant received AIR Delhi 3-905 at 2250. Gabon 4-810 at 2130 featured in Bill Stewart's log and others.

Sounds of a tribal dance were heard by Bill Kelly from Radio Cameroon 5-010 at 0240. Later, Radio RSA 3-230 at 0400 and Albanian Radio 5-020 at 0450 were received.

Xinjiang, China 4-220 & 5-060 and Radio Moscow 4.045 & 4.060 were logged by Edward Stone. Martyn Whyte heard Mozambique 4.855 at 1730, The Voice of Kenya 4-885 at 1855 and John Parry's log included ZBC Zimbabwe 3-396 at 1925.

Graham Powell listened to Radio Atlantida, Peru 4-790 at 2315, Radio Rumbos, Venezuela at 0215 and Radio Brasil Central at 0541.

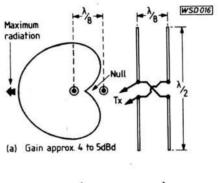
Using a DX400 receiver, Tim Shirley of Bristol included in his logs SABC South Africa 4835, Radio Nacional Manus, Brazil 4-845 at 0154, Havana, Cuba (via Moscow?) 4.765 at 0240 and Paramaribo Suriname 5.005 at 0222.

Please note: Many broadcasters will have changed their frequencies in November to account for seasonal changes in Ionospheric conditions.

shown in Fig. 1.4 (b) has the transmission line connected at the junction of the phasing line at mid-point. The impedance at the point of feed will however, be about 6000 ohms. Such a system could be matched to a low impedance transmission line via a  $\lambda/4$ stub. Otherwise open line wire transmission line (600 ohms) from transmitter to antenna can be used and the requisite low s.w.r. obtained by tuning the transmission line.

# **Endfire Systems**

There are various methods of feeding an endfire array with  $\lambda/2$  elements and two are shown in Fig. 2.1. In (a) a section of the phasing line is transposed above the feed point to ensure that the element currents are correctly phased. The method shown in (b) is suitable for close spaced arrays i.e., \(\lambda/8\) as each half of the connecting lines are only  $\lambda/16$  in length and carry very little current. With \(\lambda/4\) spacing, the radiation resistance increases and the array can be fed via a tuned 600 ohm transmission line, although the array itself becomes sharply tuned. An alter-



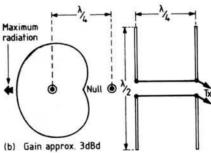


Fig. 2.6: Uni-directional endfire arrays, (a)  $\lambda/8$  spacing, 135° current phasing, (b)  $\lambda/4$  and 90° phasing

native is to use folded elements (folded dipoles) in order to obtain an increase in feed impedance. Twin 600 ohm transmission lines can be used but impedance transformation via a balun will be necessary to match to a 50 ohm transmitter output.

Since parts 1 and 2 of this series of articles have been intended solely for explanation of the basic function of endfire and broadside arrays, it has not been possible to include full details of the numerous methods of matching and types of transmission lines that could be used. The reader is therefore, respectfully referred to the references given. However, following articles will contain practical details of broadside and endfire systems together with methods of matching to the now commonly used 50 ohm coaxial transmission cable.

# References

1: Out of Thin Air IPC Magazines. (A Practical Wireless publication.) 2: ARRL Antenna Handbook ARRL. Transmission line section chapter 3.

# ▶ Wigtownshire

Wigtownshire ARC: Gerry Maxwell GM4BAE (Stranraer 2876). Meets Thursdays, 7.30pm in the Stranraer CC, Lewis Street, Stranraer.

# Wiltshire

Blackmore Vale ARS: M. R. Bailey, 11 Brines Orchard, Templecombe. Meets 2nd and 4th Tuesdays in The Bell and Crown Inn, Zeals. Dec 10-Xmas Entertainment.

Devizes & District ARC: Peter Greed G3MQD, 18 Nursteed Park, Devizes. Meets Fridays, 8pm in the Devizes Town FC, Devizes.

Trowbridge & District ARS: Gerry Callaghan G4SPE (Trowbridge 4532). Meets 4th Tuesdays, 8pm in the Southwick Village Hall, Nr Trowbridge.

# Yorkshire

Denby Dale & District ARS: G. Edinburgh G3SDY (Huddersfield 602905). Meets 2nd Wednesdays, 8pm in the Pie Hall, Denby Dale. Dec 11—Xmas Party; Jan 8—AGM.

Maltby ARS: Ian Abel G3ZHI (Rotherham 814911). Meets Fridays, 7pm in the Church Buildings, Church Lane, Maltby. Dec

Cover Date	Deadline	For events from early
March 86	Dec 15	February 86
April	Jan 15	March
May	Feb 12	April

6-Computer Night; 13th-Xmas Junk Sale; 20th-Social.

Pontefract & District ARS: Colin Mills (Pontefract 43101). Meets Thursdays, 8pm at the Carlton CC, top floor, Pontefract. Dec 19—Xmas Party; Jan 2—AGM.

Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield. Dec 19-Xmas Gathering.

Todmorden & District ARS: J. Gamble G6MDB (Todmorden 2494). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden.

Wakefield & District RS: Walter Parkin G8PBE (Wakefield 379727). Meets alternate Tuesdays, 8pm in the Ossett CC, Prospect Road, Ossett. Dec 10-Xmas Social.

Practical Wireless, January 1986



TRIO		ICOM		BNOS	
TS940 HF tcvr.	£1694.00	ICV751 HF tcvr.	£1299.00	25Amp P.S.U.	£148.00
AT940 Int ATU	£194.00	IC745 HF tcvr.	£899.00	40Amp P.S.U.	£296.00
TS430S HF solid state	£719.00	IC735 HF tcvr.	£839.00	2M 3/50 no pre-amp	£108.00
PS430 PSU	£137.00	PS35 PSU	£174.00	2M 10/50W no pre-an	
AT250 Auto ATU	£285.00	PS15 PSU	£145.00	2M 1/100W	£181.00
AT230 ATU	£157.00	[A.T. 12.13.13]		2M 3/100	£181.00
TS830S HF tcvr.	£799.00	PS55 PSU	£168.00	2M 10/100	£157.00
TS530S 130S HF tcvr.	£698.00	SM6	£40.25	2M 25/160	£217.00
TS130S Solid state	£629.00	ICR71 Receiver	£699.00		
TL922 2kw linear	£1149.00	IC271E 2m base	£729.00	70cm 3/50 70cm 10/50	£235.00 £195.00
MICS - All stocked		IC471E 70cm base	£829.00	70cm 10/100	£335.00
TS780 Dual band	£948.00	Higher power units		/0Cm 10/100	1.335.00
TR9130 2m all-mode	£498.00			TONNA	
TH21E 2m H'held	£169.90	IC290D All-mode	£479.00	TONINA	
TH41E 70cm H'held	£199.00	IC27E 2m FM	£379.00	6M 5 EL	£34.30
TR2600 2m H'held	£275.00	IC47E 70cm FM	£469.00	2M 9 EL	£17.70
TM201A Mini-mobile	£265.00	IC2E 2m	£199.00	2M 9 EL Portable	£20.00
TM401A 70cm version TM211E	£315.00 £365.00	ICO2E 2m	£265.00	2M 5 EL Crossed	£26.30
TS711E 2m base	£695.00	ICO4E 70cm	£275.00	2M 9 EL Crossed	£32.00
R600 Receiver	£299.00	BP3 Ni-cad pack	£27.00	2M 13 EL Portable	£31.00
R2000 Receiver	£479.00	LC3 Case	£5.50	2M 17 EL	£37.60
VC10 VHF module	£128.00	LC11 Case	£6.80	70cm 19 EL	£20.70

# NOBODY BEATS OUR MAIL ORDER SERVICE

All goods despatched by return. 24 hour Securicor £6. Carriage: Transceivers, receivers, etc, Securicor £6, smaller items £2. Aerials at cost. If in doubt phone for quote. Any excess refunded.

YAESU	
FRG8800 Receiver	£475.00
FRG9600 Scanner	£499.00
PA4C PSU	£12.65
FRT7700 ATU	£49.50
FRV8800 VHF module	£80.00
FT203/FNB3 2m	£195.00
FT209R/FNB3 2m	£239.00
FT270R 2m mobile	£315.00
FT290R All mode	£299.00
FT2700R Dual band	£499.00
FT709/FNB3 70cm	£265.00
FT726R 2m base	£775.00
FTV70CM 70cm modu	le £275.00
SAT726	£95.00
FT757GX HF tcvr.	£729.00
FC757AT Auto ATU	£255.00
FP757GX Switch mod	e £159.00
FT980 HF tcvr.	£1449.00
FP757HD PSU	£175.00
FF501DX L.P.F.	£29.90
FL2100Z 1KW linear	£699.00
YH55 H'phones	£15.25
NC11C Charger	£9.95
YM49 Speaker mic.	£19.95
YHA15 290 helical	£7.65
QTR24D Clock	£33.00

WELZ	
SP200 VSWR HF/VHF	Đ
SP400 VSWR VHF/UH	F £
SP10X Budget HF/VH	F £3
SP220 PEP HF/VHF	£
SP225 Dual meter	£
SP420 PEP VHF/UHF	£
SP425 Dual meter	£
AC38 ATU 10-80m	£
CH20A Coax switch	£
RS485 4 amp PSU	£4
RS655 6 amp PSU	£7
RS1150 11 amp PSU	£11
RS3050 25 amp PSU	£16
DIAMOND	

Thousand a mink i do	
RS1150 11 amp PSU	£119.00
RS3050 25 amp PSU	£169.00
DIAMOND	
CP4 4 band vert.	£119.00
CP5 5 band vert.	£149.00
EL40 40m whip	£44.00
EL80 80m whip	£49.00
M285 5/8th	£11.50
M287 7/8th	£19.95
GLS Gutter mount	£12.45
TRM boot mount	£18.95
RH200B 3db 2m BNC	£24.95
EL770 Dual band	£24.00

£89.00
£89.00
£34.00
£59.00
£99.00
£69.00
£99.00
£85.00
£22.95
£47.00
£79.00
£119.00
£169.00
£119.00
£149.00
£44.00

30		
)	CP4 4 band vert.	
)	CP5 5 band vert.	
,	EL40 40m whip	
)	EL80 80m whip	
,	M285 5/8th	
,	M287 7/8th	
,	GLS Gutter mount	
;	TRM boot mount	
,	RH200B 3db 2m BNC	
)	EL770 Dual band	
	OPDED 9.	

FDK	
M750XX 2m all-mode	£389.00
M725X 2m FM	£269.00
ATC720 Airband Rx	£189.00
RX40 140-180MHz	£159.00
ADONIS	

ADOMS	
MM202S Mobile mic.	£32.00
AM303G Base mic.	£39.95
AM503G Base mic.	£52.95
AP1 Amp for ICOM	£12.95
FX1 Goose neck mobile	£48.00
MISC	

£119.00	MISC.	
£169.00	Rubbere mag mount	£14.95
	AT1000 SWL ATU	£52.95
	HP4A High pass filter	£6.95
£119.00	HK708 Morse key	£16.95
	BL40X 1:1 HF Balun	£15.70
E149.00	Ferrite rings	€0.60
£44.00	DRAE VHF/UHF W'met	er <b>£27.95</b>
£49.00	Datong Morse Tutor	£56.35
£11.50	Mutek Pre-amps	£39.95
£19.95	Revcone Discone (RX)	£27.50
£12.45	CDE AR40 Rotator	£115.00
C0000000000000000000000000000000000000	KR400 Rotator	£132.50
£18.95	KC038 Mast clamps	£12.95
£24.95	KS065 Bearing	£23.50
£24.00	KR500 Elevator	£135.00



# SCANNER OPERATORS' GUIDE TO THE VHF/UHF SPECTRUM



If you're one of the many new owners of a scanning receiver and are not sure where to listen then this is for you. Only just published and coverning the range 27 to 1300mHz it provides details of frequencies that the various services operate on. Fascinating reading for the student of the radio spectrum it will put you at a tremendous advantage to those who just 'fumble about in the dark'. At this price can you afford not to have a copy beside you.

£3.95 + 40p P&P £3.95 + 40p P&P



# VHF/UHF AIRBAND FREQUENCY LIST

This unique frequency manual has just been updated and contains 50% more information. No other publication at anywhere near this price contains so much information about Military and Civil frequencies. Nearly 2000 copies of the original were sold in 3 months and much of the information has come from listeners with a wealth of experience. If you are interested in VHF/UHF air communications whether it be RAF, USAF, NAVAL, MOD, CIVIL or even the RED ARROWS channel, you must have a copy of this. We have a limited print run of this so get your order in today.

£3.95 + 50p P&P

# HF OCEANIC AIRBAND SUPPLEMENT

Yet another super little publication that has put together a host of information concerned with HF air communications. If you thought that air communications was restricted to the VHF bands then you're wrong! The short wave spectrum is crowded with air communications if you know where to listen! And that's just what this publication tells you. Hear Concorde crossing the Atlantic, the world's airliners talking back to base, the search and rescue helicopters at work etc etc. It's all there at a very reasonable price plus information on general air communications on the HF bands.

£1.95 + 30p P&P

# UK CONFIDENTIAL FREQUENCY LIST

The first print run sold out in just 4 weeks! Covering 4-30 MHz this publication is a must for all UK short wave listeners. It contains information that no serious listener should be without. Listed are details not normally available to the public of frequencies used by a wide range of services. As well as some general information the main body of the publication contains a comprehensive list of non-broadcast stations such as Military, Air, Navy, Marine, Embassy, even details of stations whose whereabouts are still a mystery! In addition there is a comprehensive list of broadcast stations with times and frequencies of all the broadcasts in English. This publication will certainly have you burning the midnight oil. Only a fraction of the price of some overseas publications and written with the UK listener in mind.

£4.95 + 50p P&P £4.95 + 50p P&P

# VHF AIRBAND MONITOR

The R537S is a purpose designed airband receiver covering the entire VHF aircraft allocation. This latest model is now fitted with a squelch control which gives noise free monitoring and longer battery life. The receiver is fully tuneable between 118-136mHz and has the option of being fitted with two xtal controlled priority channels. The built-in speaker provides clear reception and the telescopic whip can be replaced with an external aerial. As supplied to many private pilots and advertised by us in the professional journals. At our super price they are tremendous value.

**R537S** £55! P&P

£1.50





MAIL ORDER

MAIN SHOWROOM: 18-20 MAIN ROAD, HOCKLEY, ESSEX. Tel: Southend (0702) 206835 & 204965

12 NORTH STREET, HORNCHURCH, ESSEX. Tel: Hornchurch (04024) 44765 HOURS: MON - SAT 9.00 am - 5.30 pm.

E.C. WED 1.00 pm Goods by return



# CEPTRON 'PHONEPATCH'



The Ceptron Duplex Autopatch allows radio users to have a full telephone interconnect facility. Telephone calls can be made to or from a mobile transceiver

with the aid of this tiny board. Installation is extremely simple: two wires go to the telephone lines, two go to a regulated 12V power supply, one goes to the TX audio (mic input), one to the RX audio (speaker) and one to the PTT.

The Autopatch is also simple to use. An incoming call keys the base station transmitter which then sends a tone to the mobile. The call can then be answered normally. To make a call from the mobile, a DTMF microphone is needed to control the Autopatch – no other modifications are necessary. are necessary.

Prices start at £295 for the uncased model but for more information on the Ceptron Duplex Autopatch (and our full range of products), please contact:

CEPCO COMMUNICATIONS LTD. 176, Copenhagen Street, London N1 0ST. Tel: 01-278 3627/29 Telex: 894 686 (Cepco G) (Please Note: The Ceptron Autopatch is not licensable for use by amateurs in the U.K. Export orders welcomed.)

# BIRKETT

**RADIO COMPONENT SUPPLIERS** 



25 The Strait Lincoln, Tel. 20767 (LN2 1JF) Partners (J.H.Birkett. (J.L.Birkett.

FURTHER SUPPLY OF US NAVY DC30 CRYSTALS 7010, 7930, KHz. All @ 60p each.
STORNO HAND HELD TRANSCEIVERS Present Freq. 146 to 161 MHz. But NO Batteries, Mike, Crystals,
Aeral, with wome details @ 52,35 + (90) P8P) = £4.85 each.
1000p1 1.2KVW DISC CERAMIC @ 59 each.
1000p1 1.2KVW DISC CERAMIC @ 59 each.
144 MHz WAVEMETER KIT With Instructions. As in P.W. Oct. '83 @ £4,60.
WIRE ENDED CRYSTALS 28KHz, 28.5KHz @ 50p ea. 5MHz, 10MHz @£1.
FILM TRIMMERS 1001, 2201, 3501, 6-p1, @ 15p ea. 125p1 @ 20p.
LED 6 VOLT BULBS @ 50 for £1.15.
NUT FIXING FEED THRUS 3000 Volt insulation @ 6 for 50p.
TELEPHONE DIALER CHIP With Circuit @ 85p.
DISC CERAMICS 01014, 50v. ... @ 20p doz, 0, 101 50v.w., 0 22ul, 12v.w. 0.47ul 12v.w. All @ 50p each.
RF POWER TRANSISTORS BLYSS @ £2.50, BLY97 @ £3, BLY90 @ £7.50, BLW60R @ £7.50, BRF64 @ £4, BLYS3a @ £6.95.

28, BLYSSA @ 88.95.

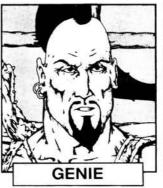
SOLDER-IN FEED THRUS 5pl. 27pl. 300pl. 1000pl. All @ 20p each.
FERRITE BEADS FX1115 @ 15p doz, ½ Long Type @ 6 for 10p.

ELECTROLYTICS 22uf 450v.w., @ 35p, 32uf 500v.w. @ 50p, 16uf 350v.w., @ 35p, 16+16uf 450v.w., @

ELECTROLYTICS 22rd 450v.w. (iii 35p, 32rd 500v.w., iii 35p, 16rd 350v.w., iii 35p, 16+16rd 450v.w., iii 45p, 32+32d 350v.w., iii 35p, 45p, 26+23d 350v.w. iii 35p, 16+16rd 450v.w., iii 45p, 32rd 350v.w., iii 35p, 16+16rd 450v.w., iii 35p, 32rd 35p









# DARE YOU BRAVE THE PERILS OF SHINDERG'S TOMB?



MAIL ORDER CO. angrex Supplies Ltd., Langrex Supplies Climax House, 159 Fallsbrook Road, Streatham, SW16 6ED.

# SPECIAL EXPRESS MAIL ORDER SERVICE

AZ31	£p 2.75	EM81	2.50	PL509	6.00	6AK5	5.99	6K8	3.00
		EM87	2.50	PL519	6.00	6AL5	1.50	6KD6	7.00
CL33	4.00	EN91	6.50	PL802	6.00	6AM6	6.02	6L6G	3.00
DY86/7	1.50	EY51	2.75	PY33	2.50	6AN5	4.75	6L6GC	5.75
DY802	1.50	EY86	1.75	PY81	1.50	6AN8A		6L7	2.50
E88CC	10.33	EY88	1.75	PY82			3,50	6LQ6	7.50
E180F	12.05	EY500A			1.50	6AQ5	3.25	6Q7	3.75
E810F	35.48		3.00	PY83	1.25	6AR5	25.00	6RHHB/6K	NR.
EABC80	1.25	EZ80	1.50	PY88	2.00	6AS6	8.66		10.00
EB91	1.50	EZ81	1.50	PY500A	4.00	6AS7G	8.75	6SA7	3.00
EBF80	1.50	GY501	300	PY800	1.50	6AT6	1.25	6SC7	2.75
EBF89	1.50	GZ32	4.00	PY801	1.50	6AU5GT	5.00	6SJ7	3.25
EC91	8.00	GZ33	4.75	QQV02-6	34.00	6AU6	2.50	6SK7	3.50
ECC33	4.50	GZ34	4.00	QQV03-10		6AW8A	3.75	6SL7GT	3.00
ECC35	4.50	GZ37	4.75	QQV03-20		6B7	3.25	6SN7GT	3.00
ECC81	1.75	KT61	5.00		48.38	6B8	3.25	6SS7	2.75
ECC82	1.75	KT66		QQV06-40		6BA6	1.50	6SG7M	2.50
ECC83	1.75		15.00	2000	46.00	6BA7	5.00	6U8A	2.25
ECC85	1.75	KT77 GOI		QV03-12	6.80	6BE6	1.50	6V6GT	4.25
ECC88	3.50	KT88 LIO	N 20.00	R18	3.00	6BH6	2.50	6X4	3.00
ECC91	8.93	N78	15.00	R19	9.24	6BJ6	2.25	6X5GT	1.75
ECF80	1.50	OA2	3.25	SP41	6.00	6BN6	2.00	12AX7	1.75
ECH35	3.00	OB2	4.35	SP61	4.00	6BQ7A	3.50	12BA6	2.50
ECH42	3.50	OC3	2.50	U19	13.75	6BR7	6.00	12BE6	2.50
ECH81	3.00	OD3		U25	2.50	6BR8A	3.50	12BY7A	3.00
ECL80	1.50		2.50	U26	2.50	6BS7	6.00	12E1	20.00
ECL82	1.50	PC86	2.50	U37	12.00	6BW6	6.00	12HG7	4.50
ECL83	3.00	PC88	2.50	UABC80	1.25	68W7	1.50	30FL1/2	1.38
ECL86	1.75	PC92	1.75	UBF89	1.50	6BZ6	2.75	30P4	2.50
EF37A	5.00	PC97	1.75	UCH42	2.50	6C4	1.25	30P19	2.50
EF39	2.75	PC900	1.75	UCH81	2.50	6C6	3.50	30PL13	1.80
EF41	3.50	PCF80	2.00	UCL82	1.75	6CB6A	2.50	30PL14	1.80
EF42	4.50	PCF82	1.50	UCL83	2.75	6CD6GA	5.00	572B	55.00
EF50	2.50	PCF86	2.50	UF89	2.00	6CL6	3.75	805	45.00
EF54	5.00	PCF801	2.50	UL41	5.00	6CH6	13.00	807	3.75
EF55	3.50	PCF802	2.50	UL84	1.75	6CW4	8.00	811A	18.33
EF80	1.75	PCF805	1.70	UY41	2.25	6D6	3.50	812A	35.00
EF86	3.50	PCF808	1.70	UY85	2.25	6DQ5	6.00	813	65.00
EF91	2.95	PCH200	3.00	VR105/30	2.50	6DQ6B	4.75	866A	35.00
EF92	6.37	PCL82	2.00	VR150/30	2.50	6EA8	3.00	872A	20.00
EF183	2.00	PCL83	3.00	Z759	25.00	6EH5	1.85	931A	18.50
EF184	2.00	PCL84	2.00	Z803U	25.00	6F6	3.00	2050	7.50
EH90	1.75	PCL85	2.50	2D21	3.25	6Gk6	2.75	5763	4.50
EL32	2.50	PCL86	2.50	3B28	50.00	6H6	3.00	5814A	4.00
EL33	4.00	PCL805	2.50	4CX250B	58.00	6HS6	3.77	5842	12.00
EL34	4.00	PD500	6.00	5R4GY	5.50	6.15	4.50	6080	14.00
EL36	2.50	PFL200	2.50	5U4G	3.00	6.16	8.93	6146A	12.00
ELL80	19.00	PL36	2.50	5V4G	2.50	6.17	4.75	6146B	12.00
EL81	5.25	PL81	1.75	5Y3GT	2.50	6JB6A	5.00	6550	8.00
EL84	2.25	PL82	1.50	5Z3	4.00	6JE6C	7.50	6883B	12.50
EL86	2.75	PL83	2.50	5Z4GT	2.50	6JS6C	6.00	6973	4.00
EL91	7.39	PL84	2.00	6/3OL2	1.75	6K4N	2.50	7025	3.00
EL95	2.00	PL504	2.50	6AB7	3.00	6K6GT	2.75	7025 7027A	8.00
EL360	8.50	PL508	5.50	6AH6	5.00	6K7	3.00		
		1.0				1000	0.00	7360	10.00
				Mon-Fri 9 a				7586	15.00
9	Valve	es, Tubes a	nd Trans	istors - Clos	ed Satu	rday		7587	23.00
Terr rices exclu	ns C.W.C Idina			for delivery types not li			Telex	Prices c	
AT add 15				king 50p per			46708	when g	
	CITÉ.	. 551	- Pace	a aab bei				to pr	BSS

COMPACT Spacesaver **ANTENNAS** Our Own Uniqu Design That Works! AQ6 20, 2 Ele and 3 Ele. 4 BAND. 6, 10, 15, 20 M AQ40, 2 Ele. 40 M! NEW

CLOSE COUPLED - HI'Q' - CAPACITY HAT LOADED YAGI

Unique Altron fully sealed coils for max stability

- Resonant length elements for improved VSWR (1:1).
- Selectively detuned for optimum performance and gain. (No gimmick quad. needed), Easy trim spokes with lock nuts and spares. Minimized wind load and weight.
- Double insulated elements.

Typical Performance

ANTENNA MODEL	AQ6-20/2E	AQ6-20/3E	AQ40/2E	
Forward Gain Dbd.	3.8 to 4.8 5.5 to 7.5		3.8	
Front to Back Db.	13 to 15	16 to 18	12	
Side Null Db	25	25	20	
VSWR (Typical)	1-1:1	1-1:1	1-1:1	
Weight	7-5 lb	12 lb	12 lb	
Wind Load	2ft²/0-18M²	3ft <sup>2</sup> /0-27M <sup>2</sup>	3ft <sup>2</sup> /0-27M <sup>2</sup>	
Turning Radius	76"/1930mm	96"/2438mm	114"/2895mm	

PRICE + P&P £114.50 (£4.50) £169.00 (£7.00) £149.50 (£7.00)

Prices are inclusive of VAT Terms C.W.O. Access Visa

WE DESIGN - WE MAKE - WE SELL - DIRECT. You Get Best Value

Open Mon-Fri 9am-Sat. 9am-12.15 pm.



Telephone: 01-680 2995 (24hr) 01-681 6734.

STOCK ITEMS NORMALLY DISPATCHED WITHIN 7 DAYS

# RADIO and RTTY BOOKS

	Each	P&P
Radioteletype Press Broadcasts	11.85 +	0.65
US Military Radio Communications	10.80 +	0.65
World Radio TV Handbook 1985 (Normal price £17.95 + P&P)	16.95 +	FREE
Guide to Utility Stations 1986	16.00 +	1.45
Clandestine Confidential	5.25 +	0.60
RTTY Today	7.85 +	0.60
Shortwave Facsimile Frequency	7.50 +	0.65
Embassy Radio Communications	5.50 +	0.60
Radioteletype Code Manual	8.75 +	0.65
Air & Metro Code Manual	14.50 +	0.70
Satellite Experimenters Handbook	9.75 +	1.55
World Press Services Frequencies	8.75 +	0.65
AERAD	5.00 +	0.65
99 Nights on Medium Wave	3.90 +	0.35
NEW BOOKS		1,3,0,70
Handbook for Radio Operators	9.95 +	0.65
Radio Beacon Handbook	8.85 +	0.35
	12.85 +	
Communications Satellites	12.85 +	1.55
Title or more books of a EPEE		

Two or more books p&p FREE Please allow 14 days for delivery

FREE CATALOGUE OF ALL BOOKS AVAILABLE ON REQUEST INTERBOOKS, PWD6, Stanley, Perth PH1 4QQ. Tel: (0738) 828575

# **GENERAL COVERAGE RECEIVER KIT FCR 130**

Model FCR 130 Receiver kit



- ★ 60: 1 Geared analogue tuning ★ 3 Band switch with spare position
- ★ Tape record socket
- ★ Headphone socket \* Signal Meter
- ★ Internal Speaker + On/Off sw.
- \* A.F. Gain and Tone Control
- ★ C.W. A.M. SSB.

This is a kit designed with the beginner in mind. It uses most types of components that one will come across in radio & electronic construction. All components are of very high quality and engineering standards. If you can use a soldering iron then you can build the kit. It is a very good learning aid and very suitable as a first home-brew receiver. All components are supplied, even down to \(^1\)2 metre of solder. No scratching around in a junk box for that elusive component that usually prevents completion of a project. Its an attempt to encourage a move away from the Black Box concept and to teach the basics of radio. Not a 'complete in an evening' project. Send 17p stamp for details.



# COMMUTECH (Devon) LTD

12 Edgecumbe Way, St. Anns Chapel, Gunnislake, Cornwall PL18 9HJ.

little devil can talk bac

This must be the smallest, 2M, FM mobile available today, measuring only 38mm H × 144mm W × 177mm D. It has all the features that you require included in this microprocessor controlled unit. In addition, if you feel lonely and can't find anybody on the band, just press "speech" and the optional built in speech synthesizer will tell you the frequency you are tuned to. This is a boon to the blind operator or to those that tuck their rigs out of sight.

Brief features: - 25/1 Watt output, green LED readout. scanning (memories and programmable limit band scan), priority scan, programmable duplex splits, 25 and 5 Khz tuning steps, 10 memory channels with lithium back up cell, normal and reverse repeater switch, dual VFO, internal speaker and optional speech synthesizer. Just ask for a leaflet and we'll be glad to send you one.

Thanet Electronics Limited ICOM
Herne Bay, Kent CT6 8LD. Tel: (O227) 363859. Telex: 965179 Thanet G



# Receivers and Components

900 MHZ HANDHELD SCANNER. Regency HX2000A 800-999 MHz 440-512 144-174 118-136. AM/FM all bands 5, 10, 12.5 or 25KHz steps plus 12.5 KHz shift. 20 memories, two flexible antennas, charger 4 nicads, muff, £395. PC 49, 4 Haddington Street, Hove, Sussex. Phone 774381.

DISCOUNT MULTIMETERS, auto range digital £29.95. heavy duty analogue £34.95, folding analogue £19.95, m ture £6.95. Add £1 p&p. Many other bargains. SAE catalogue, 11 Appleriss Kendal, Cumbria. Phone 25728.

GRUNDIG VIDEO 2 × 4 super infra-red remote control unit VIF-KI and tele-pilot TPV355 (plugs straight in). Brand new VIF-KI and tele-pilot TPV355 (plugs straight in). Brand new £12.95, post £2.00. 500 TETRAD cartridges & styli TC11M1 (13MD78/LP). 5kS78/1p £3000, sample 50p. STAN WILLETTS, 37 High Street, West Bromwich, West Midlands, Tel. 021 553 0186.

K.I.A. SALETIME!!! 100 watt Japanese poweramps £7,50p. Stabilised power supplies 12-40 volt £5.90p, 8 Cuncliffe Road,

RADIO CANADA, Peking, Australia, Voice of America. A Vega 206 (6× SW/MW/LW) pulls these and dozens more. £23.95. Year's guarantee. Return despatch. CORRIGAN-RADIOWATCH, Building 109. Prestwick Airport, KA9

CRYSTALS Made to order for any purpose and large stocks of standard frequencies for computers, modems, etc. Amateur CW (QRP) freqs £4.00 and CB conversion crystals at £4.50. PROGRAMMABLE OSCILLATORS (PXO) for baud rates, MPU, and freg markers £12.50.

FILTERS Crystal, monolithic, mechanical and ceramic for all standard IF's. Special 10.695MHz for big improvement to most CB rios at £4.50 each

S.A.E. FOR LISTS. PRICES INCLUDE VAT AND POST

P. R. GOLLEDGE ELECTRONICS G3EDW, Merriott, Somerset, TA16 5NS Tel. 0460 73718

# PRACTICAL WIRELESS KITS

Meon 50mHz Transverter U.H.F. Prescaler All kits complete (less batteries) unless specified, including all comp nents, PCB (or Vero), case & hardware. All components are new/full sp P.W. PROJECT COMPONENTS RAS3 Thermistor £4.95 LM586 12V Relay-Meon (RS type) £2.95 22mHz Crystal-Meon £7.95 180uH Choke-Meon £0.49 Coil Former-Meon per 3 £2.95 Cermet Multitum Pots 34" £0.85

Two tone oscillator excl. mic plug Capacitance Meter DIP Oscillator

Please add 70p postage unless specified. Do not add VAT. Cheque or Postal Order to:

C.P.L. ELECTRONICS

8. Southdean Close, Hemilington, Middlesbrough, Cleveland TS8 9HE.

10. 1062-59115, Kits available for other magazine projects, plus components enc. Write or phone for Free Price List.

Oct. '85 £19.90 Oct. '85 £49.50+£1.50 p&p Sept. '85 £24.95

(All R.S. components available)

# SMALL ADS

The prepaid rate for classified advertisements is 40 pence per word (minimum 12 words), box number 60p extra. Semi-display setting £13.23 per single column centimetre (minimum 2.5 cms). Please add 15% VAT to total. All cheques, postal orders etc., to be made payable to Practical Wireless and crossed "Lloyds Bank Ltd". Treasury notes should always be sent registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, (HH204A) IPC Magazines Limited, King's Reach Tower, Stamford St, London SE1 9LS. (Telephone Mandi, 01-261 5846.)

# NOTICE TO READERS

Whilst prices of goods shown in advertisements are correct at the time of closing for press, readers are advised to check with the advertiser both prices and availability of goods before ordering from non-current issues of the magazine.

JAYCEE ELECTRONICS JOHN GM30P

20 Woodside Way, Glenrothes, Fife KY7 5DF Open: Tues-Sat 9-5

Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam - Microwave Modules - LAR.

COILS AND CHOKES
PREVIOUSLY MADE BY DENCO S.A.E. PRICE LIST 8 BRUNEL UNITS, BRUNEL ROAD, GORSE LANE IND. ESTATE, CLACTON, ESSEX CO15 4LU. TEL: (0255) 424152

# **ELECTRONIC** COMPONENTS

● Full range of Components ● Speakers & Accessories ● Audio Connectors & Switches ● Amplifier Modules & Cases

FREE PRICE LIST AVAILABLE

13A STATION ROAD, CULLERCOATS, NORTH SHIELDS, TYNE & WEAR NE30 4PQ. TEL: 091 251 4363.

PROFESSIONAL POLICE, Fire & Public-Service style pocket-size monitor receiver. 54-176MHz VHS plus 10m Amateur Band (11mCB on request) and VHF Aircraft. Excellent sensitivity, VFO, Squelch provision, Whip antenna etc. Complete with accessories & frequency lists. Only £24.95 post paid. The ideal gift, CWO/COD welcome, D. TAYLOR, (Dept GSE12), 8 Emmerson Street, Crook, Co. Durham, U.K.

### Software

SSTV FOR THE BBC MICRO. Full TX/RX system Rom (£22). New higher resolution sideways Ram version (£18). Full system details, send SAE: G6GCM, 1 Goldsmith Drive, Newport Pagnell, Bucks

"MICROCOM 16" CW/RTTY (TX. and RX) with morse tutor for the Commodore 16. Also available "Microcom +4", "Microcom 64", and "Microcom 128". S.A.E. to: MORAY MICRO COMPUTING, Enzie Slackhead, Buckie Moray AB5 2BR for full details

RTTY FOR 48K SPECTRUM. Menu driven, split screen morse ident, programmable memories, 4 baud rates, etc. NO TERMINAL UNIT, uses simple filter unit. Cassette and instructions including filter circuit etc. £8.50. Filter built and tested £6.00. RTTY/CW filter fully tested and boxed, £11.50. same with tuning LED, £13.50. S.A.E. for full detail to address below. MORSE READER PROGRAMMES. Off air onto screen. Programmes for SPECTRUM, ZX81-16K, BBC B, AMSTRAD 464, ATARI 600/800XL, DRAGON, COMMODORE 64 & any Vic 20. Sinclair machines need no interface, others use simple one transistor interface. Self tracking 8/30 WPM. All connections to existing sockets. Cassette with instructions including interface circuit £6.00. Ready-built interface £2.50. J.E.P. ELECTRONICS, NEW ROAD COMPLEX, KIDDERMINSTER, DY10 3XL. PHONE (0562) 753893.

### For Sale

SONY-WORLD-ZONE CRF/230 radio, realistic DX302 as new; Amstrad 6010 £35; Taylor 68A signal generator £55, KW204-160M-10M. Transmitter £160 etc. SAE all enquiries: manuals galore. State requirements. NORMAN G3EKX, SSB PRODUCTS, 42 Halvarras Road, Playing Place, Truro. (0872) 862575

# Aerials

AERIALS, TRAPS, KITS, BALUNS. Data sheets 24p. SAE Aerial Guide £1. 03986-215. G2DYM, Uplowman, Devon

Auctions

# **AUCTION NOTICE ELECTRONICS**

AUCTIONS HELD EVERY OTHER FRIDAY - LOTS INCLUDE: Electronic and Electrical Equipment, Components, Test Gear, Radiotelephones, Computers, Photographic and Video Equipment, also Manufacturers Plant and General Works Effect.

CATALOGUES AVAILABLE, SUBSCRIPTION £10 PER YEAR, POST PAID.

ANGLIA INDUSTRIAL AUCTIONS 5 Station Road, Littleport, Cambs. CB6 1QE. Phone: 0353 860185.

e/P.O. for £rs should be crossed	 CAT. he	
_		

Company registered in England. Registered No. 53626. Registered Office: King's Reach Tower, Stamford Street, London SE1 9LS.

Box No. 60p extra.
PLEASE ADD 15% VAT TO TOTAL

## Service Sheets

SERVICE SHEETS for valve radios etc. From 70p. 5 Holcombe Avenue, Bury BL8 2RN. Tel. 061-797-5653 anytime.

BELL'S TELEVISION SERVICES for service sheets on Radio, TV, etc. £1.50 plus SAE. Service Manuals on Colour TV and Video Recorders, prices on request. SAE with enquiries to B.T.S., 190 Kings Road, Harrogate, N. Yorkshire. Tel. (0423) 55885.

# **TECHNICAL INFO SERVICES** 76 Church St - Larkhall - Lanarks

FULL SIZE SERVICE SHEETS Any radio, audio £2.50 + l.s.a.e. CTVs/MusC £3.50 + l.s.a.e. complete set

Worlds largest collection service manuals 30's - date from £4.50-£35 each.

Comprehensive T.V. Repair Course Complete Radio Service & Repair Course ONLY £9.50 EACH

Unique comprehensive repair data & circuits for almost every TV & video in stock.

S.a.e. brings any quotation FREE 50p mag. inc. service sheet! Pricelists unique elect. publications

FOR FAST QUOTES RING 0698 884585 before 5pm 0698 883334 after 4pm

### Educational

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc.,) write or phone: THE RAPID RESULTS COLLEGE, Dept JX15, Tuition House, London, SW19 4DS. Tel. 01-947 7272 (9am-5pm) or use our 24hr Recordacall Service: 01-946 1102 quoting Dept JX15

# Miscellaneous

BURGLAR ALARM EQUIPMENT. Ring Bradford (0274) 308920 for our catalogue or call at our large showroom opposite Odsal Stadium.

WAVEGUIDE, FLANGES & DISHES, All standard sizes & alloys (new material only) from stock. Special sizes to order. Call: EARTH STATION 01-228 7876, 22 Howie Street, London SW11 4AR.

QSL CARDS for the discerning ham. Sae for samples. RMB Electronics, The Wharf House, Dadlington, Nr. Nuneaton, Warwicks CV13 6JD.

OSL CARDS. Gloss or tinted cards. SAE for samples to: TWROG PRESS, Dept PW, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd.

TELEVISION PROJECTORS. Converts T.V. into 7 ft screen. Professional system £25. Details: 10 Farm Road, Rylands, 7764, South Africa.

SUPERB INSTRUMENT CASES by BAZELLI, manufactured from PVC, Faced steel. Vast range. Competitive prices start at a low £1.50. Punching facilities at very competitive prices. Suppliers only to Industry and the Trade. BAZELLI, (Dept No. 25), St. Wilfrid's, Foundary Lane, Halton, Lancas ter LA2 6LT.

	HE SCIENT			
	st Road, Lond			31 1568
	ENAMELL			
SWG	1lb	8 oz	4 oz	2 oz
8 to 34	3.63	2.09	1.10	0.88
35 to 39	3.82	2.31	1.27	0.93
40 to 43	6.00	3.20	2.25	1.61
44 to 47	8.67	5.80	3.49	2.75
48	15.96	9.58	6.38	3.69
SI	LVER PLA	TED COP	PER WIRE	
14 to 30	9.09	5.20	2.93	1.97
	TINNED	COPPER	WIRE	
14 to 30	3.97	2.41	1.39	0.94
Fluxcore				
Solder	5.90	3.25	1.82	0.94
Prices incl	ude P&P V	AT. Orders	under £2	add 20p.
SAE f	or list of co	pper and r	esistance	wire.
		nquiries we		

INDEX TO ADVERT	ISERS
Aerial Techniques	
A.H. Supplies	
Albol Ltd.	14
Allweld Engineering Amcomm Services Ltd.	
Anglian Industrial Auctions	70
Apollo Aerials	71
A.R.E. Communications Ltd. Armon Electronics	10,11
Birkett, J.	
Blackstar	67
B.N.O.S. Electronics	9
Bredhurst Electronics	
Cambridge Kits	
Cepco Comms. Colomor Electronics	
Commutech (Devon) Ltd.	69
C.P.L. Electronics	70
Cricklewood Electronics	
Datong Electronics Dewsbury Electronics	
Dressler (U.K.) Ltd.	15
Electrovalue	11
E.S.R. Electrical Components	70
Garex Electronics	
G4TNY Amateur Radio Golledge Electronics	
Greenwood Electronics	
I.C.S. Intertext	
Interbooks	69
Jaycee Electronics	
Lowe Electronics	
Maplin Supplies Ltd. Maxi Q	Cover IV
Microwave Modules	
Moray Micro	
Photo Acoustics	53
Radio Component Specialists Radio Shack Ltd.	65
Randam Electronics	65
Rapid Results College R.S.T. Valve	11
R.S.T. Valve	69
Scientific Wire Co. S.E.M.	71
Sitec	14
South Midlands Communications	485 12
Spectrum Communications Standard Communications (U.K.) Ltd.	13
Stephens James Ltd.	Cover III
Tandy	47
Technical Info. Services	71
Technical Software	6
Telecomms Thanet Electronics	36 37 69
Universal Semiconductor Devices	30, 37, 69
Ward, Reg & Co. Waters & Stanton	67
Withers, R. Communications Wood & Douglas	
W.P.O. Communications	12

# **APOLLO**

# BRITISH MADE AERIALS OF OUALITY

In response to many requests received during our visits to the Mobile Rallies, our aerials are now available direct by Mail Order.

Take advantage of these introductory price offers

Price	Mainland P&P
£8.50 +	£1.95
£14.50 +	£2.50
£16.00 +	£2.50
£27.50 +	£3.50
£5.50 +	£1.95
	£8.50 + £14.50 + £16.00 + £27.50 +

The design and construction of these aerials ensure first class performance at a realistic price. The results speak for themselves – ask around – or just listen. S.a.e. for current lists. Callers by telephone appointment please. Allow 7 days delivery.

APOLLO AERIALS (BLACKPOOL) 161 SAINT WALBURGAS ROAD

# ELECTRONICS LTD

It's no secret!

that there is a real different fewood Electronics. That's wh should never be without the CRICKLEWOOD ELECTRONICS the FREE PONENTS CATALOGUE for sheer variety competitive prices and service from the U.K.'s number one 100% component shop. No gimmicks, no gadgets or computers, just components, millions of them, all easily available by mail order, calling or credit card telephone orders. Just pick up the phone (or a pen) to get your FREE copy now (no SAE required). You have nothing to lose.

CRICKLEWOOD ELECTRONICS LTD. 01-450 0995 & 01-452 0161

ALL MAJOR CREDIT CARDS ACCEPTED

BLACKPOOL FY3 7EY Tel. 0253 31040



# **USED AMATEUR EQUIPMENT?** I Buy, Sell & Exchange!

SELLING? I pay the BEST POSSIBLE PRICES for your Clean Used Equipment!

BUYING? I have the BEST SELECTION of top Quality Used Equipment Available!

For the Deal You've been Looking for, Phone Dave, G4TNY

ANYTIME ON HORNCHURCH (04024) 57722 or Send SAE

# **G4TNY AMATEUR RADIO**

132 Albany Road, Hornchurch, Essex RM12 4AQ

# PRACTICAL WIRELESS PCB's SERVICE

1.5mm GLASS FIBRE HIGH QUALITY BOARDS USING P.W. MASTERS

WASTER			
JULY 83	MARCHWOOD POWER SUPPLY	WR161	£3.55
OCT 83	P.W. DART	WR176/177/178	£3.65(each)
MARCH 84	P.W. BRIDPORT	WR182	£2.55
NOV 84	P.W. TEME	WR196	£4.80
JUNE 85	P.W. COLNE	WR197	£3.50
MAY 85	P.W. COLNE	WR198	£5.10
JUNE 85	BATTERY CHARGER CONTROLLER	WAD302	£2.50
JULY 85	LOW COST X-TAL TESTER	WR200	£2.50
<b>AUG 85</b>	ADD ON B.F.O.	WR201	£2.50
SEPT 85	UHF PRESCALER	WR202	£5.00
OCT 85	SIMPLE CAPACITANCE METER	WR203	£3.50
ALSO A FUL	L RANGE OF R.S. COMPONENTS AVA	AILABLE	

IDGEMOND PARK, TELFORD AVENUE, STEVENAGE, IERTS SG2 0AX TEL 0438 312566

# YOUR LOCAL DEALERS

# LONDON

# **AMCOMM**

Approved dealer for Yaesu and Icom

194 Northolt Road, South Harrow, Middx HA2 0EN Tel: 01-422 9585

(Mail order a speciality)

# LONDON

# Dressler (UK) Ltd.

A large selection always in stock – all makes

191 Francis Road, Leyton, LONDON, E10 Tel: 01-558 0854

(Mon-Sat 9am-5.30pm)

# LONDON

# Henry's

Test instruments, components and accessories. Catalogue -S.A.E. (A4) + 34p (UK)

404 Edgware Road, London W2 1ED Tel: 01-724 0323

(Open 6 days a week)

# Selectronic

The UK's leading suppliers of 934MHz personal radio equipment

203 High Street, Canvey Island, Essex Tel: 0268 691481

(Open Mon-Sat 9-5:30) Amateur radio equipment also in stock

### HERNE BAY

# Thanet Electronics

The Official Icom importer

95 Mortimer Street, Herne Bay, Kent Tel: 0323 369464

(Open Mon-Sat 9-5.30, except Thurs 9-1)

# SOUTHAMPTON

# **South Midlands** Communications

Official Yaesu Importer

S.M. House, Rumbridge Street, Totton, Southampton SO4 4DP Tel: 0703 867333

### PORTSMOUTH

# **Telecomms**

Importers of the Nevada range of 934MHz equipment

189, London Road. North End, Portsmouth, Hants, PO2 9AE Tel: 0705 662145

### DEVON

# Reg. Ward & Co. Ltd.

The South-West's largest amateur radio stockist. Approved dealer for Trio, Yaesu and Icom

1 Western Parade, West Street, Axminster, Devon, EX13 5NY Tel: 0297 34918

(Closed 1:00-2:00 and all day Monday)

# BUCKINGHAMSHIRE

# Photo-Acoustics Ltd.

Approved Trio, Yaesu and Icom dealer (part exchange always welcome)

58 High Street, Newport Pagnell, Buckinghamshire MK16 8AQ Tel: 0908 610625

(Mon-Fri 9:30-5:30, Sat 9:30-4:30)

# WEST MIDLANDS

# **Dewsbury Electronics**

Approved Trio, Yaesu and Icom dealer

> 176 Lower High Street, Stourbridge, West Midlands Tel: 0384 390063

(Open Mon-Sat 9.30-5.15)

# MERSEYSIDE

# A.R.E. Communications

For all your amateur radio needs - most models in stock

38 Bridge St., Earlestown, Newton-Le-Willows, Merseyside

Tel: 09252 29881 For commercial enquiries ring Bernie o Brenda on 01-992 9142 or 01-993 8367)

# DERBYSHIRE

# **Lowe Electronics**

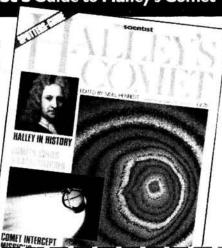
The official importer of the TRIO range of equipment (See main ad, for the full list of all our shops)

Chesterfield Road, Matlock, Derbyshire, DE4 5LE Tel: 0629 2817/2430/4057

# **YOU'LL NEVER SEE IT'S** IKE AGAIN!

newscientist's Guide to Halley's Comet

After 76 years in distant orbit, Halley's Comet makes its long-awaited return this winter. New Scientist marks the big event with this definitive guide compiled by seventeen of Britain's leading comet experts. Complete the order form and post with cheque or P.O. to Post Haste, Unit 3, Roslin Square Roslin Road, Acton. London, W.3, allowing 28 days



Special, Halley's Comet, at £2.25 each (inc. p & p) for which I enclose cheque/P.O. for £.....payable to New Scientist.

Name\_ (PLEASE PRINT)

Post Haste, Unit 3, Roslin Square, Roslin Road, Acton, London, W.3.

for delivery NEW SCIENTIST HALLEY'S COMET SPECIAL Please send me.....copy/copies of the New Scientist (Overseas readers: please add 75p per copy). Address. Post code

\*SPECIAL QUALITY 4.40 EF85.
1.15 EF89.
0.50 EF91.
0.50 EF92.
0.50 EF95.
0.50 EF95.
0.50 EF95.
0.50 EF184.
0.55 EF81.
0.50 EF184.
0.55 EF83.
0.50 EF184.
0.75 EL34.
0.75 EL34.
0.70 EL84.
0.70 EL82.
0.70 EL82. 1.25 EM80
1.36 E A1065 A2293 A22900 AR8 ARP ATP4 B12H CY31 DAF92 DF92 DF92 DF92 DF92 DF92 DF92 E92C E180CC EA70 EABC80 EBF81 EBC93 EBF80 EBF80 EBF83 EBF83 EBF83 EBF83 EBF83 VALVES AND TRANSISTORS Telephone enquiries for valves, transistors, etc. Retail 7493934, trade and export 743 0899.
POSTAGE: £1-£3 50p; £3-£5 60p; £5-£10 80p; £10-£15 £1.00; £15-£20 £1.50. Mimimum order £1.00. Delivery by return.

COLOMOR (ELECTRONICS LTD.) 170 Goldhawk Rd, London W12 Tel: 01-743 0899 or 01-749 3934. Open Monday to Friday 9 a.m.-5.30 p.m.

# **MAKE YOUR INTERESTS PAY!**

More than 8 million students throughout the world have found it worth their while! An ICS home-study course can help you get a better job, make more money and have more fun out of life! ICS has over 90 years experience in home-study courses and is the largest correspondence school in the world. You learn at your own pace, when and where you want under the guidance of expert 'personal' tutors. Find out how we can help YOU. Post or phone today for your FREE INFORMATION PACK on the course of your choice. (Tick one box only!)

Electronics		Radio, Audio and TV Servicing	
Basic Electronic Engineering (City & Guilds)		Radio Amateur Licence Exam (City & Guilds)	
Electrical Engineering		Car Mechanics	
Electrical Contracting/ Installation		Computer Programming	
GCE over 40 'O' and 'A' le	vel s	ubjects	

Name	
Address	P. Code
International Correspondence So Surrey SM1 1PR. Tel: 01-643 95	hools Dept EES16, 312/314 High St., Sutton 68 or 041-221 2926 (24hrs).

Post Haste, Unit 3, Roslin Square, Roslin Road, Acton, London, W.3. Post Haste, Unit 3, Hosin Square, Hosin Hoda, Acton, Loridon, W.S.

Published on approximately the 7th of each month by IPC Magazines Limited, Westover House, West Quay Road, Poole, Dorset BH15 1JG. Printed in England by Benham & Co Limited, Colchester, Essex. Sole Agents for Australia and New Zealand – Gordon and Gotch (Asia) Ltd.; South Africa – Central News Agency Ltd. Subscriptions INLAND £13 and OVERSEAS £15 payable to IPC Magazines Ltd., "Practical Wireless" Subscription Department, Room 2816, King's Reach Tower, Stamford Street, London SE1 9LS. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without the written consent of the Publishers first having been given, be lent, resold, hired out or otherwise disposed of by way of Trade at more than the recommended selling price shown on the cover, and that it shall not be lent, resold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade or affixed to or as part of any publication or substanting. However, the property of the pro publication or advertising, literary or pictorial matter whatsoever.

LEE ELECTRONICS LTD? NO! NORTH LONDON COMMUNICATIONS? NO! WE'VE MADE UP OUR MINDS AT LAST! IT'S . . .

# STANDARD COMMUNICATIONS (UK) LTD®

SAME FIRM - SAME FACES BUT BETTER SERVICE + MORE LINES!



# THE TINY C111 2 WATT HANDHELD

Frequency Range RX/TX 144-148MHz Transmit Hi: 700mA Current Drain Low: 250mA

# TRANSMITTER

RF Output Hi: 2 watt Low: 400mW

2.5 W plus available with Nicad battery CNB111

# RECEIVER

System: Double superheterodyne (10.695MHz/455MHz)

Sensitivity 12dB SINAD -10dB

-16dBu 1uV . . . . . more than 30dB S/N at Input Voltage 400mW (8 ohms 10% distortion) Audio Output 1750Hz Tone burst comes in with Repeater Switch

\*"S" Meter Socket

**CSA111** 

31/4"





ACCESSORY RANGE

CMP111 Speaker Microphone	£19.50 inc VAT
CHP111 Head Set/Boom Mic with PTT	£22.50 inc VAT
CMA111 DC Charger/Adaptor (Switchable)	£32.50 inc VAT
CAD111 DC Charger Unit	£7.50 inc VAT
CSA111 Base Charger	£45.00 inc VAT
CNB111 Nicad Pack (For 2.5 + Watt Output)	£35.00 inc VAT
C10/120 Wall Charger	£7.50 inc VAT
CMB111 Mobile Mount Clip	
CNT111 CTCSS Tone Squelch Unit	£30.00 inc VAT
CLC111 Carrying Case	£5.25 inc VAT
Spare Helical	



**CMB111** 



**CHP111** 

YOU CAN'T BEAT THIS SIZE FOR 2 WATTS!!!

211 WEST HENDON BROADWAY, LONDON NW9 7DE

21/2"

TEL. 01-202 3638 TELEX 298765 UNIQUE G

(FORMERLY LEE ELECTRONICS) Mail Order + Retail All prices are inclusive of VAT and are correct at time of going to press

and

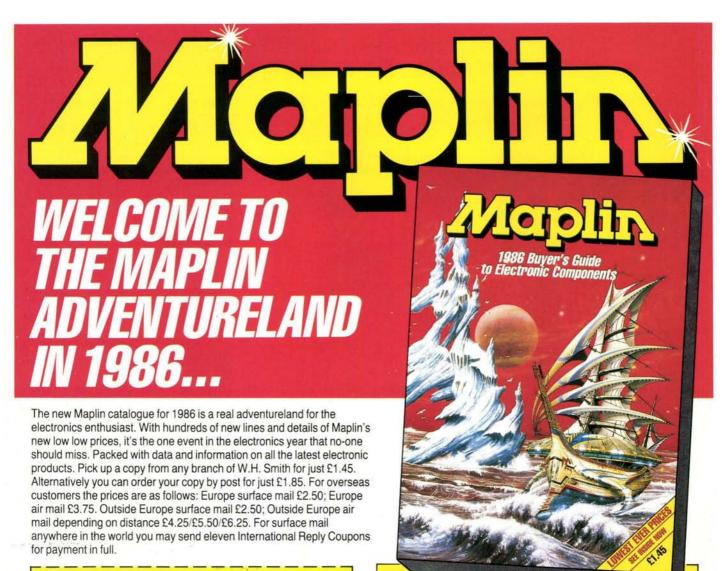
**CMP111** 

400 EDGWARE ROAD, LONDON W2 TEL. 01-723 5521 TELEX 298765 UNIQUE G

> Northern Agents: Joe Bell G4PMY Unit 3, Thomas St., Crewe Tel. 0270 582849



Normally 24hr despatch but please allow 7 days for delivery



Post this coupon now for your copy of the 1986 catalogue.

Price £1.45 + 40p post and packing. If you live outside the U.K.

send £2.50 or 11 International Reply Coupons. I enclose £1.85.

DW 1 6

# MAPLIN ELECTRONIC SUPPLIES LTD.

Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: Southend (0702) 552911 SHOPS

- BIRMINGHAM Lynton Square, Perry Barr, Tel: 021-356 7292
- LONDON 159-161 King Street, Hammersmith, W6. Tel: 01-748 0926.
- MANCHESTER 8 Oxford Road, Tel: 061-236 0281
- SOUTHAMPTON 46-48 Bevois Valley Road, Tel: 0703 225831.
- SOUTHEND 282-284 London Rd, Westcliff-on-Sea, Essex. Tel: 0702-554000 Shops closed all day Monday.

