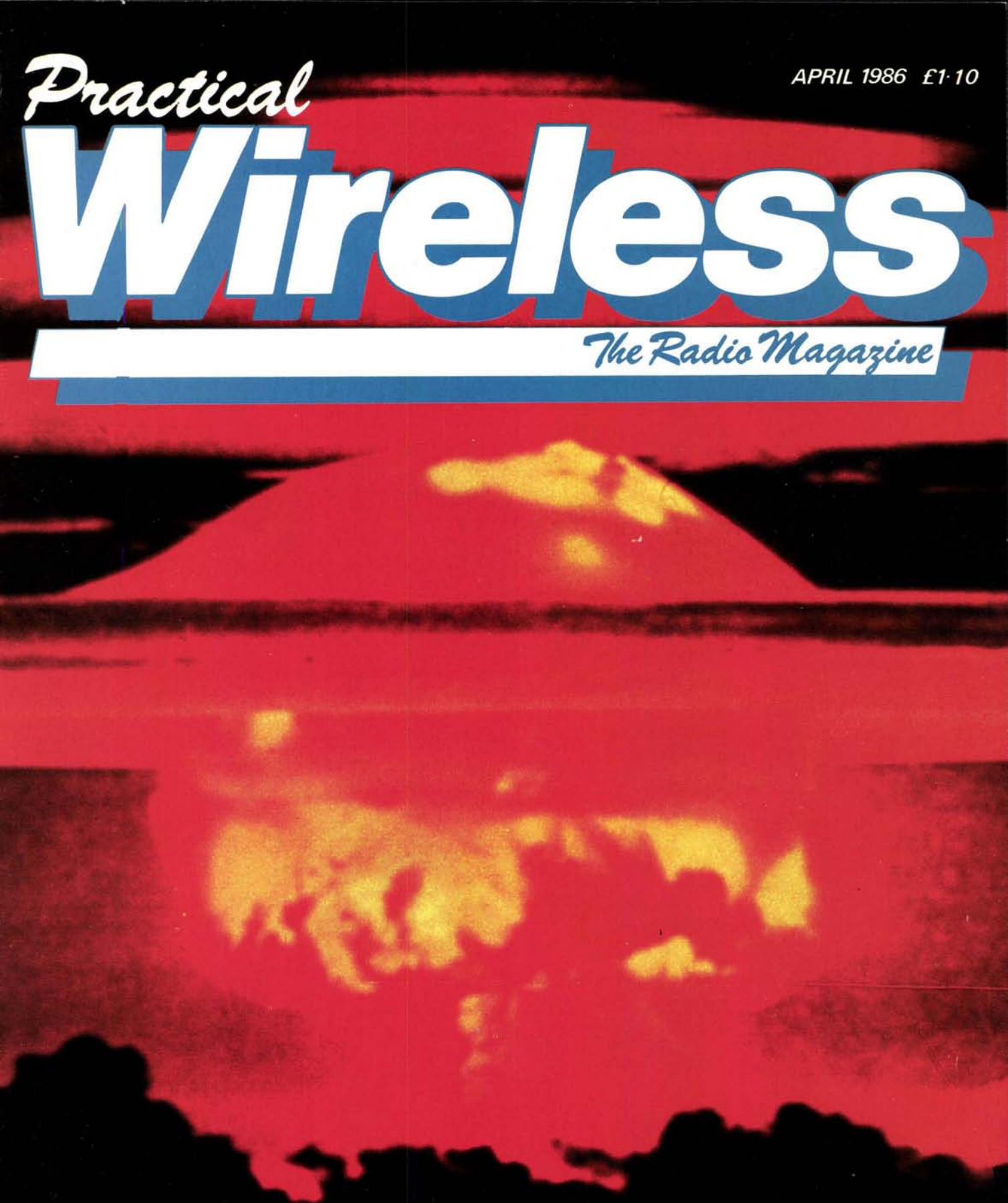
APRIL 1986 £1·10

Practical Wireless

The Radio Magazine



NEW SERIES
Sunspots ~ Their History and Effects

PLUS

PW MEON 2 ~ Build Our 4m/6m Transverter For Your 2m Rig

REG. WARD & CO. LTD.

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

THE SOUTH-WEST'S LARGEST AMATEUR RADIO STOCKIST

Trio

TS940S	9 Band TX General Cov RX	1795.00	
TS930S	9 Band TX General Cov RX	1395.00	(—)
TS830S	160-10m Transceiver 9 Bands	898.00	(—)
AT230	All Band ATU/Power Meter	170.65	(2.00)
SP230	External Speaker Unit	51.43	(1.50)
TS530SP	160m-10m Transceiver	779.79	(—)
TS430S	160m-10m Transceiver	750.00	(—)
PS430	Matching Power Supply	139.01	(3.00)
SP430	Matching Speaker	39.50	(1.50)
MB430	Mobile Mounting Bracket	13.56	(1.50)
FM430	FM Board for TS430	45.00	(1.50)
SP120	Base Station External Speaker	33.33	(1.50)
MC50	Dual Impedance Desk Microphone	39.56	(1.50)
MC35S	Fist Microphone 50K ohm IMP	18.65	(1.00)
LF30A	HF Low Pass Filter 1kW	27.70	(1.00)
TR7930	2M FM Mobile	365.60	(—)
TR9130	2M Multimode	544.73	(—)
TW4000A	2M/70cm mobile	580.35	(—)
TM201A	2M 25W mobile	296.09	(—)
TM401A	7cms FM 12W	350.91	(—)
TH21E	2M Mini-Handhelds	189.30	(—)
TH41E	70cm Mini-Handhelds	220.95	(—)
TM211E	2M FM Mobiles	398.00	(—)
TM411E	70cm FM Mobiles	466.18	(—)
TS711E	2M Base Stations	770.74	(—)
TS811E	70cm Base Stations	895.00	(—)
TR3600	70cm Handheld	324.36	(—)
TR2600	New 2M FM Synthesised Handheld	299.00	(—)
ST2	Base Stand	66.11	(1.50)
SC4	Soft Case	16.95	(1.00)
SMC25	Speaker Mike	19.78	(1.00)
PB25	Spare Battery Pack	32.20	(1.00)
MS1	Mobile Stand	38.41	(1.00)
R600	Gen. Cov. Receiver	323.78	(—)
R2000	Synthesiser 200KHz-30MHz Receiver	518.73	(—)
HS5	Deluxe Headphones	29.39	(1.00)
SP40	Mobile External Speaker	18.08	(1.00)
TL922	160/10M 2kW Linear	1265.00	(7.00)
TS780	2M/70cm M/M Transceiver	1061.20	(5.00)
TS670	6, 10, 15, 40M 10W M/M Transceiver	774.13	(5.00)
TR9300	6M M/M Transceiver	590.49	(5.00)

Linear Amps

TOKYO HI POWER

HL 160V	2m, 10W in, 160W out	244.52	(2.00)
HL 82V	2m, 10W in, 85W out	144.50	(2.00)
HL 110V	2m, 10W in, 110W out	204.99	(2.00)
HL 32V	2m, 3W in, 30W out	89.95	(2.00)
HL 20U	70cms, 3W in, 20W out	89.90	(2.00)

MICROWAVE MODULES

MML144/30-LS	inc preamp (1/3 w i/p)	94.30	(2.00)
MML144/50-S	inc preamp, switchable	106.95	(2.00)
ML144/100-S	inc preamp (10w i/p)	149.95	(2.50)
MML144/100-HS	inc preamp (25w i/p)	159.95	(2.50)
MML144/100-LS	inc preamp (1/3w i/p)	169.95	(2.50)
MML144/200S	inc preamp (3/10/25 i/p)	334.65	(2.50)
MML432/30L	inc preamp (1/3w i/p)	169.05	(2.00)
MML432/50	inc preamp (10w i/p)	149.50	(2.00)
MML432/100	linear (10w i/p)	334.65	(2.50)

B.N.O.S.

LPM 144-1-100	2m, 1W in, 100W out, preamp	197.50	(2.50)
LPM 144-3-100	2m, 3W in, 100W out, preamp	197.50	(2.50)
LPM 144-10-100	2m, 10W in, 100W out, preamp	175.00	(2.50)
LPM 144-25-160	2m, 25W in, 160W out, preamp	255.00	(2.50)
LPM 144-3-180	2m, 3W in, 180W out, preamp	295.00	(2.50)
LPM 144-10-180	2m, 10W in, 180W out, preamp	295.00	(2.50)
LP 144-3-50	2MN 50W out, preamp	125.00	(2.50)
LP 144-10-50	2M 10W in, preamp	125.00	(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	50-150MHz 20/200 Interval PEP/SWR	106.70	(1.50)
FS300V	50-150MHz 20/200 PWR/SWR	53.50	(1.50)
FS300H	1.8-60MHz 20/200/10W	53.50	(1.50)
FS210	1.8-150MHz 20/200 Auto SWR	63.50	(1.50)
W720	140-430MHz 20/200W	41.50	(1.50)

WELZ

SP10X	1.8-150MHz PWR/SWR	34.00	(1.50)
SP122	1.8-60MHz PWR/SWR/PEP	75.00	(1.50)
SP220	1.8-200MHz PWR/SWR/PEP	59.00	(1.50)
SP225	1.8-200MHz PWR/SWR/PEP	99.95	(1.50)
SP420	140-525MHz PWR/SWR/PEP	69.00	(1.50)
SP425	140-525MHz PWR/SWR/PEP	99.95	(1.50)
SP825		149.00	(1.50)

NEW RANGE OF WELZ METERS NOW AVAILABLE

TOYO

T430	144/432 120 W	44.65	(1.00)
T435	144/432 200 W	49.35	(1.50)

Scanning Receivers

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)
AOR2002	VHF/UHF Continuous Coverage	398.00	(2.50)

Icom Products

IC751	HF Transceiver	P.O.A.	(—)
IC745	HF Transceiver	P.O.A.	(—)
IC735	New HF Transceiver	P.O.A.	(—)
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)
IC50S	50MHz multi-mode portable	349.00	(—)
IC290D	2m 25w M/Mode	479.00	(—)
IC271E	2m 25w M/Mode Base Stn.	729.00	(—)
IC271H	100W version of above	899.00	(—)
IC27E	25W FM mobile	379.00	(—)
IC47E	25w 70cm FM mobile	469.00	(—)
ICBU1	B/U Supply for 25/45/290	29.90	(1.00)
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)
R7000	VHF/UHF Scanning Receiver	849.00	(—)
IC3200	2M/70cm Mobile Transceiver	495.00	(—)

Mutek Products

SLNA 50	50MHz Switched preamp	44.90	(1.50)
SLNA 144s	144MHz Low noise switched preamp	39.95	(1.50)
SLNA 145sb	Preamp intended for 290	29.90	(1.50)
GLNA 432e	70cm Mast head preamp	149.90	(2.50)
RPCB 144ub	Front end FT221/225	79.90	(1.50)
RPCB 251ub	Front end IC251/211	84.90	(1.50)
BBBA 500u	20-500MHz Preamp	34.90	(1.50)
GFBA 144e	2m Mast head preamp	149.90	(2.50)
SBLA 144e	2m Mast head preamp	89.90	(2.50)
RPCB 271ub	Front end for IC271	89.90	(1.50)
TVHF 230c	2M-FM Transverter	334.90	(5.00)
LBPF 144v	Bandpass Filter	22.40	(1.50)
LBPF 432u	Bandpass Filter	22.40	(1.50)
TVVF 50c	6M Transverter	199.90	(2.50)
GLNA 433e	70cm Pre-amp	79.90	(2.50)
TVVF 144a	2M Transverter	239.90	(2.50)

Datong Products

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)
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)

CW/RTTY Equipment

Tono 9000E	Reader/Sender	P.O.A.	(—)
Tono 550	Reader	329.00	(2.50)

MICROWAVE MODULES

MM2001	RTTY to TV converter	189.00	(2.00)
MM4001KB	RTTY term with keyboard	299.00	(2.00)

BENCHER

BY1	Squeeze Key, Black base	67.42	(2.00)
BY2	Squeeze Key, Chrome base	76.97	(2.00)

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)
FT757GX	HF Transceiver	739.00	(—)
FC757	Auto A.T.U.	255.00	(2.00)
FP757HD	Heavy Duty PSU	175.00	(2.00)
FP757GX	Switched Mode PSU	160.00	(2.00)
FL2050	Linear Amplifier	115.00	(2.00)
FT290	2m M/Mode Port/Transceiver	315.00	(—)
FT290	With Mutek front end fitted	345.00	(—)
FT690	6M M/M Portable Transceiver	385.00	(—)
FL2010	Linear Amplifier	69.00	(1.00)
MMB11	Mobile Bracket	30.00	(1.00)
NC11	Charger	11.50	(1.00)
CSC1	Carrying Case	5.00	(1.00)
YHA15	2m Helical	7.65	(1.00)
YHA44D	70cm ½wave	9.95	(1.00)
YM49	Speaker Mike	20.20	(1.00)
MMB15	Mobile Bracket	14.55	(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	8.80	(1.00)
NC9C	Charger	9.60	(1.00)
NC8	Base/station Charger	64.80	(2.00)
PA3	Car Adaptor/Charger	18.00	(1.00)
FNB2	Spare Battery Pack	27.02	(1.00)
YM24A	Speaker Mike	23.75	(1.00)
FT726R	2m Base Station	775.00	(—)
430/726	70cm Module for above	255.00	(2.50)
FRG8800	HF Receiver	475.00	(—)
FRV8800	Convertor 118-175 for above	80.00	(1.50)
FRT7700RX	A.T.U.	49.85	(1.50)
MH1B8	Hand 600 8pin mic	15.70	(1.00)
MD1B8	Desk 600 8pin mic	64.80	(1.00)
MF1A3B	Boom mobile mic	18.00	(1.00)
YH77	Lightweight phones	14.95	(1.00)
YH55	Padded phones	15.35	(1.00)
YH1	L/weight Mobile H/set-Boom mic	14.95	(1.00)
SB1	PTT Switch Box 208/708	15.70	(1.00)
SB2	PTT Switch Box 290/790	13.80	(1.00)
SB10	PTT Switch Box 270/2700	14.95	(1.00)
QTR24D	World Time Clock	33.35	(1.00)
FF501DX	Low Pass Filter	29.90	(1.00)

Power Supplies

DRAE			BNOS		
4 amp	40.50	(2.00)	6 amp	69.00	(2.50)
6 amp	63.00	(2.50)	12 amp	115.00	(3.00)
12 amp	86.50	(3.00)	25 amp	169.00	(4.00)
24 amp	125.00	(4.00)	40 amp	345.00	(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)
Wolz	2 way SO239	23.95	(1.00)
Welz	2 way 'n' Skts	42.95	(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)
CT20A	20W Dummy Load PL259	12.95	(1.00)
CT20N	20W Dummy Load N. Plugs	20.95	(1.00)
CT530	300W Dummy Load	75.00	(2.00)
DRAE	2m Pre-set A.T.U.	14.50	(1.50)

TOKYO HI-POWER

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

CAP CO.
AERIAL TUNERS

SPC300	1kW PEP	164.00	(3.00)
SPC3000	3kW PEP	214.00	(4.00)

VIBROPLEX KEYS NOW IN STOCK

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

COMPLETE RANGE OF WOOD & DOUGLAS KITS

ICOM (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

REG G2BSW **RODNEY G6LUJ**

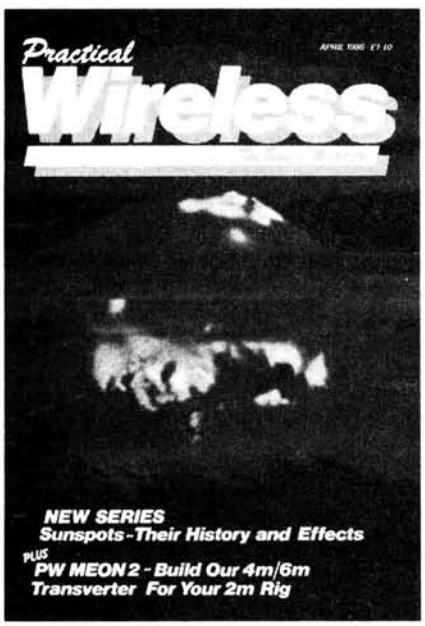
Instant credit also available

Mail/Telephone order by Cheque or Credit Card. Cheques cleared before goods despatched.

Delivery prices shown in brackets

Practical Wireless
The Radio Magazine

APRIL 1986 VOL 62 NO. 4 ISSUE 949



THIS MONTH'S COVER

As the current sunspot cycle approaches its minimum, F. C. Judd G2BCX looks back at sunspot records since 300AD and their link with climatic changes.

Regular Features

Editorial and Advertisement 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 G0API
Technical Features Editor Elaine Howard G4LFM
Technical Artist Rob Mackie
Advertisement Manager Roger Hall G4TNT
Administration Kathy Moore

Name .....
Address .....
.....
Code .....
TICK YOUR SPECIAL INTEREST ☐ RECEIVERS ☐ VHF/UHF ☐ HF
I ENCLOSE £1 PLEASE SEND ME A COPY OF THE
LOWE CATALOGUE

LOWE SHOPS ARE TO BE FOUND IN

In Glasgow,
the shop manager is Sim, GM3SAN, the address, 4/5 Queen Margaret Road, off Queen Margaret Drive, Glasgow,
telephone 041-945 2626.

In the North East,
the shop manager is Don, G3GEA, the address, 56 North Road, Darlington,
telephone 0325 486121.

In Cambridge,
the shop manager is Tony, G4NBS, the address, 162 High Street, Chesterton, Cambridge,
telephone 0223 464154.

In Cardiff,
the shop manager is Carl, GW0CAB, the address, c/o South Wales Carpets, Clifton Street, Cardiff,
telephone 0222 464154.

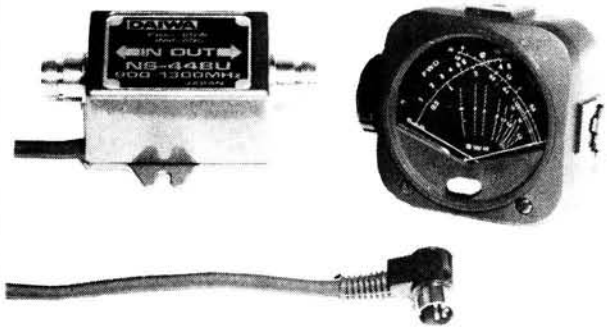
In London,
the shop manager is Andy, G4DHQ, the address, 223/225 Field End Road, Eastcote, Middlesex,
telephone 01-429 3256.

In Bournemouth,
the shop manager is Colin, G3XAS, the address, 27 Gillam Road, Northbourne, Bournemouth,
telephone 0202 577760.

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. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

LOWE ELECTRONICS SHOPS are open from 9.00 am to 5.30 pm, Tuesday to Friday and from 9.00 am to 5.00 pm on Saturday. Shop lunch hours vary and are timed to suit local conditions. For exact details please telephone the shop manager.

DAIWA NS448 swr/power meter range..... 900 to 1300 MHz.

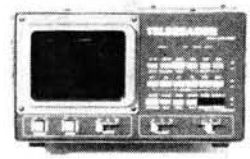


Frequency range 900 to 1300 MHz, impedance 50 ohms, power range forward 5/20W, reflected 1.6/6.6W, connections N type.

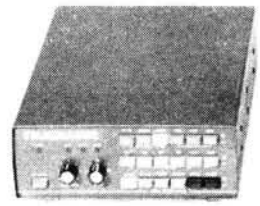
NS448 cross needle power/swr meter . . . **£75.00 inc VAT, carriage £2.50.**

TELEREADER range of equipment.

CWR685E

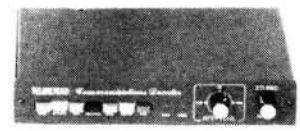


CWR675E



CWR670E

CWR610E



CD660

CWR685E . . . A radio-teletype terminal designed for use in the shack or out portable. Having a built-in monitor and external keyboard, the unit can receive and transmit CW, Baudot or ASCII codes. High and low RTTY tones, selectable baud rates and frequency shift, together with a buffer memory on transmit make the CWR685E ideal. Add nothing more than a DC power supply and transceiver to create a complete CW/RTTY station.
CWR685E . . . . . **£856.51 inc VAT, carriage £7.00**

CWR675E . . . A receive only version of the CWR685E, the CWR675E complete with built-in monitor, provides the short wave enthusiast with an additional dimension to his listening.
CWR675E . . . . . **£498.57 inc VAT, carriage £7.00**

CWR670E . . . For the listener with his own monitor or who prefers to use a television, the CWR670E has similar facilities as the CWR675E.
CWR670E . . . . . **£436.00 inc VAT, carriage £7.00**

CWR610E . . . Not only a CW/RTTY/ASCII terminal but a CW random generator for morse practice. Requires a monitor or UHF television for display.
CWR610E . . . . . **£216.41 inc VAT, carriage £3.00**

CD660 . . . A receive only unit for not only RTTY/CW/ASCII but TOR/AMTOR plus a morse code practice generator.
CD660 . . . . . **£257.19 inc VAT, carriage £3.00**

From TELEREADER, a comprehensive range of equipment!

LOWE ELECTRONICS LTD.

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

send £1 for complete mail order catalogue.

TRIO uhf equipment.

TS780 VHF/UHF dual band transceiver.

The TS780 is the ideal base station for the enthusiastic operator who wants both 70 centimetres and the 2 metre band in one transceiver. Modes of operation are USB, LSB, CW and FM. full repeater facilities, plus two VFO's, IF shift, two priority channels, memory and band scan combine to make the TRIO TS780 the perfect rig.

TS780 ..... **£1,061.28 inc VAT, carriage £7.00**

TS811E 70 centimetre base station transceiver.

The TS811E is a perfect 70 centimetre base station transceiver. It produces 25 Watts output and has a full range of operating features. Forty memory channels are available, each of which can be used as a separate VFO. Digital code squelch is also a feature of the TS811E.

TS811E ..... **£895.00 inc VAT, carriage £7.00**

TW4000A FM VHF/UHF dual band transceiver.

To have both 70 centimetres and 2 metres available in one mobile transceiver has been a desire of the VHF/UHF enthusiast for many years. TRIO with the TW4000A have satisfied that need. The transceiver is now well known for having an excellent receiver and as those who already own and operate one know, is a delight to use. Compact and producing 25 Watts on both bands, the TW4000A is the enthusiast's natural choice.

TW4000A ..... **£580.34 inc VAT, carriage £7.00**

TM401A 70 centimetre mobile FM transceiver.

Accepting the fact that there is little space in a modern car for anything other than a radio/cassette unit, TRIO have with the TM401A produced the definitive compact transceiver. By removing the speaker and making this separate, TRIO have given you excellent receive audio quality. The TM401A is ideal for the amateur who wants a high performance rig.

TM401A ..... **£350.91 inc VAT, carriage £7.00**

TM411E 70 centimetre FM mobile transceiver.

By taking the popular TM401A and adding DCS and a tiltable front panel, TRIO have produced a higher specification transceiver. Even easier to fit in tight locations, the TM411E with 25 Watts output is the ideal 70 centimetre FM mobile transceiver.

TM411E ..... **£466.18 inc VAT, carriage £7.00**

TR3600E 70 centimetre FM handheld.

The TR3600E handheld from TRIO is a natural progression from the much liked TR3500. By adding DCS, the ability to skip particular memory channels, to hold for either a timed period or carrier when scanning, the memory to hold whether the channel is simplex or repeater shift and including an illuminated "S" meter, TRIO have produced a first class transceiver.

TR3600E . **£324.36 inc VAT, carriage £7.00**

TH41E centimetre FM compact transceiver.

The TH41E is a simple handheld, extremely small yet having full repeater facilities including reverse repeater. Power output is one Watt of 150 milliwatts in the low position and frequency selection is by means of thumbwheel switches. Very small but still convenient to operate, the transceiver is just right for the amateur who wants to stay in touch.

TH41E ..... **£220.95 inc VAT, carriage £7.00**

TRIO hf equipment.

TS940S HF transceiver with general coverage receiver.

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands, 160 through to 10 metres plus a general coverage receiver tuning from 150 KHz to 30 MHz. Modes of operation are USB, LSB, CW, AM, FSK and FM which is included as standard. Forty memory channels, each effectively a separate VFO and simple keyboard frequency entry make operation and ownership of a TRIO TS940S a pleasure.

TS940S ..... **£1795.00 inc VAT, carriage £7.00**

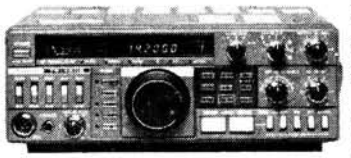
TS930S HF transceiver with general coverage receiver.

Much has been said and written about the TS930S and it now has a place high in the affection of those amateurs fortunate enough to own one. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 KHz to 30 MHz, the TRIO TS930S is ideal for today's crowded frequencies.

TS930S ..... **£1395.00 inc VAT, carriage £7.00**

TS430S HF transceiver with general coverage receiver.

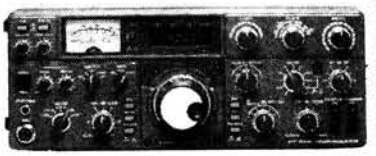
A compact transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S has, in addition to the amateur bands from 160 to 10 metres, a general coverage receiver. Modes of operation are USB, LSB, CW, AM with FM optional. Owned by many radio amateurs worldwide, the TRIO TS430S is an ideal way to combine amateur radio with short wave listening.



TS430S ..... **£750.00 inc VAT, carriage £7.00**

TS830S HF amateur bands transceiver.

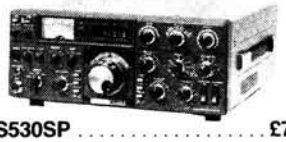
Needing no description, the TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands for its superb signal quality. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.



TS830S ..... **£898.00 inc VAT, carriage £7.00**

TS530SP HF amateur bands transceiver.

A standard HF valve transceiver without frills but providing today's amateur with all necessary facilities for reliable worldwide communication. Modes of operation USB, LSB and CW. The most popular HF transceiver on the market.



TS530SP ..... **£779.79 inc VAT, carriage £7.00**

SMC — South Midlands

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

SEE US AT N.E.C. STAND NO. B10,12 & C9,11 FOR SOME VERY SPECIAL OFFERS

GREAT PERFORMANCE—HOKUSHIN

BASE STATION

SMC HF5V	Vert 10-80m trapped	£66.50
SMC HF3VNB	Vert 12-17-30m 1000w PEP	£66.50
SMC 3Y1015D20	3 ele beam 10-15m, dipole 20m	£179.00
SMC 11V11S11	G/fibre ground plane 27-30MHz 2.6m	£35.15
SMC GP27	Vert ground plane 27-30MHz 5.5m	£29.00
SMC VA27	Vert ½ wave no radials 5.5m	£29.00
SMC GDXA	Discone 100-440MHz 3.0dB ¼	£41.85
SMC GDX1	Discone 80-480MHz 3.0dB ¼	£49.50
SMC GDX2	Discone 50-480MHz 3.0dB ¼	£62.85
SMC VHFL	Discone 65-520MHz RX only	£19.60
SMC 2HB6	HB9CV 6m 2 element	£28.50
SMC GP23	Colinear 2m 3 × ⅝ wave	£49.95
SMC GP144W	Colinear 2m 2 × ⅝ wave	£33.95
SMC GP2M	Ground plane 2m ⅝ wave	£22.95
SMC SQ144	2m Swiss quad vert polarised	£67.95
SMC GP432X	Colinear 70cm 3 × ⅝ wave	£36.95
SMC GP714	Colinear 70cm 14 step coaxial	£88.20
SMC 70N2V	Colinear 2m & 70cm, 2.8dB ¼ & 5.7dB ¼	£36.80

NEW

ONE PIECE ALL GLASSFIBRE

SMC 70N2FG	144/432MHz 2m ½ wave 2.8dB, 70cm 2 × ⅝ wave 5.7dB, 1.2m	£41.40
SMC 358FG	432MHz 3 × ⅝ wave 1.7m	£49.05
HS GP727	144/432MHz 2m 6/8 wave 4.5dB, 70cm 3 × ⅝ wave 7.2dB 1.8m	T.B.A.

OSCAR 2/10M

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 £75 inc.

FRG-8800 £475 inc

Continuous coverage from 150kHz to 30MHz. Two speed spin tuned VFO plus keyboard plus computer interface control.

The FRG-8800 demodulates SSB (USB & LSB) CW, AM (Wide and Narrow) and FM narrow as standard, useful for 10M, CB and for VHF.

The FRG-8800 comes with twelve memories, programmed and scanned at the touch of a single button. Any of the memory channels will accept a frequency including the VHF range (optional VHF unit). The mode is also stored in the memory.

Four filters are fitted as standard (SSB/CW, AM, AM-NAR and FM-NAR) chosen for optimum performance, with switchable AGC and variable tone control.

The back-lit green LCD display incorporates easy to read "any angle" 10mm digits.

A twelve function display indicates the status at a glance. It includes memory channel number mode, and frequency to a resolution of 100Hz. Also included is a two dimensional LCD, graphical SIMPO and "S" meter. A 12 button keyboard allows quick accurate changes of frequency and band.

Dual accurate 12 hour clocks, with AM/PM indicators uses the main digital display and features full back-up facilities (mains failure) and can activate the receiver or tape recorder via relay contacts. The FRV-8800, extends coverage to include 118-174MHz all within the main frame, allowing monitoring of, PMR, marine and air bands, as well as 2M. 240-220VAC to 110-120V, 50/60Hz mains standard, 12VDC operation is optional.

LEEDS
SMC (Leeds)
257 Otley Road,
Leeds 16, Yorkshire
Leeds (0532) 782326
9-5.30 Mon-Sat

CHESTERFIELD
SMC (Jack Tweedy) Ltd
102 High Street
New Whittington,
Chesterfield
Chest. (0246) 453340
9.30-5.30 Tues-Sat

BUCKLEY
SMC (TMP)
Unit 27, Pinfold Lane
Buckley, Clwyd
Buckley (0244) 549563
10-5 Tues, Weds, Fri
10-4 Sat

STOKE
SMC (Stoke)
76 High Street
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tues-Sat

SMC (HUMBERSIDE)
S. HUMBERSIDE
247A Freeman Street
Grimsby
(0472) 59388
9.30-5.30 Mon-Sat

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

N. IRELAND
SMC N. Ireland
10 Ward Avenue
Bangor
County Down
0247 464875.

Southampton Showroom open 9-5.30 pm Monday to Friday, 9-1 pm Saturday.

AGENTS
NORMAN DILLEY, DARTCOMMS, DARTMOUTH (08043) 3534
PAT GILLEN, IPSWICH COMMS, IPSWICH (0473) 462173

-Communications ltd.

AUTHORISED YAESU

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

ANTENNAS—GREAT VALUE

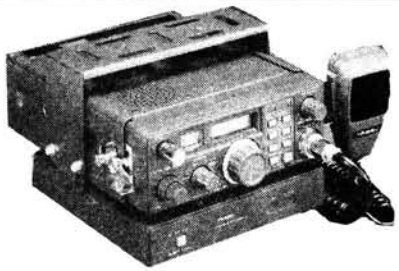
MOBILE

SMC 17SE	Element 17m 1.92M 'Fold over'	£18.75
SMC 15SE	Element 15m 1.72M 'Fold over'	£16.85
SMC 12SE	Element 12m 1.92M 'Fold over'	£16.85
SMC 10SE	Element 10m 1.72M 'Fold over'	£15.95
SMC 4E	Element 70MHz ¼ wave 'Fold over'	£10.35
SMC 370F	Element 70MHz ⅜ wave	£18.00
SMC 2QW	Element 144MHz ¼ wave	£2.70
SMC 2NE	Element 144MHz ⅝ wave 'Fold over'	£7.95
SMC 2VF	Element 144MHz ½ wave 'Fold over'	£14.66
SMC 78F	Element 144MHz ⅞ wave 'Fold over'	£16.95
SMC 78B	Element 144MHz ⅞ wave ball adjust	£16.95
SMC 78SF	Element 144MHz ⅞ wave short whip	£16.95
SMC 88F	Element 144MHz 8/8 wave	£22.95
SMC 118M	Element 144MHz 11/8 wave colinear	£39.85
SMC 258	Element 432MHz 2 × ⅝ 'Fold over'	£16.95
SMC 268E	Element 432MHz 2 sect. cap matched	£29.95
SMC 358	Element 432MHz 3 × ⅝ wave 'Fold over'	£20.95
SMC 70N2M	144MHz + 432MHz, 2.7dB ¼ + 5.1dB ¼	£20.95

NEW

SMC 38F	144MHz ⅜ wave 1.5dB 0.77M	£9.60
SMC 70N2S	144/432MHz 2m ¼ wave 0dB, 70cm ⅝ wave 3·2dB, 0·47M	£8.45
SMC 70N2DX	144/432MHz 2m 6/8 wave 4.5dB, 70cm 3 × ⅝ wave 7.2dB 1.55m	£23.75
SMC 2N6M	50/144MHz 6m ¼ wave odB, 2m ⅝ wave 3dB 1.15M	

6M IS HERE!!



FT690R

- FM, AM, SSB, CW
- 10/20KHz STEPS
- DUAL VFO's
- TEN MEMORIES

£289 inc VAT

FRG-9600 £449 inc

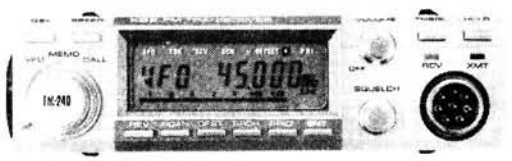
An all mode scanning receiver covering 60 through 905MHz continuously, with 100 keypad-programmable memory channels.

In addition to FM wide (for FM and TV broadcasts), FM narrow and AM (wide and narrow) the FRG-9600 also provides SSB (single sideband) reception up to 460MHz. A front panel tuning knob simplifies tuning of SSB and narrowband AM. Seven tuning/scanning rates between 100Hz and 100kHz assure fast and efficient scanning while permitting easy tuning of narrowband signals.

The scanning system allows full or limited band scanning and memory channel scanning, with auto-resume. In addition to carrier sensing scan stop, audio scan stop sensing is also selectable to avoid stopping on inactive "carrier-only" channels. Scanning steps are selectable, with the wide steps indicated on the front panel display. Signal strength indicated by a two-colour graphic S-meter. A 24-hour clock/timer, recorder output, cpu band selection outputs, multiplexed (FM wide) output, AF and RF mute and other control signals for maximum expansion potential with future options or for own add-on hardware for special applications.

The direct control link to the cpu in the FRG-9600, allowing virtually unlimited customised control functions; such as multiple, organised memory banks; automatic tuning; and customised scanning systems; using most personal computers and a Yaesu FIF CAT Interface Unit.

The FRG-9600 requires 12VDC.



KDK FM240

ON SHOW AT N.E.C.

A brand new 25W FM transceiver from KDK, featuring all the latest in microchip technology and incorporating the revolutionary new **MAN MACHINE INTERFACE** (M.M.I.). The alpha-numeric LCD display combined with rotary controls and push button switches allied to a new C.P.U. displays prompt messages and command data allowing for maximum flexibility of operation with minimum button pushing! Most of the major functions are simple one button operations including: Simplex, Tx+ Offset, TX- Offset; Receive Scanning Modes – Skip, Busy, Pause and Delay; 16 Memory Channels; Programmable Scan Limits and Priority Scan. Receive sensitivity 0.2µV for 12dB SINAD. All this in a small box measuring only 140W × 40H × 170D (mm).

£T.B.A.

★ 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.
Biggest branch agent and dealer network.
Securicor 'B' Service contract at £5.00
Biggest stockist of amateur equipment.
Same day despatch possible.

GUARANTEE
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.**

BARCLAYCARD VISA

AGENTS
JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 52374 DAY (0639) 2942 EVE **JACK McVICAR, SCOTCOMMS, EDINBURGH 031 657 2430**

50MHz, A New Dimension for the U.K.

IC-505, 50MHz Transceiver

The IC-505 is a 50MHz band SSB, CW transceiver, and has already gained an excellent reputation worldwide. The dual VFO system has been developed using advanced computer and PLL technology. The IC-505 features 6 channel memories and can be used independent of emission modes, memory scan, program scan which searches only specified frequency band. LCD ensures clear visibility even in sunlight. The R.F. amplifier, a dual gate MOSFET features high gain and low noise characteristics. The IC-505 accepts a standard dry cell pack, rechargeable nicad battery pack (BP10) or 13.8v external power supply, 3 watts R.F. output, 0.5 watts low power, 10 watts at 13.8v. Accessory circuits include split frequency operation, noise blanker, squelch and CW break-in. Options include:- PS45 AC Power Supply and LC10 Carrying Case.
All these features make the IC-505 a great transceiver for operation on the 50MHz band.

IC-551D, 50MHz Base station

This base station has all mode capability, SSB, CW, AM and FM (when optional FM is installed). It covers 50-54MHz with 80 watts variable R.F. output power (40 watts A.M.), Dual VFO's for split frequency operation. 3 memory channels and memory scan, program scan with adjustable scanning speed and auto stop when a signal is received. A powerful audio output, 2 watts at 8 ohms for easy listening even in noisy surroundings.
Other features include a noise blanker, AGC fast or slow RIT, VOX passband tuning and speech processor.
Options include:- PS15 20 amp external power supply, IC-EX106 FM unit and IC-HP1 headphones.
These two transceivers allow you to explore this fascinating part of the spectrum. UK stations have worked int VE, VO, W1,2,3,4 and 8. The UK beacon GB3NHQ has been received as far west as Washington State. Please contact Thanet Electronics Limited or your local ICOM dealer for more information on these 6m transceivers.

British TELECOM

Cellnet

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM

IC-1271E, Fantastic New 1·2GHz Multimode Transceiver

ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240 – 1300 MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output. The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's for microwave applications. The rugged power amplifier provides 10 Watts which can be adjusted from 1 to 10 Watts. A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display. The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment. The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply.

IC-271 & 471 Multimode Base stations

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.
By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital readout of the doppler shift. The easy modifications needed to give you this unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.
This range includes the IC-271E-10W, IC-271E-25W, 271H-100W and the 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H can use the pre-amp AG-25, with the 471E and 471H using the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35.

IC-290D/25 Watt Mobile

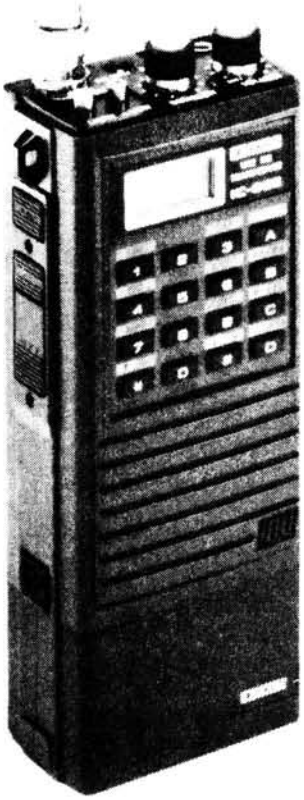
290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz. The squelch on SSB silently scans for signals, while VFO's with equalising capability mark your signal frequency with the touch of a button. Other features include: RIT, 1KHz or 100Hz tuning/CW sidetone. AGC slow or fast in SSB and CW, Noise blanker to suppress pulse type noises on SSB/CW.

British TELECOM Cellnet

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Than

ICOM

IC-02E/04E Handportables



These direct entry micro-processor controlled handhelds, one for 2 metres, the other for 70 centimetres. Scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority. They have a LCD readout indicating frequency, memory channel, signal strength, transmitter/output and scanning functions. A range of accessories include the HS10 Headset and boom microphone, HS10SB PTT switch box with pre-amp, HS10SA voice operated (VOX) switch box. The IC-2E and IC-4E still continue to be available.

New Retail Shop

We are pleased to announce that we have moved to a new larger retail shop. This will be managed by Andy G6MRI and is situated on the corner of Stanley Road and Kings Road, Herne Bay, Kent. Tel: (0227) 369464. Give it a visit for demonstrations and advice on anything to do with your shack. BCNU.

You can get what you want just by picking up the telephone. Our Mail Order department offers you free same day despatch whenever possible, instant credit, interest free H.P. Telephone Barclaycard and Access facility, 24 hr answerphone service.

WANT TO LEARN MORE?

Telephone us free-of-charge on:

HELPLINE 0800-521145.

—— Mon-Fri 09.00-13.00 and 1400-17.30 ——

This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret this service cannot be used by dealers or for repair enquiries and parts orders. Thank you.

ICOM authorised dealers in the U.K.

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 Holdings (Bath) Ltd., Bristol, 02217-2402.
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.
D.P. Hobbs, Norwich, 0603-615786.
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.
R.A.S. Nottingham, 0602-280267.
Ray Withers Comms, Warley, West Midlands, 021-421 8201.
Scotcomms, Edinburgh, 031-657 2430.
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-42043.
Reg Ward & Co. Ltd., S.W. England, 0297-34918.
Waters & Stanton Electronics, Hockley, Essex, 0702-206835.

Listed here are just some of the authorised dealers who can demonstrate ICOM equipment all year round. This list covers most areas of the U.K. but if you have difficulty finding a dealer near you, contact Thanet Electronics and we will be able to help you.

ICOM Thanet Electronics Sea Street, Herne Bay, Kent CT6 8LD Tel: (0227) 363859. Dept. PW

EUROPE'S No. 1 . . . AMCOMM/A.R.E.

Where a good deal more costs a good deal less . . .

ICOM IC 745

Call or telephone 01-992 5765 for latest prices and information plus full range of H.F. equipment and accessories.

IC 751

- **Two year guarantee all major products**
- **Absolutely free finance**
- **Most mail order post free**
- **All securicor items carriage free**
- **Negotiable guarantees**
- **Factory appointed distributors with access to engineering**
- **Next day delivery**
- **Massive stocks of spares and various 'bits and pieces'**
- **Dedication to total service**
- **Door to door repair service free under guarantee**

FT 757 YAESU

Telephone 01-992 5765 for latest information on the YAESU value for money high performance equipment. Full range of accessories available.

FT 980

IC 02

IC 04 E

IC 2 E

IC 4 E

ICOM

Four exciting hand helds from ICOM for you to come and try . . . or call 01-992 5765 and we'll send you the proof.

TOKYO H.P. LABS

This range of highly engineered linear amplifiers and antenna couplers is fast becoming everyone's number one choice. Refer to mail order ad. on page 13

NEW **AMCOMM 9000**

— Available now — carriage paid £89 inc. VAT. A new general coverage 1.8-30 MHz. Antenna coupler rated at 300W P.E.P. max. Suitable for balanced feeders, coaxial input and random wire.

YAESU

FT 209 RH

FT 209 R

FT 703 R

FT 709 R

Voted the world's number one range of hand helds by the experts, available now from stock — or ask for literature. Telephone 01-992 5765

B.N.O.S. LINEARS

LPM 144-1-100	181.00	LP 144-3-50	108.00
LPM 144-3-100	181.00	LP 144-10-50	108.00
LPM 144-10-100	157.00	LPM 432-1-50	235.00
LPM 144-25-160	217.00	LPM 432-3-50	235.00
LPM 144-3-180	247.00	LPM 432-10-50	195.00
LPM 144-10-180	247.00	LPM 432-10-100	335.00

Complete range in stock

MUTEK

SLNA 50	44.90	SBLA 144e	89.90
SLNA 144s	39.95	RPCB 271ub	89.90
SLNA 145sb	29.90	TVHF 230c	334.90
GLNA 432e	149.90	LBPF 144v	22.40
RPCB 144ub	79.90	LBPF 432u	22.40
RPCB 251ub	84.90	TVVF 50c	199.90
BBA 500u	34.90	GLNA 433e	79.90
GFBA 144e	149.90	TVVF 144a	239.90

Complete range in stock

ANTENNAS & ROTORS

A WIDE RANGE OF ANTENNAS AND ROTORS FOR ALL APPLICATIONS FROM HIRSCHMANN 250 TO THE FAMOUS 'TAIL TWISTER'. ANTENNAS FROM JAYBEAM, TONNA, HIGH GAIN, M.E.T., ETC. — FAST DELIVERY ANYWHERE!!!

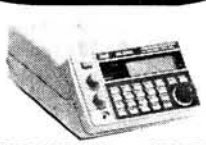
OUR BIG BUYING POWER GUARANTEES YOU EUROPE'S No. 1 DEAL ALL ROUND. SEND 90p FOR OUR BUMPER LITERATURE PACK!

AMCOMM/A.R.E. — WHERE A GOOD DEAL MORE COSTS A GOOD DEAL LESS!!!

VISA Access

FRG 9600 £429

ICOM 7000 £849



AR 2002 £375

Prices subject to currency fluctuations. E. & O.E. excepted.

AMCOMM/ARE

DON'T FORGET OUR OTHER MAIL ORDER AD–PAGE 13

373 Uxbridge Road, London W3 9RN. Tel: 01-992 5765/6. Telex: 24263

This little devil can talk back!

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:(0227) 363859. Telex:965179 Thanet G

ANTENNES TONNA (F9FT)

50MHz

5 element	£37.87(a)

144MHz

4 element	£15.82(a)
4 element crossed (N)	£34.78(a)
9 element fixed (N)	£25.62(a)
9 element portable (N)	£27.92(a)
9 element crossed (N)	£41.03(a)
13 element portable (N)	£39.57(a)
17 element fixed (N)	£47.83(a)

435MHz

9 element (N)	£22.31(a)
19 element (N)	£28.75(a)
19 element crossed	£36.01(a)
21 element 432MHz (N)	£38.12(a)
21 element ATV (N)	£38.12(a)

144/435MHz

9 & 19 element Oscar	£36.01(a)

1296MHz OR 1269MHz OSCAR UPLINK

23 element	£27.72(b)
4×23 element – power splitter – stacking frame	£144.74(a)
55 element	£44.75(a)

We are pleased to introduce a new range of antennas shown thus (N). The dipoles have been redesigned and now include a fully sealed 'N' connector – absolutely NO matching or tuning required. Also a new 1296MHz 55 element yagi. Send for full details.

POWER SPLITTERS - STACKING FRAMES
PORTABLE ALUMINIUM TELESCOPIC MASTS

PLEASE ADD CARRIAGE AS SHOWN (a) £4.00. (b) £2.20. ALL PRICES INCLUDE VAT AT 15%

ACCESS VISA Just telephone your card number for immediate despatch

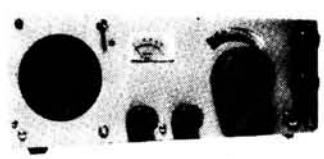
FOR FULL SPECIFICATIONS SEND 40p FOR CATALOGUE

Callers welcome, but by telephone appointment only please. Goods by return.

RANDAM ELECTRONICS (P)
12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: (0235) 23080 (24 hours)

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 ½ 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.

CLEAN UP YOUR ACT

WITH A BNOS FILTER

With TVI and BCI bearing an almost everyday occurrence the Radio Amateur needs to ensure that he is putting out a clean signal. B.N.O.S. Filters help reduce those nasty harmonics which cause so many of these everyday problems, especially with the new 6m band and its FM broadcast band harmonic. The 2m band is by no means innocent either. It has harmonics in the 70cm Amateur band and the Broadcast TV band. B.N.O.S. Filters reduce these by at least 50dB (typically 75 dB) and get rid of the non-harmonic sproggies too! The advanced design has enabled our research team to keep the insertion loss down and the power handling up. In fact these filters are more than man enough to cope with even our biggest linears. They were designed that way, even though we like to think that you'll only need them with our competitions products.

SPECIFICATIONS

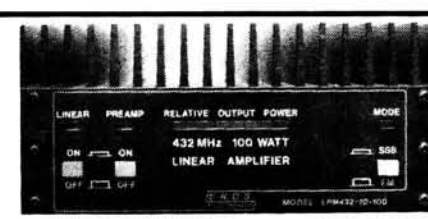
Model	*Band MHz*	*Insertion Loss dB*	*Harmonic 2nd*	*Rejection 3rd*	*Non Harmonic Rejection*	*Power Handling*	*Connectors*	*Price*
F50-L/U	50	Better than 0.5	50dB	75dB	75dB	250W	UHF	£24.95
F70-L/U	70	Better than 0.5	50dB	75dB	75dB	250W	UHF	£24.95
F144-L/U	144	Better than 0.5	50dB	75dB	75dB	250W	UHF	£24.95
F144-L/N	144	Better than 0.5	50dB	75dB	75dB	250W	N	£28.50

Note: Rejection Figures are typical and w.r.t. the wanted signal

70cm
OVERDRIVE PROTECTION

100W
ADVANCED EFFICIENT DESIGN
TRUE 100W RMS OUTPUT

VSWR SHUTDOWN
AND ALL THE USUAL BNOS FEATURES



L432-3-100	£295.00
L432-10-100	£295.00
L432-25-100	£255.00
LPM432-3-100	£335.00
LPM432-10-100	£335.00
LPM432-25-100	£295.00

FREQUENCY RANGE	430 to 440 MHz
OUTPUT POWER	100W RMS ± 0.5dB
INPUT POWER*	3W, 10W & 25W
POWER REQUIREMENTS	13.8V, 20A
PRE-AMP GAIN	Typically 12dB
PRE-AMP NOISE FACTOR	Better than 1dB

* Dependent on model

BARCLAYCARD VISA

Delivery Free
(For orders over £10)
Securicor 'B' available at £5 extra

B.N.O.S. ELECTRONICS

DON'T FORGET OUR NEW ADDRESS

BNOS ELECTRONICS LTD. DEPT PW, STEBBING, ESSEX CM6 3SL. Tel. (037186) 681

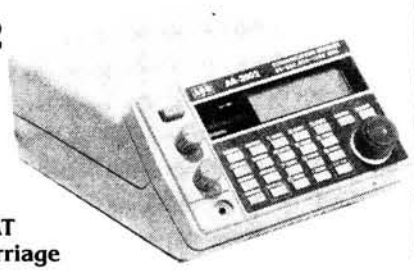
Now you know why we're Europes No. 1

NOW AMCOMM/A.R.E. UNDER ONE ROOF AT UXBRIDGE ROAD

Take part in our 'success story' now! Come and get it at Europe's No. 1 Emporium — or phone for fastest delivery. Remember you'll get a good deal more for a good deal less at AMCOMM–A.R.E.

AR 2002

Receiver
25-550 MHz
800 MHz-
1.3 GHz



£375 inc VAT
add £3.50 carriage

NEW YAESU FRG 9600

ALL MODE
VHF/UHF SCANNER

£429.00

60-905MHz. Wide and Narrow AM/FM with 5, 10, 12½, 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.

YAESU

FT1 HF Transceiver	P.O.A.
FT980 HF Transceiver	P.O.A.
SP980 Speaker	75.00
FP700 PSU	170.00
FC700 Tuner	111.00
FT757GX HF Transceiver	699.00
FC757 Auto A.T.U.	245.00
FP757HD Heavy Duty PSU	189.00
FP757GX Switched Mode PSU	179.00
FT290 2m M/Mode Port/Transceiver	STAR BUY 299.00
FT290 With Mutek [illegible] fitted	STAR BUY 329.00
MMB11 Mobile Bracket	31.45
NC11 Charger	11.50
CSC1 Carrying Case	5.00
YHA15 2m Helical	7.65
YHA44 2m ½wave	9.95
YM48 Speaker M[illegible]	20.30
MMB15 Mobile [illegible]	14.5[illegible]
FT203R NEW 2m H/Held/C[illegible] FNB3	175.[illegible]
FT209R NEW 2m Held/C[illegible] FNB	219.00
MMB10 Mobile Bracket	8.80
NC9C Charger	[illegible].60
NC8 Base/station Charger	[illegible]
PA3 Car Adaptor/Charger	[illegible]
FNB2 Spare Battery Pack	24.[illegible]
YM24A Speaker Mike	23.75
FT726R 2m Base Station	775.00
430/726 70cm Module for above	270.00
MH1B8 Hand 600 8pin mic	17.65
MD1B8 Desk 600 8pin mic	74.75
MF1A3B Boom mobile mic	19.95
YH77 Lightweight phones	14.95
YH55 Padded phones	14.95
YH1 L/weight Mobile H/set-Boom mic	15.70
SB1 PTT Switch Box 208/708	17.25
SB2 PTT Switch Box 290/790	17.25
QTR24D World Time Clock	34.50
FF501DX Low Pass Filter	31.45
YP150 Wattmeter/Dummy Load 150W	97.75
FRG8800	450.00
FRV8800	79.00
FT703	215.00
FT709	229.00
FT270R	299.00
FT2700R	479.00
FRG9600	429.00

Complete range of YAESU equipment and accessories from stock

Prices may be subject to change due to currency fluctuations

ICOM

IC751 HF Transceiver	1139.00
IC745 HF Transceiver	829.00
ICOM IC 735 HF Transceiver	799.00
PS15 P.S. Unit	135.00
PS30 Systems p.s.u. 25A	259.00
SM6 Base microphone for 751/745	36.50
IC290D 2m 25w M/Mode	469.00
IC290E 10w M/Mode Mobile	399.00
IC271E 2m 25w M/Mode Base Stn.	699.00
IC271H 100W version of above	889.00
IC25H 2m 45w FM	359.00
IC27E 25W FM mobile	359.00
IC45E 70c 10w FM	345.00
IC47E 25w 70cm FM mobile	449.00
ICBU1 B/U Supply for 25/45/290	24.50
ICR70 General Coverage Receiver	599.00
ICR71 General Coverage Receiver	699.00
IC02E 2m H/Held	259.00
IC2E 2m H/Held	199.00
M[illegible] 2m 10w Linear	69.00
IC4E 70cm H/Held	259.00
IC04E 70cm hand[illegible]	269.00
BC30 Base Charger	56.35
HM9 Speaker mic	18.55
IC[illegible] Case	5.50
IC[illegible]P3 Std Battery Pack	47.50
BP5 High Power Battery Pack	5[illegible].00
CP1 Car Charging Lead	6.50
DC1 12v Adaptor	[illegible].75

Aerial Rotators

9502B 3 core Light Duty	[illegible].50
AR40 5 core Medium Duty	1[illegible].00
KR400 Med/H Duty	189.95
KR500 6 core Elevation	189.95
KR400RC 6 core Medium Duty	132.50
CD45 8 core Heavy Duty	189.95
KR600RC 8 core Heavy Duty	189.50
HAM1V 8 core Heavier Duty	299.00
T2X 8 core Very Heavy Duty	365.00
Hirschman 250 ★ STAR BUY ★	49.50

EMOTO — all models POA

HEIL ACCESSORIES

HEIL HC3 Microphone Element	22.85
HEIL HC5 Microphone Element (Icom SM5/6)	25.40
HEIL HM 5 Desk Microphone (300Hz-3KHz) cardoid 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 8OZ HEADSET/BOOM MIC	65.00

Carriage and VAT included.

VHF LINEAR AMPLIFIERS

THP HL30V 0.5-3w in 30w out	45.00
THP HL82V 10w in 85w out	144.50
THP HL110V 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 HL90U 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

TELEGRAPH ACCESSORIES

Hi Mound Keys

HK 708 Hand Key with base	14.95
HK 707 Hand Key with base and dust cover	15.48
HK 706 Hand Key with base and dust cover	16.60
HK 702 Key with marble base and dust cover	29.65
MK 704 Dual lever paddle, no base	14.00
MK 705 Dual lever paddle marble base	25.65
CMOK-2 Practice Oscillator	8.99
KENPRO [illegible]ambic Electronic Keyer KP100	79.00
KENPRO [illegible]ambic [illegible]Keyer	169.00

Bencher

BY1 Squeeze Key, Black [illegible]	53.95
[illegible]Squeeze Key, Chrome [illegible]	69.95

Auto CW T[illegible]

Tono 9[illegible]	799.00
Tono 9000[illegible] Reader/[illegible]der	P.O.A.
Tono 550 Reader	299.00
Tono 5000E	799.00

VAT included. Add £[illegible] carriage p[illegible]n.

SWR/POWER METERS

WELZ SP200 1Kw	[illegible].00
WELZ SP300 1Kw	[illegible].00
WELZ SP400 150w	89.00
WELZ SP15M 200w	49.00
WELZ SP250 2Kw	65.00
TOYO TM1X 3.5 150MHz 120w	18.80
TOYO T430 145/430MHz thru line watt meter 120w	44.65
TOYO T435 145/435MHz thru line 200w	49.35

VAT included. Add £2 per item carriage.

HOURS: 10:00 — 5:30
SAT. 10:00 — 5:00

AMCOMM ARE

HAM RADIO WISDOM ... FROM HAM RADIO EXPERIENCE ...

PLUS JAYBEAM M.E.T. ANTENNAS MICROWAVE MODULES, DATONG AND LOTS, LOTS MORE!

373 Uxbridge Road, Acton, London W3 9RN Tel: 01-992 5765/6 Telex: 24263

CALL IN NOW FOR THESE AND 400 OTHER PRODUCTS

dressler

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

Access VISA

LATEST NEWS

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

£849 inc ARA500
Active Antenna Worth £99

DATONG P.C.I.

Fit the PCI with the R7000 or FRG9600 & have 100Kc to 30 MHz general coverage H.F. USB/LSB/AM/FM for

Only £139.00

or with the FRG9600 and all power supplies

£575.00

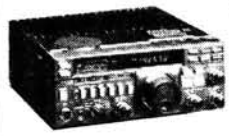
YAESU FRG-9600 £425

60-905MHz
AM · FM · SSB

AOR 2002

25-550 MHz
+ 800MHz-1.3GHz

YAESU FT-757GX



+ FP757 HD PSU
+ FC757 ATU

TRIO-KENWOOD TS-940

INCLUDING
AUTO-ATU **£1,725**

ICOM R71

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

YAESU FRG - 8800 £450

+ OPTIONAL
FRV8800 CONVERTOR
GEN. COV.

HX 2000E
An excellent hand-held scanner
60- 80MHz
118-136MHz
136-174MHz
390-490MHz
490-525MHz
AM/FM
5-10-12½Kc steps

£260

DRESSLER ARA 500 ACTIVE ANTENNA

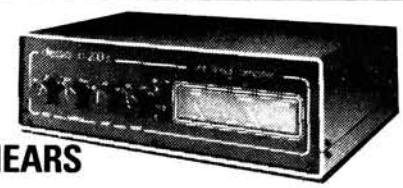
50MHz to 1300MHz
Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 500

Gain	17dB Typical (14-17dB)
Frequency Range	50-1300MHz
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

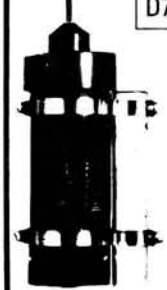
£99.00

Operation is possible up to 1300MHz with gain of 10dB
Noise 4-6dB
Intercept Point 3rd Order: +18dbm at Input



LINEARS

D200	2 MTR 500W SSB	**£699**
D200S	2 MTR 750W SSB	**£799**
D70	70 CMS 550W SSB	**£799**



dressler – ara 30 – active antenna

200 kHz . . . 40 MHz

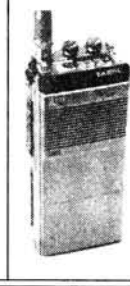
Professional electronic circuitry with very wide dynamic range. Meets professional demands both in electronics and mechanical ruggedness. 120 cm long glass fibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems. £90 + £4 p&p. See Review in August Issue p.15

MUTEK SPECIALISTS

TRIO KENWOOD TH-21/TH-41

YAESU FT209/709

YAESU FT203/703



ICOM IC2E/IC02E

ICOM IC4E/IC04E

PRE-AMPS – NEW MODELS

MODEL	FREQ.	NOISE	GAIN	POWER	PRICE
EVV1296S	1.25-1.3GHz	0.7-0.9	16-19dB	100W	£139
EVV1296C	1.25-1.3GHz	0.9-1.2	16-18dB	100W	£119
EVV1296	1.25-1.3GHz	1.9-2.1	14-17dB	100W	£100
EVV700	430-440MHz	0.5-0.9	15-18dB	500W PEP	£90
EVV2000FB	144-146	0.6-0.9	16-18dB	1000KW PEP	£90
EVV200FB	144-146	0.6-0.9	16-18dB	700W PEP	£80
EVV2000GAAS	144-146	0.6-0.8	16-18dB	1KW PEP	£90
EVV200GAAS	144-146	0.6-1	16-18dB	700W PEP	£80
EV2GAAS	144-146	0.6-0.9	15-18dB	100W PEP	£60

VV INTERFACE FOR ABOVE PRE-AMPS £20

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

C. M. HOWES COMMUNICATIONS

EASY TO BUILD KITS BY MAIL ORDER

139 HIGHVIEW, VIGO, MEOPHAM, KENT DA13 0UT
TEL: FAIRSEAT (0732) 823129

IT'S MAGIC!

Hey Presto! Your 2M rig is also a 20M rig, with the new HOWES HC220 transverter! Add a fascinating new dimension to your radio. All the tricks happen in the HC220 – your 2M multimode is not affected in any way – it just receives and transmits on 20M when the transverter's connected! A really magic idea for both the car and home station. HF mobile becomes feasible for anybody who can squeeze a 2M multimode under the dash!

- ★ 10W RF output on CW or SSB from missmatch proof transistors.
- ★ Accepts .5 to 5W (adjustable) 2M input for full output.
- ★ Operates from a nominal 13.8V DC.
- ★ Balanced receive mixer.
- ★ Balanced, broadband transmit strip.
- ★ 10 element bandpass receive filtering, 5 element low pass filter on transmit – no alignment required for either.

The HOWES HC220 kit is designed to not only work well, but to be easy to build by anyone who is competent with a soldering iron. No fancy test equipment is needed to align the module either. If you prefer, the kit is also available ready assembled and tested. Whichever form you decide on, add a case and connectors to fit in with your station, and Hey Presto, your 2M rig works on 20! Open up some exciting new horizons!

HC220 Kit: £48.90 **Assembled PCB Module £79.90**

TRF3 SHORTWAVE BROADCAST RECEIVER
Once upon a time, in days long ago, all receivers were TRF receivers, unless they were crystal sets! Now the Tuned Radio Frequency principle has been brought into the silicon age by the TRF3 receiver kit. This little receiver is really straightforward to build. It also gives much better performance than the single valve kit that I built as my first Shortwave receiver many years ago, when I was still in short trousers! How things have changed!
TRF3 Kit: £13.90 **Assembled PCB module: £18.90** (tuning capacitor £1.50)

DcRx DIRECT CONVERSION COMMUNICATIONS RECEIVER
This is our very popular single band receiver. Versions are available for 20, 30, 40, 80 & 160 Meter Amateur bands. A case and two tuning capacitors are the only major parts to add to finish your receiver. We have suitable capacitors (approx 50pF) for all but the 160M version at £1.50 each. You will be amazed how good a simple receiver can be!
DcRx Kit: £14.80 **Assembled PCB Module: £19.90**

CTX LOW POWER TRANSMITTERS
Two versions are available, one for 40M (3W output) and one for 80M (5W output). These are great fun, and are an ideal introduction to QRP CW operating. The output power level is adjustable, and one crystal is supplied. You can add the CVF VFO to give full band coverage if you wish.
CTX40 or CTX80 Kit: £12.95 **Assembled PCB Module: £18.95**

CVF EXTERNAL VFOs
The CVF40 or CVF80 can be used with the CTX transmitters to give full band coverage. They can also drive the DcRx as well to provide transceive operation. IRT (clarifier), a stable FET oscillator and onboard voltage stabilisation are just some of the features included. You will need to find a 50pF tuning capacitor to go with the CVF. We can supply a suitable one for £1.50.
CVF40 or CVF80 Kit: £9.30 **Assembled PCB Module: £14.90**

ST2 CW SIDESTONE/PRACTICE OSCILLATOR
The ST2 provides a nice sounding 800Hz sine wave note at up to 1W of output. It can work from your key, or by RF sensing of your transmitter's output.
ST2 Kit: £7.30 **Assembled PCB Module: £10.80**

XM1 Crystal Calibrator (8 o/p)	**Kit: £16.80**	**Assembled PCB Module: £21.30**
AP3 Automatic Speech Processor	**Kit: £15.90**	**Assembled PCB Module: £21.40**
CM2 "Hands free" Mic with VOGAD	**Kit: £10.25**	**Assembled PCB Module: £13.75**
PA2/15 2M 15W Linear Amplifier	**Kit: £18.90**	**Assembled PCB Module: £23.90**
PA2/30 2M 30W Linear Amplifier	**Kit: £22.90**	**Assembled PCB Module: £27.90**
CO1 RF/PTT Amplifier change-over	**Kit: £9.80**	**Assembled PCB Module: £13.80**
EM1 Electret Mic Capsule	**£1.90**	

Lightweight Headphones with 3.5mm mono jack for radio equipment **£3.30**

All HOWES kits come with a good quality fibre-glass circuit board, that has the component locations screen printed on it for straightforward assembly. All board mounted components are supplied, as are clear instructions, parts list, circuit etc. All the kits will operate from a 12 to 14V DC supply.

If you would like further details on any item, simply drop us a line enclosing an SAE. We have an information sheet for each kit.

73 from Dave G4KQH, Technical Manager
(PLEASE ADD 80p P&P to your total order value)

Delivery is normally within 7 days

RADIO & RTTY BOOKS

NEW BOOKS

COMMUNICATION SATELLITES Full details and frequencies of Ham, weather, international, DBS, etc. satellites. A very comprehensive and well illustrated book. **£12.85** + £1.50 p&p

RADIO DATABASE INTERNATIONAL Worldwide shortwave broadcasting stations at a glance. Frequencies, times, language, etc. given for stations between 2-26.1 MHz. Parts 1 2 together **£12.50** + £1.20 p&p

UK TABLE OF RADIO FREQUENCY ALLOCATIONS 20kHz-400GHz. Cover LW, MW, SW, VHF, UHF & etc. **£12.00** p&p FREE

GUIDE TO UTILITY STATIONS 1986 Now lists 15,083 SW frequencies Aero, CW, Fixed, Commercial, RTTY, FAX, etc. stations, plus callsigns and much more. The most comprehensive frequency book available. **£16.00** + £1.45 p&p

BEST OF MONITORING TIMES 1984 Many great articles on SWL. **£8.95** + 65p p&p

ANTENNAS FOR RECEIVING Most comprehensive and authoritative book on receiving aerials for all frequency range. **£12.85** + £1.55 p&p

---

RADIO BEACON HANDBOOK Worldwide listing of 8,500 Long and MW Beacons by callsign, frequency, station and more. **£8.85** + 35p p&p

AERAD – Europe & Middle East Lists all airports and the VHF frequencies used. **£5.00** + 65p p&p

US MILITARY RADIO COMMUNICATIONS Part 1 Details and frequencies used on HF. **£10.80** + 65p p&p

HANBOBOOK FOR RADIO OPERATORS Maritime bands manual **£9.95** p&p FREE

RADIOTELETYPE PRESS BROADCASTS Full details, frequencies & times of Press Agencies. **£11.85** + 65p p&p

CLANDESTINE CONFIDENTIAL **£5.25** + 60p p&p

Two or more books Post & Packing FREE (UK only). Ask for our free catalogue.
Delivery normally from stock within 14 days.
INTERBOOKS, PWD10, Stanley, Perth PH1 4QQ. Tel: (0738) 828575

AMATEUR ELECTRONICS UK

G6XBH
G1RAS
G8UUS

R.A.S. (Nottingham)
Radio Amateur Supplies
Tel: 0602 280267

AUTHORISED YAESU

Visit your Local Emporium

Large selection of New/Used Equipment on Show

AGENTS FOR:	ACCESSORIES:
F.D.K.	Welz Range
AZDEN	Microwave Modules
ICOM	Adonis Mics
YAESU	Mutek Pre-Amps
CELLNET	Barenco Mast Supports
VODAFONE	DRAE Products
	BNOS Linears & P.S.U.'s

AERIALS, Tonna, Halbar, New Diamond Range of Mobile Whips
JAYBEAM TIGER ANTENNAS
JUST GIVE US A RING
Monday: CLOSED Tuesday-Saturday: 10.00am to 5.00pm

3 Farndon Green, Wollaton Park, Nottingham
Off Ring Rd., between A52 (Derby Road) & A609 (Ilkeston Road)

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 diecast 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 installation time with no wiring necessary.
CTCSS 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.

NAME COMPANY ADDRESS

PW.4.86

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

STAR £10 LETTER

An Alternative

Sir: To elaborate on Mr Mann's letter (*PW* February 1986) I would like to point out the advantages of joining a very interesting and friendly band, namely 70MHz (4 metres). It offers superb possibilities as an alternative inter-G band, away from the crowds on "two" and the noise on "eighty".

Traditional activity periods are Tuesday evening and Sunday morning, but a call on 70·200MHz c.w. or s.s.b. will get results most evenings. There is a Midlands area net in operation most nights on 70·210 from around 2230 hours, which acts as a clearing house for up to date band information.

Many good transverters available in kit or ready-built form make the band very economical to join. The *PW Meon* transverter has already been heard with good results on 70MHz. Antennas need not create the problems some seem to imagine—I have worked all G prefixes and EI with a dipole.

Anyone wanting more details of what is happening on 70MHz, including the 1986 operating schedule of GB4MTR, is welcome to contact the writer or G4SEU (both QTHR).

John Jennings G4VOZ
Lutterworth, Leics

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.e. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of Practical Wireless.

Wartime Co-operation

Sir: During my wartime service in RAF Signals, I heard from colleagues of what could only be termed "co-operation" with the enemy, but hasten to add, for purely humanitarian purposes.

At that time, many aircrew—both British and German— were ditching into the North Sea, an inhospitable stretch of water at any time, and particularly so during the winter months. If the downed airman was not rescued within a very short while, he died of hypothermia. So the main task was to get a high-speed launch to him as quickly as possible—and then to see his bobbing head among the waves! Almost as bad as searching for the proverbial needle in a haystack . . .

One of the major problems at that time was the inaccuracy of the direction-finding apparatus in use, especially at dawn and dusk and near the coast. Taking bearings from only one side of the North Sea resulted in quite a large "cocked hat", and thus a much larger area of sea in which to search. So, quite unofficially, actual bearings were exchanged by the English and German wireless operators—using a special frequency set aside for that purpose. As a result of this "co-operation with the enemy", many aircrew were rescued alive—both RAF and Luftwaffe.

It would be interesting to learn if any readers who were associated with the RAF Air Sea Rescue Service could substantiate this story.

Douglas Byrne G3KPO
Ryde, IoW

Money saving

Sir: Ribbons for teleprinters and typewriters are quite expensive in these days, and if seldom used, do not wear out but simply dry up! One way of extending their life many, many times over is to re-impregnate them with ink by running over a rubber stamp pad previously wetted with endorsing ink. The only disadvantage is that your fingers get in a terrible mess.

Douglas Byrne G3KPO

Another way of extending the life of such ribbons which we heard of recently is to spray them with WD40.

OUR SERVICES

QUERIES

Although we will always try to help readers having difficulties with a *Practical Wireless* project, we cannot offer advice on modifications to our designs, nor on commercial radio, TV or electronic equipment. Please address your letters to the **Editor, "Practical Wireless", Westover House, West Quay Road, Poole, Dorset BH15 1JG,** giving a clear description of the problem and enclosing a stamped self-addressed envelope. Only one project per letter please. We cannot deal with technical queries over the telephone.

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the article. **Kits** for some of our more recent projects are available from **CPL Electronics**, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE. Tel: 0642 591157. The **printed circuit boards** are available from **Albol Electronic and Mechanical Products Ltd**, 3 Crown Buildings, Crown Street, London SE5 0JR. Tel: 01-703 2311/2312; **Proto Design**, 14 Downham Road, Ramsden Heath, Billericay, Essex CM11 1PU. Tel: 0268 710722; **Sitec Ltd**, Ridgemond Park, Telford Avenue, Stevenage, Herts. Tel: 0438 312566.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from **"Practical Wireless" Subscription Department, Oakfield House, 35 Perrymount Road, Haywards Heath, West Sussex RH16 3DH.** Airmail rates for overseas subscriptions can be quoted on request.

CONSTRUCTION RATING

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

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

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

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

INSURANCE

A special insurance scheme has been arranged for *PW* readers to cover your radio equipment. Details are available from **PW Radio Users Insurance Scheme, B. A. Laymond & Partners, 562 North Circular Road, London NW2 7QZ. Tel: 01-452 6611.**

BACK NUMBERS AND BINDERS

Limited stocks of some recent issues of *PW* are available at £1.25 each, including post and packing to addresses at home and overseas (by surface mail).

Binders are available (Price £5.50 to UK addresses, £5.75 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

Send your orders to **Post Sales Department, "Practical Wireless", Westover House, West Quay Road, Poole, Dorset BH15 1JG.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to Practical Wireless.

EDXC: Paris will be different in the spring! *says Peter Laughton*

Plans seem to be underway in Paris to make a rather special meeting at this year's European DX Council conference. Criticised in the past for being a bit too much of a social gathering, this year's organisers have decided to ask the manufacturers to speak for themselves.

The 20th EDXC Conference is being held over the Whitsun weekend, 16–19 May 1986. Events will start with a traditional reception, this time being given by Radio France International. The next morning, a special presentation is to be given. This will include a presentation of the results of EDXC's Computer Contest Survey. More than 100 people took part in this, and the findings promise to be interesting. Manufacturers such as Yaesu will be looking at the new CAT system, and presentation of the NRD-525 and ICOM ICR-7000 are envisaged.

The afternoon offers the chance to take part in specialised sessions discussing receiver technology, programmes on shortwaves, as well as computers. EDXC reports that there are currently three shortwave related bulletin boards operating in Europe, in Ireland, Holland and Switzerland.

Every EDXC Conference has its banquet, this year sponsored by the *World Radio TV Handbook* on the occasion of its 40th anniversary. This will be held at an excellent restaurant by the river, a few km outside Paris. Guests will be taken there by boat!

Alternative trips are being offered by the organisers to see the facilities of the French telecommunication authority TDF, and some of the local radio stations in Paris. In all, it appears to be a packed programme for a reasonable price.

The cost starts at 700 French Francs for three nights accommodation, three lunches, the banquet, receptions and transport. It does not, of course, include travel to and from the conference.

Since the deadline for applications is fast approaching, you'll need to write quickly for further details: ***EDXC Conference 1986, P.O. Box 56, F-94002 Creteil Cedex, France.*** You can also phone (33) for France, then 1 43 39 38 41. The organisers, Amitie Radio, speak excellent English.

Repeater News

Not too much to report this month following an RSGB Council dictate to the RMG requiring all news dissemination to be channelled via the publicity officer. However I have managed to find out that submissions to the DTI for three 29MHz f.m. repeaters have recently occurred. The proposal seeks permission to establish units at Birmingham, Leicester and Emley Moor in Yorkshire—the latter mounted on the TV mast. A common frequency will be used with power levels equivalent to 25W e.r.p. To ensure that the devices are used for their primary purpose of assisting low power, mobile and poorly sited stations, it is proposed to employ sub-audible tone recognition, which in theory should prevent access by the odd "wandering" 27MHz device. As with all experimental projects, and **all UK repeaters** fall within this category, operational feedback is vital and will directly influence IARU Region 1 policy.

Help Wanted

During the 1985 Red Rose Rally at the Pembroke Halls in Walkden, Manchester an item of amateur equipment was stolen from one of the trade stands manned by A. Kelly Electronics and Communications Equipment.

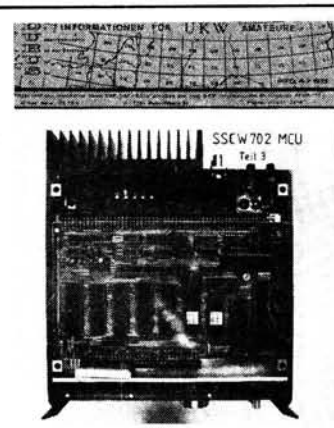
The item in question was a TR3500 v.h.f. f.m. handheld transceiver complete with speaker/microphone serial no. 3041275/M4. If you have any knowledge of the location of this equipment please contact: ***Little Hulton Police Station on 061 855 5382*** or your local Police station.

Mobile Rally

Long range warning this time of the Vange ARS Mobile Rally which will take place on Sunday 7 September at Nicholas School, Basildon. Trade stands, Bring and Buy and Refreshments will be available. Further details available from: ***Mrs D. Thompson, 10 Feering Row, Basildon, Essex SS14 1TE.***

Dubus Plus

Hot on the heels of our February mention of this worthy tome came a missive from Ken Hatton G4IZW to inform me that the subscription for 1986 has now been increased to £7.50! It's not all bad news though as the issues will be larger and also incorporate German postage increases. So for your 1986 subscription to the v.h.f./u.h.f. and microwave amateurs guide to the ultimate in DX and the sharp end of technology, post your cheques to: ***Thorneycroft House, Shield Hill, Haltwhistle, Northumberland NE49 9NW or Tel: (0498) 21372.*** Incidentally Ken also has available a very large quantity of ribbon cable. A 30m roll of 10-way will set you back £10.00 plus postage, which compares *very* favourably with the more normal £47 plus *trade* cost. Various types and colours, as many as 50-way and all 3A 250V a.c. working are available — it



makes for a very fine h.f. counterpoise when slipped under the carpet!

Chase the Dragon

Award chasers will be pleased to hear that the St George's Award will once again be available this year. The Wisbech and District Amateur Radio and Electronics Club will be running three special event stations, GB0SGD, GB4SGD and GB6SGD, active on most days between 20 April and 17 May.

To qualify for the award certificate h.f. band contacts are required with both class A stations and 8 other **English** stations. Non-UK European stations must contact 5 English stations and stations external to Europe 3 English stations plus the two h.f. award stations.

A v.h.f. version of the award is available and requires contacts to be made with any of the 3 special event stations plus stations in 8 English counties. European stations need only 5 English stations and if you manage any contacts as a non-European, you can't get an award—but I'll bet you will be just as pleased! Applications will be welcomed from s.w.l.s on the same basis.

The award, which is a two-colour on white background production, costs £1.50 (UK), 6 IRCs (Europe) or 8 IRCs/$3US. Submissions and further details from: ***Dave Wilkinson G4KHF, "Leon", Lutton Gowts, Long Sutton, Spalding, Lincs PE12 9LQ.***

Rogues' Gallery!

Those of you who visit rallies around the country may well recognise some of the faces here. We thought it was about time to introduce the rest of the team.

Sat at his desk is Geoff Arnold G3GSR, on his right is Kathy Moore, then stood behind them (l–r) is Rob Mackie, Steve Hunt, Elaine Howard G4LFM and Dick Ganderton G8VFH.

Unfortunately our Ad Manager, Roger Hall G4TNT wasn't in Poole the day the photograph was taken, so he has the honour of having his own photograph.

Keep a look-out for the *PW* stand at the rallies and come and meet the staff.

GM Convention '86

The name of Glenrothes and District ARC will be well known by most radio amateurs interested in contest operation—their successes being somewhat legend.

This year, their dedication is to be turned to organising the Scottish Amateur Radio Convention in an attempt to make this the most successful amateur radio event in Scotland to date.

The provisional date for the Convention is Saturday 13 September 1986. For further details contact ***Ken Riddoch GM3ZSP. Tel: 0334 53336*** for up to the minute information.

Special Event Station

To celebrate their 50th anniversary the Cannock Chase Amateur Radio Society will be running the special event station GB4WAB from 5 to 13 April. Operation will be on all bands from the society HQ with all contacts confirmed by purpose designed commemorative QSL card. If you also contact a CCARS member during 1986 you can claim the companion award certificate, which costs £1.50 inc.

The significance of the callsign relates to the original CCARS "Worked All Britain" award scheme started in 1969 and continued until 1973 when the present committee took over. All proceeds from this Anniversary activity will be donated to WAB for distribution to the various organisations sponsored by them, which include RAIBC.

Skeds can be arranged via the contest manager, Brian G0BXN on (0543 77558) or the QSL Manager, Alan G1AZQ on (0543 79160). Further special events are promised later in the year.

In aid of RNLI

A special event station will be on the air between 23 and 26 May this year manned by a group of Cornish radio amateurs. It will be run from one of the uninhabited islands in the Scillies, called Great Ganilly.

Sponsorship from groups, clubs, businesses and individuals is being sought before the event. They will hold a national raffle after the event has finished and one prize will be a free weekend on the Scillies with the only operating amateur resident there.

The RNLI, a very worthy cause, is very dear to the hearts of many around the Cornish coasts so the group are hoping for lots of support.

More details can be obtained from ***P. A. Bevington G4ZUI, Gwynsow Farm, Underlane, Carnkie, Wendron, Helston.***

Satellites in Education

A large number of interested organisations have recently joined forces to form the UK National Co-ordinating Committee for Satellites in Education. The committee will actively promote satellite related educational projects within British schools and will assist and liaise with: teachers who wish to become involved in using satellite data in education; individuals, or institutions wishing to conduct research on the educational uses of satellites and agencies that may fund projects.

As part of their initiative a 40-page booklet *Satellites in Education—a guide for teachers* is now available and deals with: educational possibilities; satellite orbits and tracking procedures; apparatus requirements; sources and prices of antennas and receivers. This booklet is distributed for and on behalf of the Committee by **AMSAT-UK, 94 Herongate Road, Wanstead Park, London E12 5EQ** price £3.50 (inc p&p). Cheques should be made payable to S.E.U.K.

A separate strategy paper giving further details of the initiative is available and can be obtained free of charge from: **Dr John Gilbert, Dept. of Educational Studies (AA), University of Surrey, Guildford GU2 5XH.** Other enquiries regarding the activities of the committee should be directed to the UOSAT project on (0483) 509143.

Lundy Revisited

Yes, they are going back! If you missed the Nene Valley Radio Club 1985 Lundy Island expedition listen out between 10–17 May for GB4LI, operating from the Old Lighthouse WAB SS14. All h.f. bands plus a limited amount of 144 and 430MHz activity can be expected with special QSL cards to confirm. Further details from G4NWZ at: ***128 Northampton Road, Wellingborough, Northants NN8 3PJ.***

Broadcast Listening

Statistics always make for interesting reading so when the winter 1985/86 edition of the IBA Journal *Airwaves* alighted upon my desk an item on Attitudes to Broadcasting (Radio Listening) caught my attention. It would appear that despite the lure of TV and newer rivals, radio still occupies an important place in most people's lives, with over eight in ten adults listening nowadays. This figure, amounting to 83%, is the same as that for 1984 which may indicate a stabilisation of the gradual decline noted during previous years. Certainly there is no evidence for any decline in the availability of domestic radio sets over the past five years. Like TV, multiple set homes are the norm, with one in four listeners surveyed claiming to have four or more sets available. Young adults (16–24) comprise the most likely listener group at 91% ranging down to 67% for the over 65s. No less than 67% of this latter group listen for two or more hours each day compared with 54% across all adults.

Catalogues

First place in this month's round-up of catalogues must go to *The Whiston Catalogue*. I have been receiving this intriguing little booklet regularly for probably 15 years or more and have recommended it to fellow amateurs and model engineers as an essential part of the tool box.

Sent free of charge three times a year, *The Cat*, as it is popularly known, contains a veritable cornucopia of materials, electrical and mechanical parts and tools. If you make your own antennas, do chassis bashing or even, dare I say it, steam engines, then you really must get your own copy. Just write to ***K. R. Whiston Ltd., New Mills, Stockport SK12 4PT,*** and ask for a copy of *The Cat No. 113.*

At last, after 38 years Mr Whiston has retired, selling the business to his staff—all of us at *PW* Publishing Limited wish them well in their venture. We know only too well the traumas involved in such an undertaking.

Aerial Techniques is the new name of South West Aerials and they have just launched their new catalogue and price list.

The booklet covers a wide range of antenna systems, associated parts and accessories for almost any TV enthusiast's needs.

If you are into DXTV or just need a better antenna system get in touch with ***Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH. Tel: (0202) 738232.***

Among the other catalogues and leaflets received this month is the latest West Hyde catalogue covering their comprehensive range of enclosures and boxes. They also supply a range of "front panel furniture"—indicators, switches, etc.—as well as tools likely to be needed to cut out the apertures needed to fit the furniture. ***West Hyde Developments Ltd., 9–10 Park Street Industrial Estate, Aylesbury, Bucks. HP20 1YA.***

Surfboarding

Global Specialties has introduced a completely new concept for building prototype circuits using surface-mount chips.

With the "Surfboard" the designer places a plastic leaded chip carrier (p.l.c.c.) into a chip carrier socket and has instant breadboarding access to the electronics in the chip, without soldering or permanent connections.

The "Surfboard" provides a numbered breadboarding tie-point for each lead on a chip carrier. Connection of a particular lead is achieved by inserting standard hook-up wire into the corresponding tie-point.

Changes are easily made without damage to chip carriers, p.c.b.s, or components. More than one surface-mount chip can be included in a prototype circuit through the use of additional "Surfboards".

The chip carrier socket is fabricated in phosphor bronze with tin-plated contacts, and accepts a JEDEC "type A" p.l.c.c. polarised for easy registration. Stand-offs are provided for heat dissipation.

The breadboard has replaceable nickel silver contacts and accepts components with leads up to 0·84mm diameter.

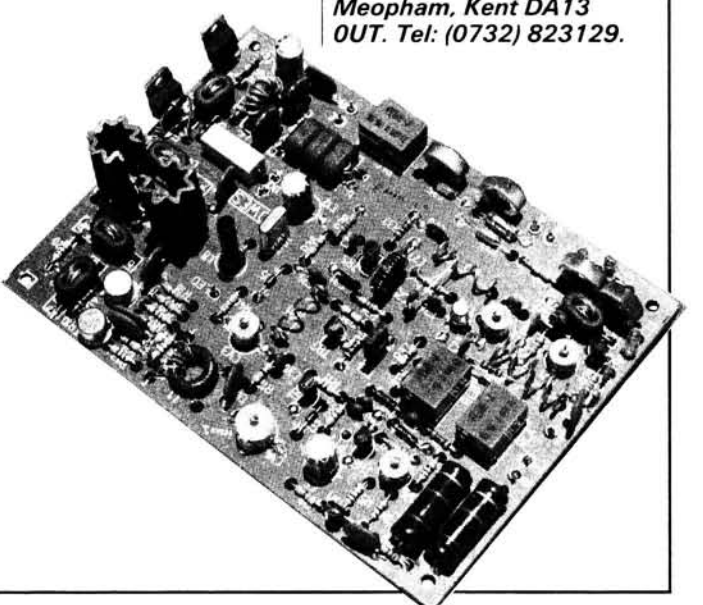
Three models are available accommodating 44, 68, and 84 pin p.l.c.c.s. More details from ***Global Specialties Corporation, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Tel: (0799) 21682.***

144 to 14MHz Transverter

The new Howes HC220 transverter enables you to use your 144MHz s.s.b./c.w. rig on the 14MHz amateur band.

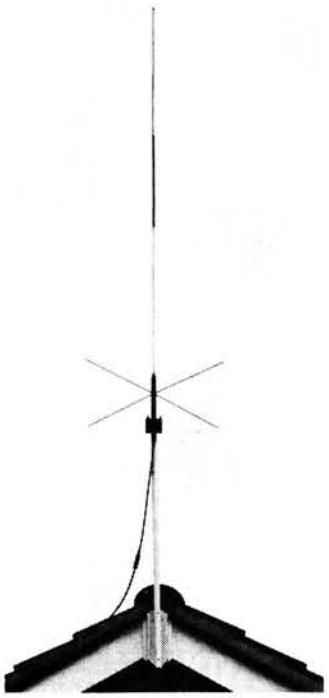
Available in either kit form at £48.90 or as an assembled p.c.b. module at £79.90 the unit produces 10W of r.f. output when operated on a 13·8V d.c. supply. The output stages are fully protected against mis-matching and the finished module can be used either with a base station rig or mounted out of sight in a vehicle for mobile use.

For full details of this and many other kits suitable for the amateur, contact ***C. M. Howes Communications, 139 Highview, Vigo, Meopham, Kent DA13 0UT. Tel: (0732) 823129.***



Colinear Antenna for 144MHz

Barry Green G1EVI, the Technical Director of a small company specialising in the manufacture of h.f. spark testers and d.c. holiday detectors down in the Romney Marshes, was troubled by the poor performance of existing commercial antennas. The area in which he lives is completely flat and suffers from fairly high prevailing winds which also carry a fair amount of salt spray from the nearby sea.



To overcome the problems of operation, wind damage and corrosion, he and fellow radio amateur G1EVH decided to construct a suitable vertical antenna. They designed a 144MHz (5/8 over 5/8) colinear antenna constructed of aluminium and *pvc* using the Marconi principle to obtain the phase change necessary to feed the inductive top element. The end result is a high gain omni-directional (6dBd) antenna claiming a superior performance to existing commercial antennas. The prototype has now been in use on Barry's roof for over six months and shows no sign of damage—despite the delightful summer we have had—or corrosion.

Following his persistence in singing its praises, and having the in-house facilities for manufacture, the other directors decided that it was a commmercially viable proposition, giving it the name UVRAL X2.

For the technically inclined the antenna is 3·14 metres long overall, weighs 1·2kg and the wind loading is 4·6kgf at 160 km/hr. It comes with 0·5 metre of UR67 cable fitted with an "N" type socket, and is tuned to 145MHz. Maximum power handling is 100W.

The UVRAL X2 is only available direct from the manufacturer, ***Buckleys (Uvral) Ltd., Beta Works, Range Road, Hythe, Kent CT21 6HG. Tel: (0303) 60127/8,*** at a price of £28.37 plus £1.50 p & p.

I was intrigued by the term "holiday detectors" so I asked Barry what it was. It seems that it is an American term for a piece of gear used in the pipeline industry to find pinholes in the epoxy, rustproofing coat applied to the outside of the pipe. If it finds a leak then the workers get a holiday whilst it is being mended!

Compact Antenna

This is Sony's AN–1 compact radio antenna which has just become available in the UK. Claimed to give excellent value for money with reliability the AN–1 has been designed for reception over the frequency range 150kHz to 30MHz.

The built-in r.f. amplifier uses an f.e.t. to give low-noise performance. The unit operates from either domestic mains electricity supply or batteries and costs about £50.

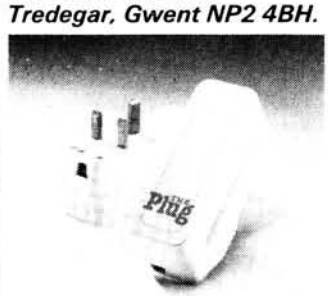
Sony (UK) Ltd., Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 61688.

The Plug

LCR Components, manufacturers of a broad range of capacitors and other electronic components, has produced a new plug-in mains filter. Designed to protect microcomputers and sensitive electronic equipment from mains-borne interference, the filter can remove both high energy transients and symmetrical and asymmetrical interference over a wide frequency range. By simply connecting the filter to the equipment lead in a similar manner to a 13A plug, the resultant single plug and socket connection to the mains supply reduces the risk of accidental disconnection.

The LCR mains filter consists of both a transient suppressor for removing mains-borne spikes and a filter to remove interference. The transient suppressor has an energy rating of 32J and a response time of less than 25ns for a peak current of 1200A. The filter consists of a twin choke wound on a high permeability ring core coupled with an arrangement of two 2·5nF (Y) capacitors and a 0·1μF (X) capacitor. The Y capacitors are of a fail-safe design which prevents short circuits. This is important, since with filters employing inferior Y capacitors, fire can result from a short-circuit. The filter gives both symmetric and asymmetric attenuation of mains-borne interference over the frequency range 0·1 to 30MHz. The whole circuit is housed in a cream ABS casing which plugs directly into a standard 13A socket outlet.

The original design of the mains filter was marketed under the trade name of "The Plug" from Power International. LCR Components has recently acquired the design and enhanced it to produce their own high specification model. Further details from ***LCR Components, Woodfield Works, Tredegar, Gwent NP2 4BH.***



FRG-9600 Scanner Mods

Readers who are contemplating buying the Yaesu FRG-9600 scanning receiver, and those of you who have already got one, will be interested to learn of a modification package being offered by R. Withers Communications Ltd.

The package includes the improvement of the receiver sensitivity for earlier models, S-meter re-calibration to give more realistic readings and the extension of the coverage up to 945MHz. The frequency extension now takes the upper limit high enough to give coverage of 934MHz CB.

Customers who purchase the FRG-9600 from RWC may have the options fitted at no extra cost and this, I understand, also includes existing RWC customers. The cost to owners who bought their sets elsewhere is £25.00 inc. VAT and return postage. RWC state that unless they originally supplied the set the warranty will be affected.

Other developments are under way including a low frequency option to take the lower frequency end down below 60MHz.

For details contact ***R. Withers Communications Ltd., 584 Hagley Road West, Oldbury, Quinton, Birmingham B68 0BS. Tel: 021-421 8201.***

Tune into Realistic® Portable Scanners & Receivers ...The Obvious Choice.

Realistic PRO-31 Portable Programmable Scanner.

This microprocessor-controlled unit allows you to scan up to 10 channels continuously. Direct keyboard frequency entry large LCD channel/frequency display, squelch control, built-in speaker, flexible antenna, jacks for earphone and long-range external antenna. 68-88 MHz VHF-Lo, 138-174 MHz VHF, 380-512 MHz VHF. Requires 6 "AA" batteries. **20-9132** **£199.95**

Realistic DX-360 Portable 9-Band Communications Receiver.

Listen to international news, all the AM/FM channels, international longwave broadcasts and six shortwave bands. Built-in AFC for drift-free FM, telescoping antenna for FM and shortwave reception, loopstick aerial for AM and LW. LED tuning/battery indicators and 1/8" earphone jack. Requires 4 "AA" batteries/mains adapater.
20-208 ..... **£69.95**

Tandy®

Tunes You Into A World Of Better Listening

Over 300 Tandy Stores And Dealerships Nationwide.
See Yellow Pages For Address Of Store Nearest You

Tandy Corporation (Branch UK), Tameway Tower, Bridge Street, Walsall. West Midlands. WS1 1LA

PW MEON 2

One of the most common questions that the authors have been asked is "can the PW Meon transverter be used with a 144MHz i.f.?" The answer is YES. Sam Jewell G4DDK and Dave Powis G4HUP provide the details and also evaluate p.a. options.

The modification for 50MHz operation in conjunction with a 144MHz transceiver is straightforward for the transmit converter but does involve a revised diplexer and post mixer amplifier stage in the receive converter.

To avoid any confusion with the original 28MHz i.f. stage, component references in this area are prefixed with the number 2. Where component values have been modified in the local oscillator to accommodate the 144MHz i.f. these changes are shown in Table 1. The original 28MHz i.f. design can be found on page 36 of the October 1985 issue of *PW*. Photostat copies are available from the *PW* Editorial offices at 75p.

Design Changes

Local oscillator: In order to convert 50MHz to 144MHz it is necessary to use a conversion frequency of: 144–50 = 94MHz. Unfortunately the design of crystal oscillator used in the *PW* Meon cannot easily be used at 94MHz, since it is meant for third overtone operation and a crystal at 94MHz would be either fifth or seventh overtone.

By operating the oscillator at 31·333MHz and tripling in the following stage the existing circuitry can still be used. The only changes required are to the number of turns on L6 and L7. The major disadvantage to this scheme is that the crystal oscillator second harmonic at 62·667MHz may appear in the output spectrum. It will, however, be at a very low level and should not be a problem. At least 10dBm is available at 94MHz from the tripler stage.

Transmit Converter: No modifications are required.

Receive Converter: No modifications are required to the r.f. stage. The type of simple diplexer used in the original *PW* Meon circuit relies upon the intermediate frequency being much less than the signal and local oscillator frequencies. With a 144MHz i.f. this is no longer true and an alternative diplexer arrangement is required. The grounded gate f.e.t. configuration has an input impedance given by: $Zi=1/g_m$ where g_m is the transconductance of the f.e.t. measured in millisiemens (mS). With a transconductance of 20mS the input impedance will be 50Ω. Finding an f.e.t. with the required transconductance is not easy since the spread of this parameter is often large with most types of f.e.t. The J309 and J310 have a spread of g_m that covers the required range, but selection by measurement will be required if matching is to be exact. Experience with these devices has shown that if drain current is measured with the source lead connected to the gate (I_{dss}) at, say, 10V then a current in excess of 17mA will often indicate a transconductance close to 20mS. Closer matching than this is just not necessary in this application.

A grounded gate f.e.t. amplifier stage now provides the 50Ω termination for the SBL-1 mixer at all critical frequencies. Additionally it provides several dB of post mixer gain. If 2R2 is replaced with a higher value, or removed altogether, the gain of this stage will increase dramatically. The chosen value optimises dynamic range such that the mixer stage is the limiting factor in achieving a higher intercept point for the entire receive converter.

It is possible to replace the original 28MHz i.f. Meon diplexer and post mixer amplifier arrangement with this f.e.t. circuit, Fig. 1. However, the *original* i.f. tuned circuit values would need to be retained.

Due to a change of gain distribution it is recommended that the value of the attenuator, R34/35/36, between the r.f. stage and the mixer be changed from 10 to 6dB. The new resistor values are given in Table 1.

Construction

No physical changes are required to the original p.c.b. to accommodate the new i.f. Unfortunately it has not proved possible to fit the components associated with the new receive i.f. directly into the old locations. It has however been possible to fit them into some of the existing holes as shown in Fig. 2. Only the junction of 2R1 and 2L2 is not supported by a p.c.b. land. Resistor 2R2 is fitted underneath the board, across 2L3.

Alignment

Local Oscillator: Place an absorption wavemeter, tuned to 31·3333MHz, close to L6 and adjust L6 until the wavemeter indicates the oscillator has started. Peak the reading by carefully adjusting the core of L6. Switch off and then on, checking that the oscillator restarts. If it does not then readjust the

TABLE 1:
Component value changes for 144MHz i.f.

L6	9T
L7	5T, tap at 1T from R24
XL1	31·333MHz HC18/U
R34/36	150Ω
R35	39Ω

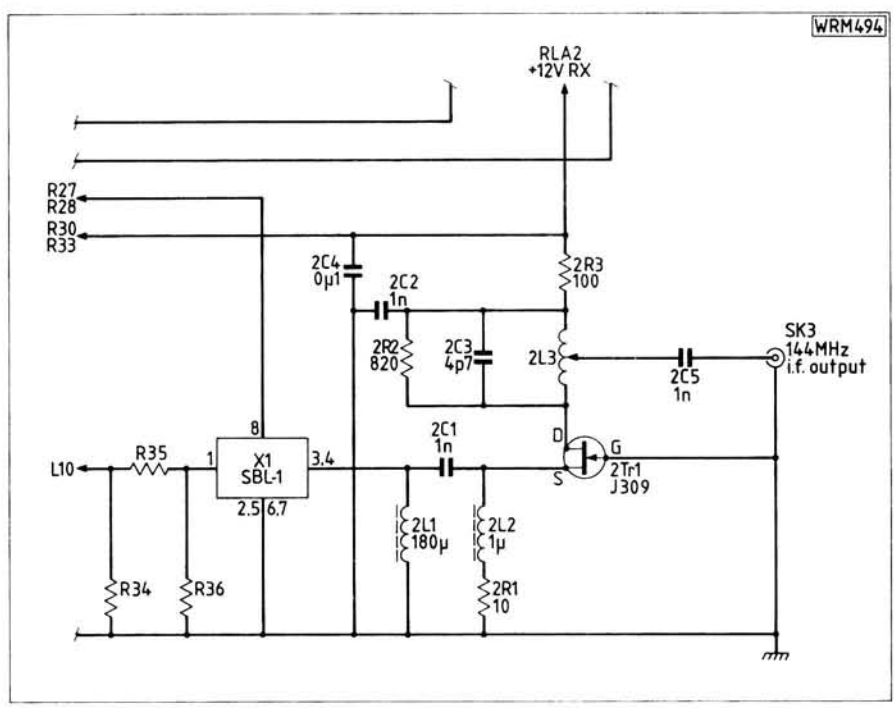


Fig. 1: Circuit diagram of the revised i.f. amplifier stage

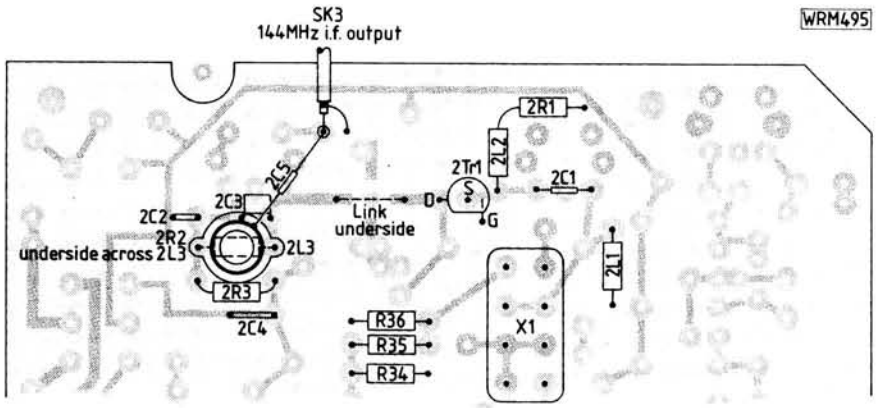


Fig. 2: Revised component location. 2L3 is tapped at 2 turns from the top

core of L6 until oscillation recommences. Once again peak the output, followed by turning the core back from the peak by a quarter turn. Again check for restarting. Repeat if necessary and turn the core another quarter turn.

When satisfied that all is well, place the wavemeter close to L7 and adjust C30 for a peak reading at 94MHz. If you have a power meter capable of measuring accurately levels as low as 10mW, then lift the end of C29 connected to R26/27 and connect the power meter. Check that at least 10mW is available and then reconnect C29. A simple, but accurate, design for a dummy load/power meter is shown on page 9.7 of the RSGB *VHF/UHF Manual*, fourth edition. Without this ability to measure the local oscillator level it will be necessary to assume all is well and proceed to the next stage.

Receive converter: Connect the i.f. output to a 144MHz receiver. Adjust the aluminium core of 2L1 for a peak in the noise output—at this stage the noise increase may not be very large. Now adjust C40 and C38, in that order, for a further increase in the noise output. Connect an antenna to the receive converter input and adjust C35 for yet more noise increase. Remove the antenna and note that the noise output falls. To be correct a 50Ω termination should be used rather than the open circuit. In practice removing the antenna should be sufficient.

It should not be possible to incorrectly tune to the image frequency during alignment due to the large frequency difference. It may be possible however to accidentally select the second harmonic of the crystal at 62·666MHz during the local oscillator alignment. Tuning the r.f. stages to approximately 82MHz will now also produce a noise peak at the output. If you hear public services traffic instead of 50MHz beacons and the trimmers in the r.f. stages are nearly unmeshed, **then recheck** the alignment!

Transmit Converter: Alignment of the transmit converter is unchanged from the original *PW* Meon.

PA Stage

The authors hoped to be able to present two alternative p.a. options for use in conjunction with the 50MHz Meon transverter and in fact two systems were evaluated up to working prototype level. Unfortunately having obtained a sample Mitsubishi M57735 r.f. power module, which works well in this application, no guarantee of supplies could be obtained. Should the manufacturer decide at some future time that the potential for module sales within the UK is viable the developed design will be published.

All is not lost though as a readily available discrete p.a. kit is available in the UK with versions available for 50, 70 or 144MHz. Whichever p.a. is used do not forget that for the recently introduced UK 50MHz band the maximum power levels are carrier 14dBW e.r.p. and p.e.p. 20dBW e.r.p. Effective radiated power is calculated by considering the p.a. stage output capability, feeder cable/filter stage losses and the gain of the antenna (14dBW = 25W).

Discrete PA

For those who like to build their p.a.s and have plenty of adjustments to "tweak" the circuit diagram of a two-stage, tuned r.f. amplifier is shown in Fig. 3. The amplifier is the TA6U2, from Spectrum Communications, and is available ready built, or as a kit, so there need be no time wasted in chasing half a dozen different suppliers to find all the bits. The amplifier is rated to give 20W output for 0·5W in, which matches the Meon board nicely.

The p.a. printed circuit board fits snugly into a "converter" size diecast box, Eddystone 7134P (111 × 60 × 27mm) or equivalent, and contains all bias components and a low-pass filter at the output. There is just room in the Meon box to mount the p.a. but some thought must be given to heatsinking. The diecast boxes themselves are not adequate heatsinks at this power level, 10W output is about the limit, and even then it is better if the boxes are given a black finish. A heatsink is supplied with the p.a. and should be adequate for s.s.b. use. If extended periods of high duty cycle are envis-

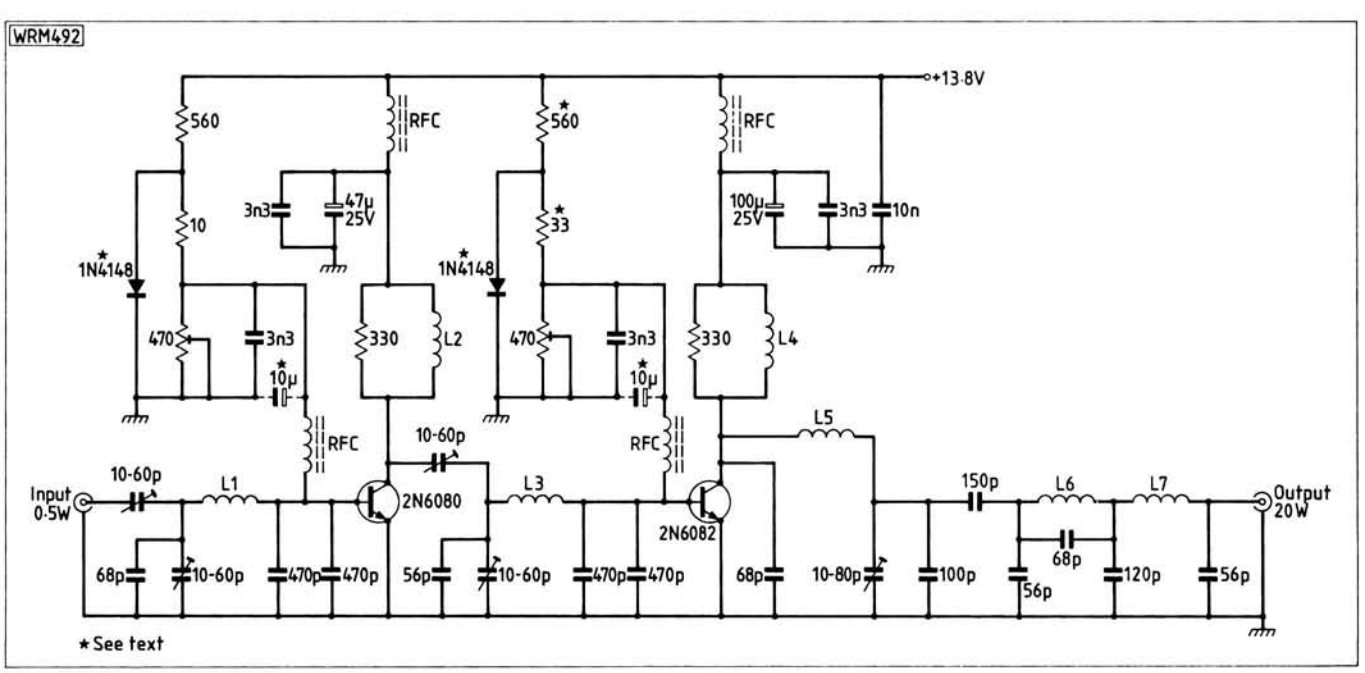


Fig. 3: Circuit diagram of the Spectrum TA6U2 p.a.

aged you would be well advised to increase the heatsink size.

The p.a. in its own diecast box, is mounted on the underside of the Meon lid, with the heatsink on the top of the lid as shown in Fig. 4. The heatsink is mounted on to the top of the lid by screws which pass right through, and secure the small diecast box to the underside of the lid. The studs of the power transistors bolt right through both diecast layers, but are not long enough to pass through the heatsink as well. This requires holes to be drilled in the heatsink to clear the nuts on the p.a. transistor studs.

The kit comes with all coils ready wound, and full instructions for assembly, so no purpose is served by merely repeating them here. However, some problems were encountered on trying to set up the amplifier. The bias for the second stage could not be set up as detailed, and even when it was achieved, the linearity of the amplifier, as evidenced by the intermodulation distortion (i.m.d.) products, was poor.

PA Biasing

Attention was turned to the bias circuits for the two stages. The arrangement shown on the circuit diagram is a fairly standard bias connection for medium power linear r.f. amplifiers. A diode is used, in its forward biased state, to establish a reasonably stable voltage of around 0·7V. A potential divider is then used to tap across this voltage and raise the base potential of the transistor sufficiently to cause a small standing current to flow in the collector circuit. For convenience the potential divider is usually made variable. To avoid r.f. being shunted from the base by the bias circuit, the connection is made via an r.f. choke, decoupled at the "cold" end. The overall effect of this is to take the transistor operation out of Class C, where the peaks of the drive signal turn it on, into a linear mode, with much lower distortion.

The effectiveness of this bias arrangement is dependent upon sufficient current flowing down through the diode to swamp the current drawn out into the base circuit. As the s.s.b. drive is applied to the device, signal components at audio frequency may develop across the bias circuit, and cause the operating point of the transistor to change. To avoid this it is important both to make the current large, as mentioned above, and to decouple the diode. In the amplifier tested, 1N4002 diodes were used, and 10µF tantalum capacitors were used for the decoupling. No changes were needed to the resistor values in the first stage bias circuit, but in the second stage some changes were needed to achieve the necessary collector current. The resistor in series with the diode was changed to 180Ω, 1W, and the fixed resistor of the potential divider was reduced to 4·7Ω. Kits and ready built p.a.s supplied in future will contain these components.

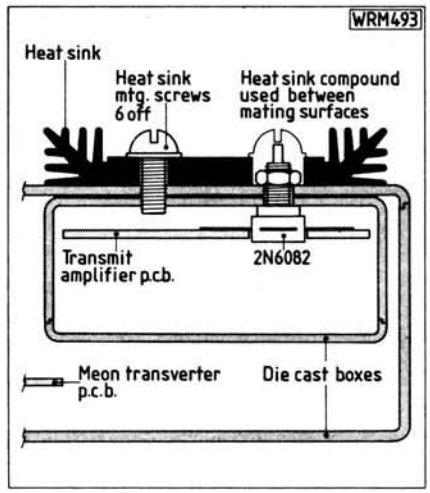


Fig. 4: Heatsink and p.a. mounting details

Once these changes had been made the bias currents were set up following the instructions with the kit. Experimentation showed that the quoted values (25mA for each stage) were close to the optimum, as the best linearity was obtained with 23mA on the first stage and 30mA on the second.

Testing

The p.a. was tested first by driving it with a signal generator (through an intermediate amplifier to give a sensible drive level), and observing the output spectrum and amplitude on a spectrum analyser. It was then connected after the Meon transverter, via a low-pass filter, Fig. 5. The filters used were of the trapped filter design detailed in Fig. 5a, on page 45 of the October 1985 issue of *PW*. Figure 6a shows a plot of the output spectrum of the G4HUP transverter (which is an early pre-Meon version and has not so far been modifed to the latest information) through the low-pass filter. The output spectrum of the p.a. is shown in Fig. 6b. Although the amplifier includes a low-pass filter at the output, its performance was not outstanding, with the second harmonic only 50dB down with respect to the carrier. Considering that the second harmonic of 50MHz is in the Band II broadcast band, anyone using the p.a. would be well advised to fit a further external low-pass filter stage. The trapped filter design can again be used at this point with power levels up to 20W.

Linearity was checked by combining signals from two signal generators, with a 2kHz separation between them. Frequencies of 28·100 and 28·102MHz were used for this test, giving wanted signals of 50·100 and 50·102MHz, third order products at 50·098 and

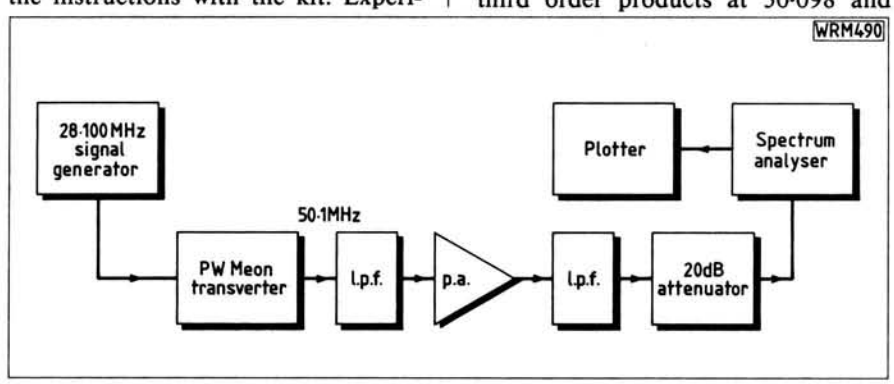


Fig. 5: Equipment set-up for spectral performance checks

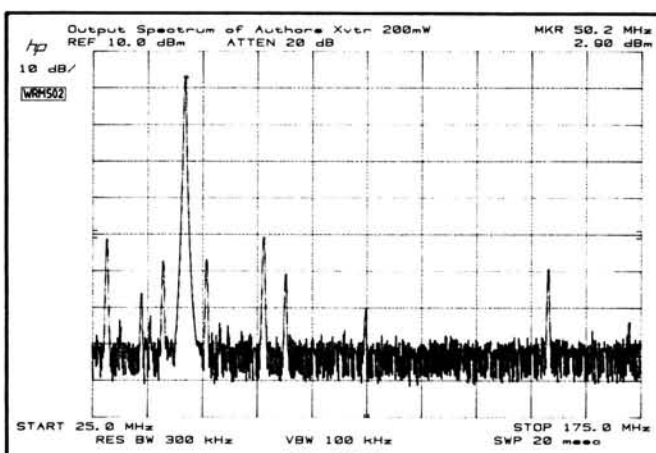


Fig. 6(a)

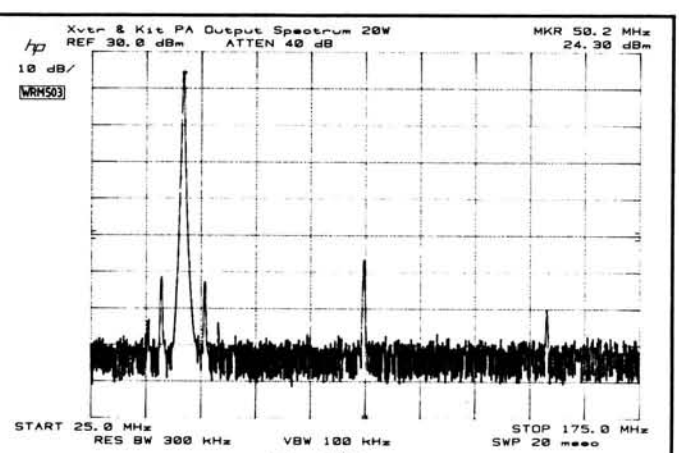


Fig. 6(b)

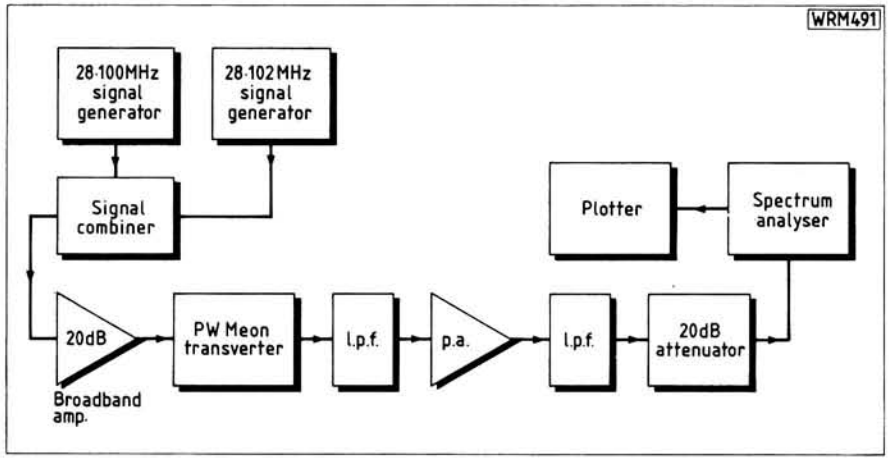


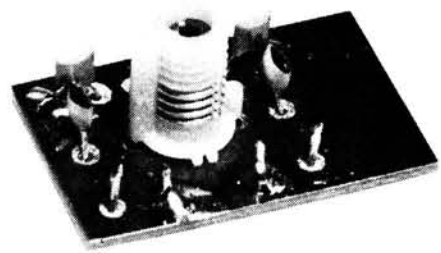
Fig. 7: Arrangement used for i.m.d. measurements

50·104MHz and fifth order products at 50·096 and 50·106MHz at the output of the transverter. The linearity was checked in this way at outputs of 400mW and 8W p.e.p., i.e. 100mW and 2W per signal, respectively. The results of these tests are shown in the plots of Fig. 8a/b. Figure 8c shows, for comparison, the linearity of the amplifier before the bias modifications were carried out. A 2kHz separation of the tones was used as this is representative of typical signals that may appear in the p.a. in s.s.b. service.

Connection To The Meon

Due to the way the Meon p.c.b. was designed, connecting in an external p.a. is straightforward. The circuit diagram of the Meon is shown in Fig. 2 of the original article and located between the output *Pi* circuit (L5, C19 and 20) and the antenna switching relay, you will see some links marked A-B and C-D.

Reference to the component location diagram shows these links to be positioned on the left side of the board. To connect in the p.a., break the two links, and using the shortest practical length of RG174 type coaxial cable, connect B to the input of the amplifier (via the trapped filter if fitted) and D to the output. Ground the braid of the coaxial cable at both ends. Power for the amplifier can be obtained from point E, which is adjacent to C19. To



A completed trapped filter

ensure that second harmonic output at 100MHz is kept to a very low level it is strongly recommended that trapped filters are fitted to both input and output. A p.c.b. layout for the filter is shown in Fig. 9. There is sufficient space under the p.a. housing to mount the input filter directly onto the lid. To avoid interaction and filter bypassing it is suggested that the p.a. output filter is mounted external to the transverter,

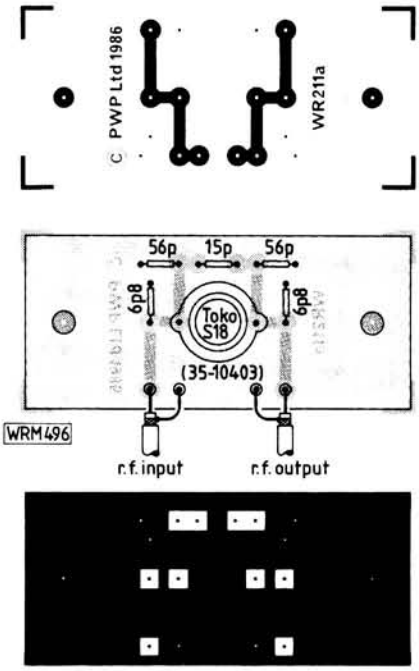


Fig. 9: Component layout and p.c.b. track layout of the filter board

within its own diecast enclosure. With a typical insertion loss of 0·4dB this will not compromise the receive performance if fitted in the antenna lead.

It may be difficult to ensure that the two low-pass filters are set up to the best performance. It is suggested that a performance close to the optimum will be achieved by the following method: Unscrew the cores of both filters. Connect a dummy load to the output, via a

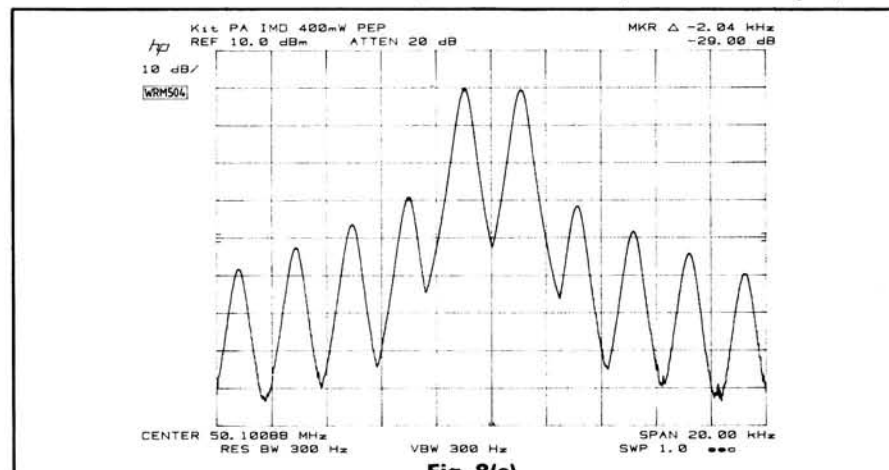


Fig. 8(a)

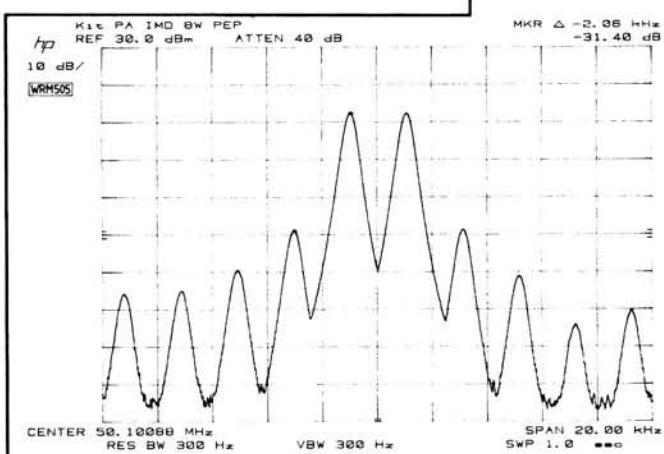


Fig. 8(b)

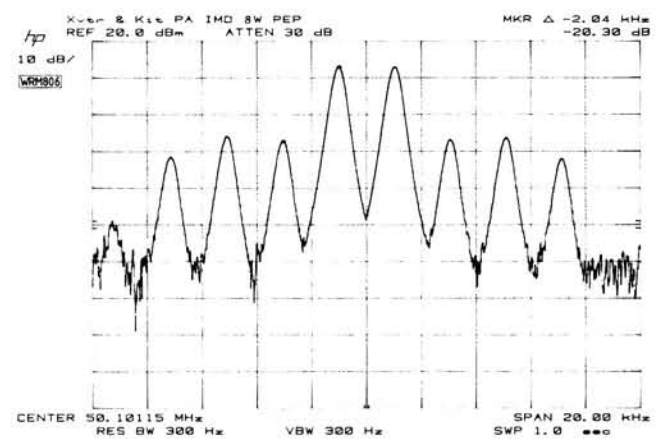
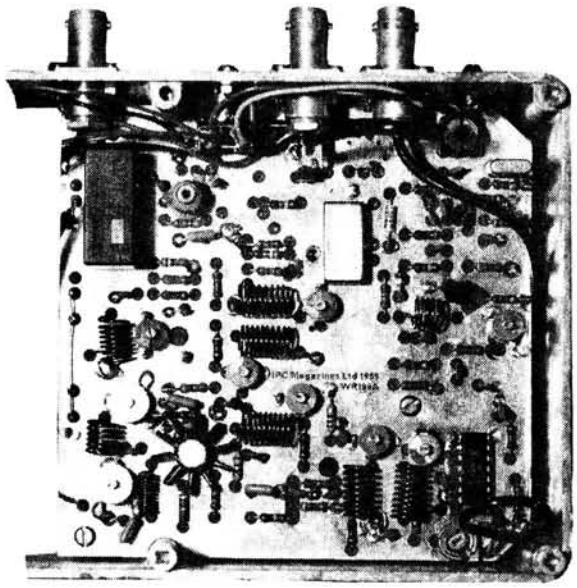


Fig. 8(c)



The author's prototype 144MHz i.f. Meon

SHOPPING LIST

REVISED I.F. AMPLIFIER

Resistors
¼W 5% Carbon film

10Ω	1	2R1
100Ω	1	2R3
820Ω	1	2R2

Capacitors
Miniature ceramic

4·7pF	1	2C3
1nF	3	2C1, 2, 5

Multilayer ceramic

0·1µF	1	2C4

Semiconductors
Transistors

J309	1	2Tr1

Inductors
Siemens B781085 moulded chokes

1µH	1	2L2
180µH	1	2L1

Toko S18 yellow, 4½ turns with aluminium core (Cirkit 35-00403)

	1	2L3

How Much? & How Difficult?
£3
Intermediate

power meter, and apply sufficient drive to the system to give a deflection of say 75 per cent f.s.d. on the power meter. Now start to screw in the core of the l.p.f. between the transverter and the p.a., continuing until the reading on the meter starts to fall. Repeat the procedure for the output l.p.f. The tops of the cores on both coils should be just below the top of the formers when this point is reached.

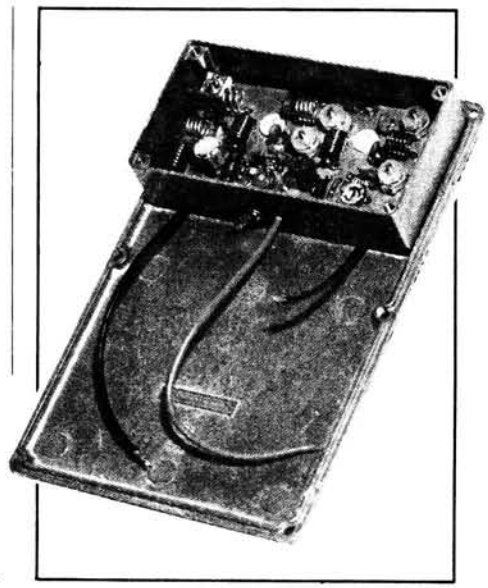
PA Source

The TA6U2 is available from **Spectrum Communications, Unit B6, Marabout Industrial Estate, Poundbury Road, Dorchester, Dorset DT1 1YA, Tel: (0305) 62250.**

Four versions of the p.a. exist which include: basic p.c.b. and all components at £40·50; built and tested p.c.b. at £48·75; p.c.b. kit with ready drilled 100 × 50 × 25mm Eddystone diecast aluminium box at £45 and a built, tested and boxed variant at £53.00. All versions come complete with full instructions and heatsink.

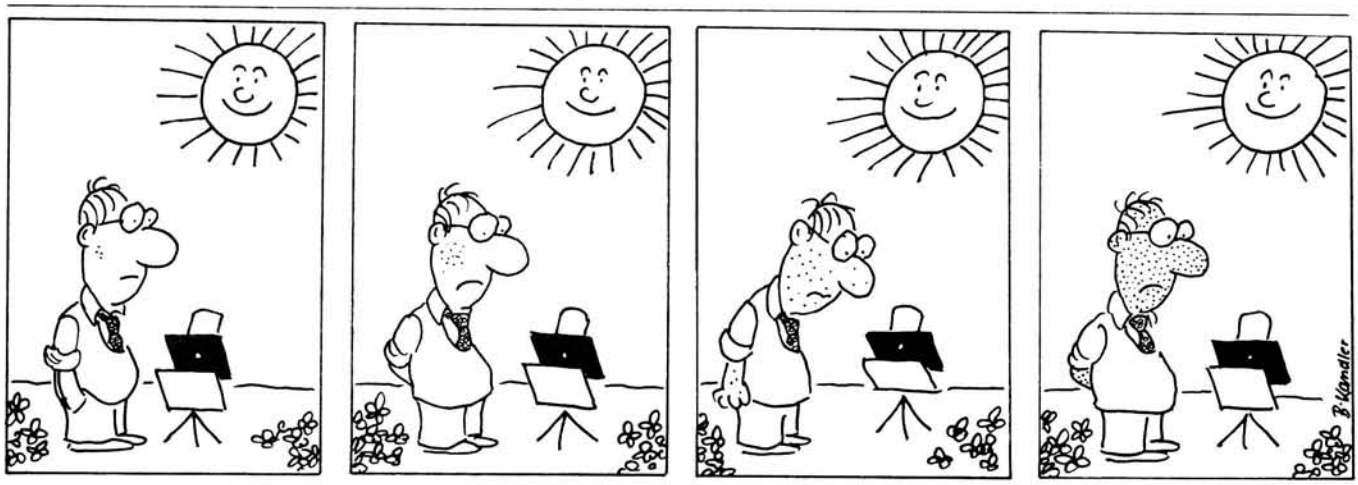
Acknowledgements

Contributions from G4FRE, G4DDN, G4PBP and G8TIR are acknowledged in the development of both the original transverter and this 144MHz i.f. version. **PW**



The lid-mounted Spectrum Communications 50MHz p.a.

BENNY



Did You Know . . . Eric Westman

That Marconi used a 20 000-volt spark to radio across the Atlantic?

In his successful attempt to send wireless waves from an experimental transmitter at Poldhu, in Cornwall, across the Atlantic to Signal Hill in Newfoundland, on 12 December 1901, Marconi used wireless apparatus of the then unprecedented power of 25 kilowatts. The 2000-volt output of a generator driven by a 32-horsepower petrol engine was fed into a set of transformers that stepped it up tenfold. A huge capacitor formed of oil-filled tubs containing plates of glass covered with tinfoil was attached. The whole produced "impressive electrical fireworks" in the spark gap, yet was only just sufficient to enable Marconi, using an antenna held 122m aloft by a kite, to hear the faint whisper of the three 20 000-volt "dots" tapped out by his assistant 4000km away.

"Bernie – what about people who can't get to N.E.C?"

A.R.E. Communications Ltd.

38 BRIDGE ST.,
EARLESTOWN,
NEWTON-LE-WILLOWS,
MERSEYSIDE.
TEL: 09252-29881

"We'll hold these prices until May Brenda."

BERNIE AND BRENDA PROMISE TO TEAR NEC APART WITH THEIR SPECIAL EXHIBITION PRICES

Once again, the year's major amateur radio exhibition at NEC Birmingham is just around the corner. Once again B & B are as determined as ever to offer the best value to be had at the Show. We have selected just a few items from the vast selection that we will be showing and, as always, we will have a large stock of all makes that can be bought at our stand.

NEW
2 METRE HANDHELD TRANSCEIVERS BY
KENPRO

6 CHANNEL (2 Fitted)
2 WATTS

£55 EACH OR TWO FOR **£99**

NEW ICOM ICR7000
25MHz to 2GHz

All mode, 99 Memories, Keyboard Entry, 6 Tuning Speeds Optional Infra-red Control + Voice Synthesiser

£849

YAESU FT-726

2 Metre-70cms & HF all in one rig – The complete base station

FROM £749

ICOM IC3200 DUAL BANDER

Icom's Superb dual-band mobile Transceiver with built-in Duplexer

SPECIAL SHOW OFFER

YAESU FRG-9600

Probably the most comprehensive receiver ever for the serious shortwave listener. Now with HF plug-in converter. 500KC-30MHz HF 60MHz-905MHz VHF/UHF ALL MODE

£449 INC. HF CONVERTER

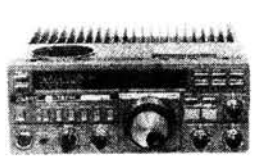
HAND-HELD TRANSCEIVERS
ALL POPULAR MODELS IN STOCK

FT203	**FROM £159**
FT209	**FROM £199**
FT209RH	**FROM £239**
FT703	**FROM £205**
FT709	**FROM £225**
TH21	**FROM £149**

Heavy Duty Battery PB21H for TH21 or TH41

YAESU FT-757GX

Still the most popular HF rig available. Complete SSB, AM, FM, CW Transceiver. General coverage receive, scan & memories



£699

KENWOOD-TRIO TS940

Undoubtedly the finest HF amateur transceiver yet produced. Owing to pound fluctuation at the time of going to press it is impossible to quote a firm price. We will certainly be able to quote a very attractive price at NEC.

YAESU FT290 AND FT690

All mode portable Transceiver. Now available for 6 metre coverage. Complete with nicads, charger, carrying case.

SPECIAL SHOW PRICE

CONVERT YOUR SCANNER TO 1.3GHz OR HF OR BOTH

A.R.E. Communications have developed 2 converters to match most VHF scanners. If you own an AOR2001 the converter will tune to 1.3GHz or if you have an FT-9600 you can convert down to HF tuning from 100KC to 30MHz to make a truly general coverage receiver.

£89 EACH

Phone 09252-29881 for all mail order — Access & Barclaycard accepted

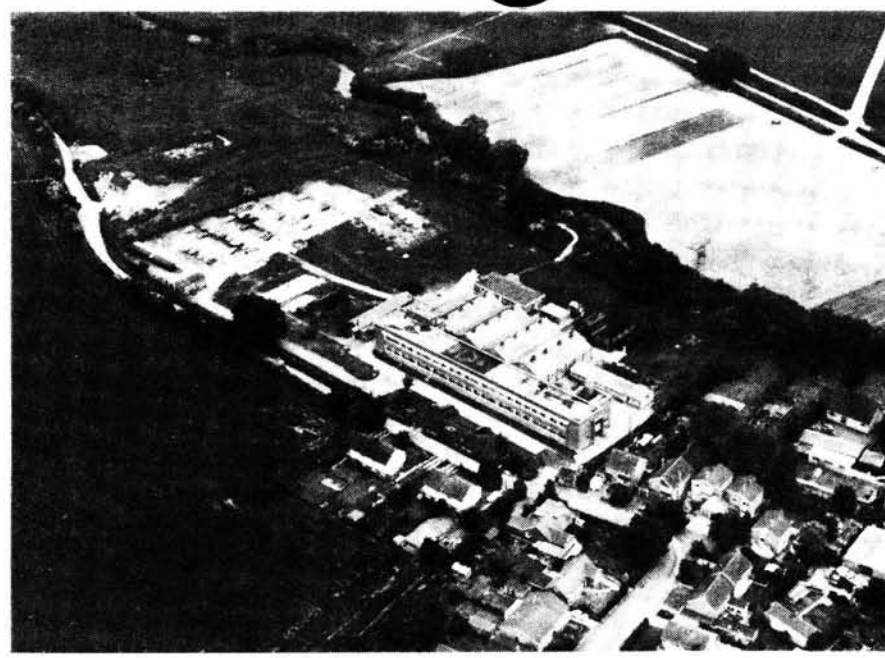
Trade enquiries welcome

Opening hours: Tuesday-Saturday 10am-5pm

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

The Birth of Broadcasting Part 2

Tim Wander completes his look at the beginning of a revolution in communications



The Writtle site today

The Writtle Team

The picturesque village of Writtle can claim to be not only one of the oldest settlements in Essex, but also one of the suggested birthplaces for Robert the Bruce in 1274. However, the Marconi site in 1922 was hardly the place for history in the making. The team who inhabited the draughty hut were all enthusiastic and dedicated engineers, led by Captain Peter Pendleton Eckersley (later chief engineer at the BBC). They included Noel Ashbridge (later Sir Noel and the first technical director of the BBC), B. N. MacLarty (later head of design and installation department at the BBC), H. L. Kirke (future head of the BBC research department) and R. T. B. Wynn (also destined for the BBC as Chief Engineer 1952–1960).

The atmosphere is remembered as being friendly and constructive, "we all taught one another, cursed head office and screamed good natured abuse at the works for not following our specifications". The team were extremely loyal to their own section and found a lot of time to laugh despite the fact that conditions were far from ideal. A good north east wind reminded them all of the active sewerage farm in the next field, there was no electricity supply (the only power being provided by a 100 volt d.c. generator), little sanitation and for some time no water supply. The hut consisted of an office at one end, a drawing office and laboratory in the middle with a workshop at the far end with the only heating supplied by an ancient coke stove that dictated that it was always too hot or too cold. Another problem was that their only vehicle for goods transport was a motor bike and sidecar with reputedly very dodgy brakes, especially when wet. The local farmer used to regularly extract members of the team from the surrounding ditches.

Eckersley remembered that the Writtle team were not sorry when the Chelmsford broadcasts closed down as they were so powerful and so close that they interfered with Writtle's experimental work, easily lighting receiver valves with the antenna current when the Chelmsford station was testing. The new Writtle station could not hope to match this power especially as they were not to interrupt their normal routine while putting the station on the air. The regulations imposed on the station were very strict with the maximum output power limited to 250W and transmission time not to exceed one half hour each week. The station also had to close down for three minutes in every ten while the engineers maintained a listening watch on its own wavelength for instructions to close down completely should the broadcast be causing interference with any legitimate service (presumably making the 2MT station an illegitimate service?).

So it was that a single weekly programme from 8.00 to 8.30pm on a Tuesday evening was decided on (in any case the amateur audience also had their normal work), and for a little extra pay they began rather lightheartedly to throw together some valves, capacitors and chokes on a board to produce the low power transmitter. The Writtle team were forced to start from scratch, nobody at the site had any previous broadcasting experience, the project was allocated no funds and all equipment had to be designed and built from first principles.

It didn't matter, the Writtle pioneers were about to write their one small piece of history. On 14 February 1922 for 11 months until 17 January 1923 the young engineers in their spare time launched and sustained the first regular scheduled broadcasting service that Britain had ever seen.

The Transmitter

The transmitter was designed by MacLarty and Kirke, being similar to that designed by P. P. Eckersley for the ground station transmitter at Croydon aerodrome in 1920. It was built by F. Bubb and H. J. Russell from any available components that were mounted on two panels obtained from a disused c.w. transmitter, and was very simple compared to other equipment under development at that time in Writtle. It is reputed to have taken under an hour to get it going but during the rest of the week various parts had to be removed as they belonged to other experimental work in progress and every Tuesday it was reassembled to put Writtle back on the air. However, any impression that the station was short of components is incorrect as the Marconi laboratories in Chelmsford could supply their needs within the hour especially replacement valves, which were regarded as altogether vicious and troublesome beasts.

The transmitter can be best described by the person who designed it,

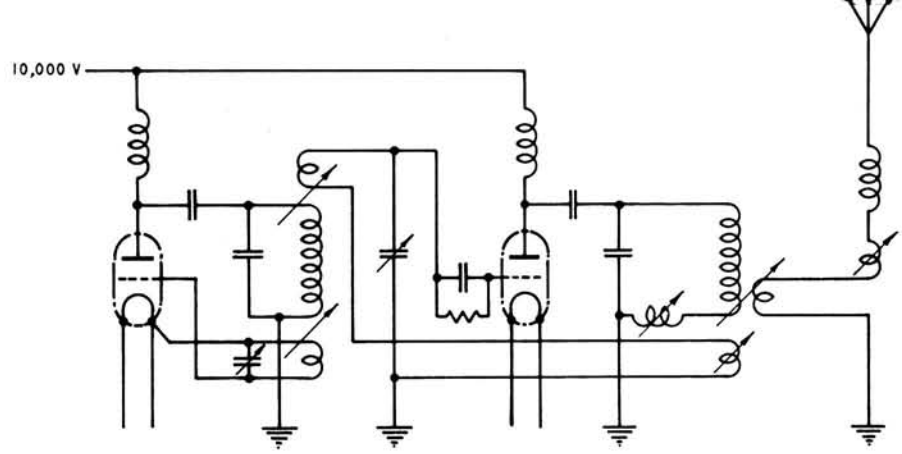
B. N. MacLarty, Engineer in Chief at the Marconi Wireless Telegraphy Co. Ltd. who wrote in a letter to *Wireless World* in January 1963:

It can be seen from the circuit diagram that the radio frequency circuit was of the self-oscillatory variety using a reaction coil (tuned to 0·7 of the operating wavelength) coupled to the main tank circuit. The antenna tuning coil consisted of an ebonite slat transformer which was magnetically coupled to the primary tuning circuit while the closed circuit capacitor consisted of a stack of zinc plates separated by ebonite insulators which was kept under the bench. In order to obtain the correct anode impedance a tightly coupled secondary winding (consisting of a coil of 20 s.w.g. wire) was wound over the primary tuning inductance. This coupled circuit was later dismantled and a plain antenna circuit was adopted, using an antenna tuning coil tightly coupled to a secondary winding. This was known as the "ratio winding" and was patented by Eckersley in 1919. It should be noted that all the wire used in the antenna coils and elsewhere was made on site in 1919 by P. P. Eckersley himself, the antenna tuning coil being 243/36 stranded wire and the primary tuning coil being 729/44 stranded wire.

The circuit was shunt-connected to one MT4 triode while amplitude modulation was achieved by a Heising circuit, with one MT4 being used as a modulator and another as an amplifier. In the first few transmissions the microphone was connected directly to the grid of this valve while the anode h.t. (8000 volts) was supplied by two MR1 valves in bi-phase connection. The primary supply to the h.t. transformers and the filament transformers was supplied by a 400 volt, 300Hz single-phase alternator, driven by a 110 volt d.c. motor which received its supply from two four cylinder Austin 4·5kW, 110 volt, petrol motor generators.

Writtle and 2MT was ready to go live but it was quickly realised that although the Heising modulation circuit was suitable for high quality reproduction the MT4 valves were not. Consequently after one or two transmissions a microphone amplifier was used in place of the MT4 amplifier.

Three MT4 valves, with their grids biased positive, were used in an effort to obtain linear working. It was not possible to obtain sufficient dissipation at the anode of these valves to provide class AB working, hence these were promptly replaced by types developed by Noel Ashbridge and H. L. Kirke. These were quickly delivered by the M.O. Valve Co and three were used in parallel, operating in Class A mode. Poor transmission quality was also due to the major limitation of using the Peel-Connor carbon microphone for all transmitted programmes. However, no other type of microphone was available until the Round/Sykes microphone in 1923.



The outline circuit 2LO 2kW transmitter 1923. The Marconi Co Ltd.

In its final form the transmitter fed 200W to a four-wire antenna which consisted of a 43m long inverted L supported by two 34m high Marconi portable masts. The station originally broadcast on a wavelength of 700 metres but this was changed on 29 May 1922 to 400 metres to avoid clashing with one of the harmonics of the GPO stations at Leafield. From that date the Morse calibration signals that had hitherto preceded the telephony transmissions were abandoned. The Morse keying had been effected by simply interrupting the h.t. transformer primary circuit using a standard Marconi Morse key.

As always the whole thing was assembled using experience as the only guide and most people quickly became experts at diagnosing which component was responsible for flash-overs or evil burning smells. The occasional covert puff of tobacco smoke into live equipment as a joke always fell flat when without looking up the operator simply said "tobacco"! But joking was put aside as the Tuesday night of 14 February 1922 approached.

First Night Nerves

P. P. Eckersley remembered the first live broadcast as almost being a disaster. Five minutes before going on the air a horrible explosion shattered a tubular glass capacitor and a loud crackling signified a complete loss of signal. Despite hurried surgery, when speech came through it was noticed that it had a peculiar tone and that the valve anodes were blushing more than usual, but it was written off as first night nerves and the broadcast continued. The format was very formal, commencing with an initial call and then "We will now play a gramophone record entitled (so and so), played by (such and such an artist) and recorded by (this or that company)".

The records arrived in parcels from London, and those that weren't rejected as being too highbrow were played on a mechanical gramophone with the microphone held into the opening of the horn. The station call was then repeated followed by "You have just heard a gramophone record entitled ( ), played by ( ), performed by ( ), and now we are closing down for three minutes". It all went smoothly enough but the team was not satisfied with their first effort, they all agreed that the signal was somewhat muffled and lacked top. It was to be several weeks before Kirke discovered that the hurriedly replaced capacitor had a value 100 times greater than practice demanded. The substitute capacitor was shunting speech currents so that the frequency characteristics of the equipment fell by 6dB per octave above 500Hz.

Once these initial teething troubles were defeated the routine was quickly established and the occasional artiste was "persuaded" to take the train from London in return for a promised £1 fee. Most of the entertainment was improvised by members of the staff who shook the ether for the sheer love of the adventure. Normally Eckersley left the others to get on with the transmissions and went home to Witham, some 13km away to listen. On one evening he decided to stay and see the transmission through. The pre-broadcast planning (and a large meal) at the "local" prompted Eckersley to do some operating. He immediately adopted a less formal attitude toward the microphone than was normal, which when coupled with the look of horror on Ashbridge's face, Kirke's broad grin and Wynn's infectious chuckling made the whole broadcast more exuberant than was ever intended. He failed to play all the records, forgot to shut down for the regulation three minutes and just kept on talking. The next morning the team awaited the outcome with a certain amount of trepidation but only one complaint was received (from Arthur Burrows the head of the publicity department) while over 50 postcards were received congratulating the station on the amazing broadcast.

Two-Emma-Toc Writtle Calling

So began the true Writtle programmes, remarkable for their gaiety and irresponsibility and always containing a surprise, sometimes a burlesque of something deadly serious, sometimes a totally unexpected remark slipping into an otherwise perfectly normal transmission. It was all totally new, in a matter of weeks the signals that amateurs could receive

changed from the continual clatter of Morse to outlandish telephony quickly making Eckersley and the station the talk of Britain. Stunts such as playing a gramophone record pivoted at some point other than its centre were common but the emphasis was always on amusing the listener. To this day people can still remember a night of grand opera from the small Essex village when the whole company of singers, instrumentalists, special effects, scene shifters and property men consisted of just three people, a Mr Mclachlan from research who played the piano and was very informal and Eckersley's continual impersonations of everything, from Italian tenors to wireless noises. Listeners even congratulated him on his impersonation when a guest singer had in fact been fetched all the way from London!

These were happy days for the engineers and it is probable that Eckersley never enjoyed himself more than when he was compere, actor manager and a soloist at 2MT, at least his spontaneous humour and bubbling enthusiasm gave that impression to his listeners. He was the power behind the microphone of 2MT, a brilliant engineer and organiser (as he later showed as director of the largest department at the BBC) but still capable of the most incredible fun. He was undoubtedly the star of the show, being able to go up to the microphone and apparently without effort, be spontaneously funny for ten minutes at a time. He talked to the listeners as if he'd lived next door to them for years and they loved it. Even today many still remember his enthusiastic voice crackling over headphones and horn speakers "Hullo CQ Hullo CQ This is Wr-r-rittle Calling" and only Eckersley could produce an evening's entertainment from a damaged gramophone record, two biscuit tins, a prehistoric piano and himself.

By mid 1922 there were some 8 000 licensed radio operators and their families in Britain who also listened to the only two other European broadcasting stations at that time. The Paris Eiffel Tower station transmitted a daily recital, and the Nederlandische Radio-Industrie service from the Hague Station PLGG (800–1000 metres) broadcast a Thursday evening programme and a weekly *"Dutch Concert"* from 3 to 5pm on Sundays. Despite the competition 2MT Writtle was still everyone's favourite—a radio first.

The station's unique status was maintained when on 17 February1922 they did the first-ever wireless play choosing the balcony scene from *Cyrano de Bergerac* as it seemed the most suitable to broadcast, being played on stage in semi-darkness with virtually stationary players. A young actress Miss "Uggy" Travers and her brother came to help the players, all sitting around a kitchen table in the middle of the hut speaking their passionate lines into the lips of their separate microphones. Another Writtle first was their

Chelmsford, New Street works from the air

five minute children's spot, which was not so much aimed at children but at the engineers and amateurs who truly appreciated nursery rhymes such as:

Hey diddle dodrode,
Two grids in one quadrode,
The outer one forming the plate.
The electrons got muddled
With so many grids,
But the final Mu value was eight.

OR:

Four and twenty B valves standing on a shelf,
Ash couldn't find one so I had to go myself,
When the circuit opened the phones began to sing,
Don't you think I was right to smash the beastly thing?

But more serious events were covered by the Writtle programmes, on 28 February 1922 the marriage ceremony of Princess Mary (only daughter of King George V) to the Earl of Harewood was recorded on gramophone records and broadcast to the nation from Writtle.

The diverse amateur performances that the new station could provide were somewhat eclipsed on 2 February 1923 when the famous Dutch tenor, Mr Lauritz Melchoir sang for 2MT. It appears that Melchior had been recently married and had left his new wife comforted with a crystal set in Denmark ready to hear the concert. Unfortunately he worked on the principle that the louder he sang the more likely his wife was to hear him and as a consequence the opening note is rumoured to have shattered the microphone, pulled out the circuit breakers and shut down the generator. Some handwritten notes on the back of a typed programme for the concert recorded the problems that the tenor caused for the Writtle engineers. His refusal to sing less forcefully caused the whole concert to sound "very metallic" and the "fiddle sounding like an oboe" and the "concertina having trouble stopping". The anonymous commentator commented that there was "not a soft note in the whole show"—"The whole transmission was almost too loud to be borne on the ears (we) tried to tune down without effect". "When we got the metallic tone away everything seemed a hundred miles off."

Usually the live concerts went more smoothly but it seems that the hut was not equipped to handle temperamental superstars, the general level of musical accomplishment being shown by the 2MT signature tune. This was sung in many versions to several different tunes. Memories differ as to the exact words. Eckersley recalled in 1941 that it was sung to the tune of Tosti's *Goodbye* with the following verses bidding the listeners goodnight:

"So Goodnight CQ, yes the usual song I know,
Dearest the concert's ended
Sad wails the heterodyne
You must soon switch off your set
I must soon switch off mine
Write back and say you heard me
Your distance and where and how

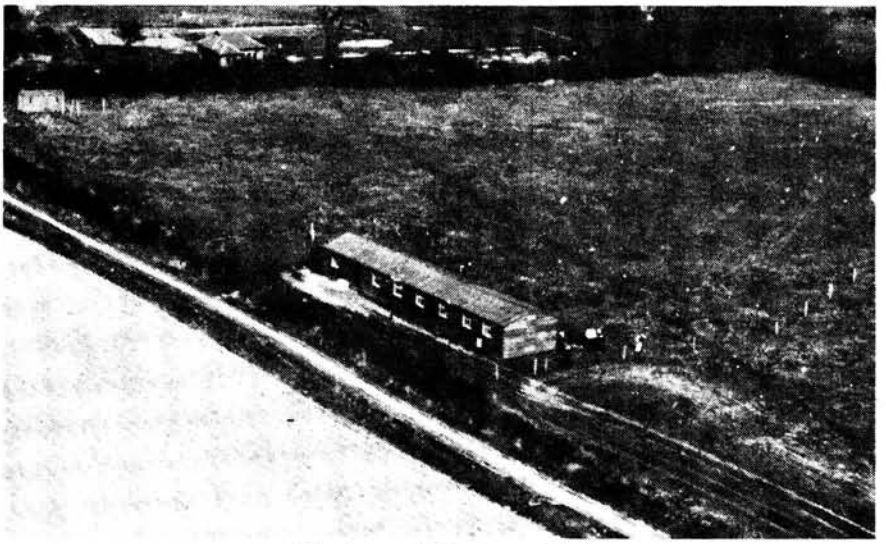
Hark the engine's failing
Goodbye you old low-brow
So Goodnight CQ, God bless you, because I can't"

But R. T. B Wynn recalled a more rhythmical version sung to the tune of *Parted:*

"CQ!! The concert's ended
Loud squeals the heterodyne
You must soon switch off your set
I must soon switch off mine.

Stay for one fleeting moment
Tuned to the last degree
CQ!! The concert's ending—
Ending for 2MT
(accel) How can we keep it going?
Valves blue and engine hot
(cres) CQ!! The concert's ended
(f.f.) I wish we could scrap the lot!
(rall.p.p) I wish we could scrap the lot"

It was all rather fun! Eckersley freely admitted that at times he was probably horribly facetious but he tried to be



The hut at Writtle, 1922

friendly and talk with, rather than to the listeners, and the success of the station lay in the fact that they failed to take themselves seriously seeing the whole thing as nothing more or less than pure entertainment as much for themselves as for the listeners.

2LO London Calling

Shortly after 2MT began transmissions a rival to the Writtle broadcasts appeared on the air when another permit was issued direct to the Marconi Company, by the Post Office, authorising the establishment of another experimental station. This had been allocated the callsign 2LO and was only allowed to transmit speech for a maximum period of one hour daily, using a radiated power of not more than 100W. The transmitter was housed in a small teak cabinet situated in the cinema theatre, on the top floor of Marconi house in the Strand, London. At the time of the station's first trial broadcast on the 11 May 1922 this only gave an area of coverage of some 54km, if listeners were using valve sets, or 24km at best for crystal set users.

Each transmission was subject to a Post Office permit as all its programmes were offically only demonstrations, and as such were not publically advertised. Those listeners that were on the company's mailing list were notified by post in advance of proposed schedules, with the broadcasts having usually been arranged for an audience at some institution (e.g. a hospital, private garden party or even a wireless society), whereupon the company then installed all wireless sets for the occasion. This was later relaxed and some of the evening programmes were even announced in the press beforehand, but no mention of Marconi House was ever allowed and every broadcast had to observe a three minute listening period (like 2MT did until they "forgot" to do so) in every ten minutes of transmission, waiting for any official closedown message. The three minute rest did give the Marconi engineers time to retune the transmitter and the rest is reputed to have done the valves "a power of good."

The Writtle spirit of farce and foolishness with the accent on their comradeship with their technical audience was in sharp contrast to the careful and deliberate pomposity of the new London station, who made it their policy to "say nothing that might offend" for fear of having their tenuous licence revoked. This fact was not lost on Eckersley and the rest of the team at 2MT who took every delight (and opportunity) in poking fun at 2LOs self conscious sobriety, and the daily speech-only broadcasts gave them plenty of time to listen for material for sketches, comments and skits. It must have been galling for Arthur Burrows (by then the 2LO Programme Director) to continually receive letters asking him not to transmit between 8.00 and 8.30pm on a Tuesday evening so that people could hear Writtle laughing at 2LO.

Within months of 2MT starting transmission 23 companies had applied for licences to establish broadcasting stations and it was decided by the Post Office who had by then developed a more lenient attitude to broadcasting, to vest the power of transmission into one authority to prevent the chaos that had occurred in America. The success of Writtle and 2MT paved the way for 2LO to grow from its humble beginnings and on the wall of Marconi House there is a plaque that reads:

"Within this building Marconi's Wireless Telegraph Company Ltd. operated their famous broadcasting station 2LO from 25 May to 15 November 1922 when it became the first station of the British Broadcasting Company." Although there is no plaque to record the historic and pioneering effort behind the fun of 2MT, broadcasting had come of age.

Writtle Leaves the Stage

Writtle and station "Two-Emma-Toc" maintained their independence and continued to regularly transmit until its eventual close down on 17 January 1923. 2MT said goodbye to its listeners, drank their good health with a glass of water, promoted to champagne by the sound of pop-gun, and left the airwaves forever. No station could have given greater pleasure and as many thrills to the amateur radio fraternity, but it had served its purpose and it was time to leave the even more crowded stage.

In its short but hilarious career Two-Emma-Toc Writtle firmly laid the foundations for the age of broadcasting, providing a vital reference station for all amateur experimentation at the time. Today 2MT has been almost forgotten, but it created an enthusiasm for broadcasting that was destined to make radio into the greatest mass medium for communication and entertainment the world has ever seen.

The Writtle site is to this day still an important part of Marconi Communication Systems Limited although all trace of the original 2MT site was lost in the redevelopment of the site in the early 1950's. It is unfortunate that no part of the historic transmitter has survived, as all its parts were returned to their normal experimental use when 2MT closed down. Eckersley's "long low hut filled with long low people" was given to a local school, where it survives to this day as their sports pavilion.

The call G2MT was recently reallocated by the Home Office to a Marconi radio society in Stanmore, North London, 48km from the small Essex village that gave British broadcasting its first home. I hope that one day they might reunite Writtle and its callsign, perhaps paying tribute to the pioneers of 2MT with a station on the village green and "Writtle Two-Emma-Toc" might call again for the first time in in over 60 years.

Further Reading

The Power behind the Microphone, P. P. Eckersley, Jonathan Cape.

The Story of Broadcasting, A. R. Burrows, Cassell and Co.

The Shell Book of Firsts, Patrick Robertson, Book Club Assoc.

60 Years of Radio, Radio Essex Cassette Tape, Radio House, 53 Duke Street, Chelmsford, Essex CM1 1JA.

Acknowledgements

My thanks to Mr Marconi for his company and their more recent help. I am currently trying to compile a complete History of Marconi in Writtle during the 1920s. If you have any personal reminiscences of 2MT Writtle, the site, station or staff I would be most grateful to hear from you via *PW*. I am especially keen to trace any relevant photographs of the period which would of course be returned, and all letters will be promptly replied to. **PW**

The Rise and Fall of the Tunnel Diode

In 1957 Leo Esaki, a Japanese physicist working for his PhD at the University of Tokyo, discovered the tunnel, or Esaki diode and for this work was awarded the Nobel Prize for Physics in 1973. Within a couple of years the tunnel diode received a blaze of publicity and forecasts were made that it would be at least as important as, or even displace, the transistor. Brian Dance traces this intriguing story.

Today the tunnel diode is employed in certain specialised applications, such as low-noise amplifiers for receiving microwave signals from satellites, as ultra-fast switches in nucleonic instrumentation and in some radar applications. However, it certainly has not fulfilled the wide variety of simple circuit applications which were originally forecast for it.

This article looks at what a tunnel diode is, without delving into the theory of quantum mechanical tunnelling, and considers why it is that this "hot news item" of the late 50s and early 60s is not now widely used. For the home constructor, tunnel diode circuits can be very simple, the device can readily be used as an oscillator for many purposes up to microwave frequencies and it is ideal for use in receiver crystal calibrator circuits. Indeed, the problem is not to make it oscillate, but rather to stop it oscillating!

The Diode Junction

The early tunnel diodes consisted of a *pn* junction diode fabricated in germanium in which the *p* and *n* type materials were more heavily doped with the impurity atoms than those of a conventional junction diode. This enabled the conjunction band on the one side of the junction to come fairly near to the potential of the valency band on the other side so that "quantum mechanical tunnelling" of the charge-carriers could take place beneath the junction barrier.

Theory showed that this tunnelling effect could lead to the type of current/voltage characteristic shown in Fig. 1. The most important region is the "negative resistance region" where the current decreases as the applied voltage increases. No device can have a true negative resistance, or power could be extracted from it continuously and violate the law of conservation of energy. The negative resistance region of the tunnel diode is really a negative incremential or dynamic resistance. That is, the resistance of the device is always positive, but as the applied voltage in this region is increased, the current falls.

The tunnel diode is essentially a small junction device with the current peak of Fig. 1 typically in the region of tens of mA. The operating voltage is also low, typically of the order of 1V or less. The small band gap of germanium results in tunnel diodes made from this material having peak and valley voltages (Fig. 1) of very low values, whereas silicon tunnel diodes have similar features in their characteristics at rather higher voltages and gallium arsenide tunnel diodes at still higher voltages —but not appreciably above 1 volt (Fig. 2).

It may be noted that tunnel diode data sheets often specify a maximum permissible current in either direction of only a few mA. Great care should be taken not to exceed this value, since a very small voltage in the forward direction and an even smaller voltage in the reverse direction can cause the current passed by the device to become greater than the permissible value. Tunnel diode junctions are generally of very small cross-section to keep the capacitance low for microwave frequency use—hence they are easily damaged by relatively small currents. Indeed, most tunnel diodes for use at up to about 1GHz are mounted in packages far smaller than those of a normal transistor—and devices for even higher frequencies require special low-inductance packages.

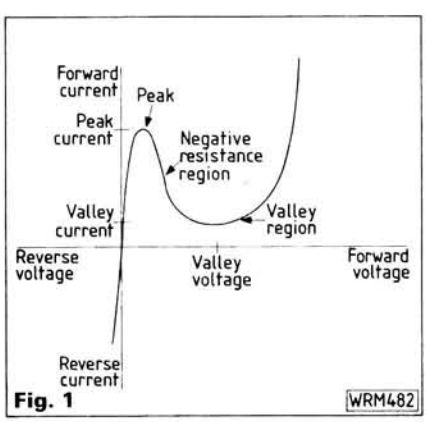


Fig. 1

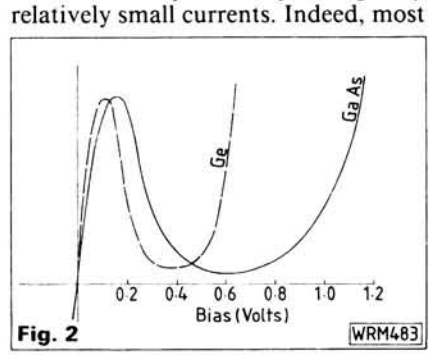


Fig. 2

Oscillator

A tunnel diode circuit can be made to oscillate merely by connecting the device in series with a resonant circuit, as shown in Fig. 3, and applying a bias to bring the operating point into the negative resistance region. Simultaneous oscillation at more than one frequency may occur.

The design of tunnel diode amplifier circuits is more difficult, since unlike the transistor it is a two terminal device without isolation of input and output. Thus considerable care is needed to prevent oscillation. A tunnel diode can easily be used as a relaxation oscillator in which switching occurs from one end of the negative resistance region to the other. If you try to plot the curve of Fig. 1, you will probably find that, as the applied voltage is increased, the device suddenly switches from the left hand side of the peak to the right hand side of the valley region; this can be avoided by careful choice of the circuit impedances and the whole curve can then be plotted.

The Decline

About 1960 STC in England used one of their tunnel diodes in a sensitive front-end of a very simple radio receiver, whilst in America IBM attempted to construct memory and high speed logic circuits using tunnel diodes. A wide variety of circuits emerged, all

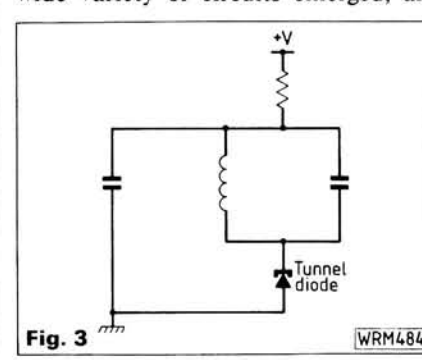


Fig. 3

more or less successful, but nowadays it is easier to use other types of components for most of these applications.

Dr. Leo Esaki has said that there were three main reasons why the use of the tunnel diode declined, all of these being connected with the evolution of other fields of electronic technology. One of the major reasons for the decline is the ease of use of the three-terminal transistor with its input/output isolation as opposed to the two terminal tunnel diode and its tendency to oscillate without very careful circuit design. The tunnel diode is a very fast device and at the time of its first development could readily operate at frequencies much higher than that of the early transistors. However, transistor frequency response has vastly improved over the years and now bipolar transistors are available for use at frequencies of up to about 5GHz and special gallium arsenide m.e.s.f.e.t. types at up to some 50GHz. As they are easier to use than tunnel diodes for most purposes, high frequency transistors have replaced most tunnel diodes.

As integrated circuits became available in the early 60s, it was soon found that they were far more economical to use than discrete components in most applications. The two terminal tunnel diode did not fit easily into the circuitry used on silicon integrated chips. The third reason for the demise of the tunnel diode is that silicon, on which modern electronics mainly relies, is not so good as germanium or gallium arsenide for tunnel diode fabrication. High quality silicon materials are more easily fabricated than any other semiconductor material and thus the use of

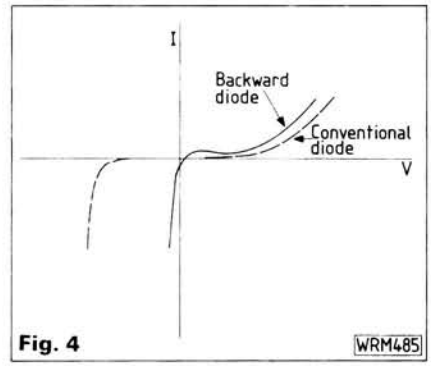


Fig. 4 WRM485

germanium or gallium arsenide for tunnel diodes greatly increased the cost—especially as the number of tunnel diodes purchased became smaller. Silicon tunnel diodes tend to be appreciably slower than those fabricated from germanium or gallium arsenide and it is difficult to control the peak/valley current ratio during manufacture. This latter problem also occurs with indium arsenide, while the band-gap of indium antimonide is too small to enable a tunnel diode employing this material to be used at room temperature.

The Backward Diode

The backward diode is essentially a tunnel diode with a very small forward peak current which has been designed for the rectification of very small voltages. Backward diodes have been so-named because they conduct current more readily in the reverse direction, as can be seen from Fig. 4; they are sometimes known as tunnel rectifiers.

Backward diodes will pass a reverse current at very low voltages, so they are suitable for the rectification of small signal voltages. Forward current can be fairly small and they can operate at very high speeds.

Availability

The writer knows of no current British manufacturer of tunnel diodes. The International General Electric Company (USA) devices are still available including their 1N3712 to 1N3721 series of germanium tunnel diodes. They are housed in a subminiature package with axial wire leads and have peak currents ranging from 1 to 22mA with tolerances of 10 or 2·5 per cent according to type. In the case of the 1mA device, oscillation is possible at over 3GHz.

A wide range of tunnel diodes is offered by Custom Components Inc., Box 334, Lebanon, New Jersey, USA. This range includes germanium diodes for amplifier use with noise figures of under 5dB into the Ku band, gallium arsenide oscillator diodes able to self oscillate at any frequency up to 65GHz and germanium and gallium arsenide switching tunnel diodes with switching speeds of the order of 200–330ps (germanium) and of 410–625ps (gallium arsenide). Germanium backward diodes are also offered for microwave video detector and mixer applications through the Ku band frequencies.

Other US and Japanese manufacturers include Aertech, KMC Semiconductors, Microwave Associates, Microphase, Nippon Electric Company, Parametric Industries and Raytheon Semiconductor. ***PW***

SWAP SPOT

Got a camera, want a receiver? Got a v.h.f. rig, want some h.f. gear to go with your new G-zero? In fact, have you got anything to trade radio-wise?

If so, why not advertise it FREE here. Send details, including what equipment you're looking for, to "SWAP SPOT", *Practical Wireless*, Westover House, West Quay Road, Poole, Dorset BH15 1JG, for inclusion in the first available issues of the magazine.

A FEW SIMPLE RULES: Your ad. should follow the format of those appearing below, it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

The appropriate licence must be held by anyone installing or operating a radio transmitter.

Have AR40 rotator, 144MHz beam with 15m UR67 cable, HF5 vertical and Trio grid drip meter. Would exchange for BBC hardware, modem, DFS, disc drive, printer etc., or general coverage receiver, w.h.y. John. Tel: 0606 550258 after 6pm. *B008*

Have AR40 medium type rotator plus 30m control cable, also reference books Aircraft of the Fighting Powers Vols 3 & 4 (WWII). Would exchange for d.c.-d.c. converter for FT-101ZD also TX/RX Mk123, Clansman portable, w.h.y. G4KKZ. Tel: Launceston 3012. *B009*

Have IC-4E 430MHz transceiver with BC25 charger, BC35 fast charger, DC1 d.c. adaptor, two BP3, one BP2, BP4 NiCad packs, CP1 mobile link, LC2, LC3 cases, HM9 speaker/mic. Full service manuals for IC-4E and BC35. Would exchange for FT-790R. Tel: 04738 5526. *B016*

Have Yaesu FT-707, a.t.u. FC-707, v.f.o. FV-707DM, p.s.u. FP-707, mic YM35 boxed as new, oscilloscope, dual trace Scopex 4D-10, solid state, frequency meter solid state 20Hz–200MHz. Datong ASP/A speech processor. Would exchange for good quality video camera and/or video recorder. Tel: Uxbridge 54116. *B017*

Have Datong AD-370 plus m.p.u. Would exchange for Trio 9R59DS and m.w. loop with balanced differential amplifier. Cash adjustment if necessary. F. Amoroso, 60 Highfield Road, Salford 6, Lancs M5 6LA. Tel: 061-74 1570. *B024*

Have Sailor (Danish) model 24D 2·5MHz marine TX, 11 channels, two QE05/40 valves r.f. output, 24V d.c. supply, v.g.c., conversion to 1·8MHz? Would exchange for good general coverage s.w. receiver or w.h.y. Wilkinson, Cragside, Lower Contour Road, Kingswear, Devon TQ6 0AL. *B025*

Have R-209Mk2 communications receiver a.m., c.w., f.m., 1–20MHz, l.f./m.f. converter, antenna and coaxial cable. Also have POR-47 scanning receiver 68–88, 144–174 and 430–490MHz. Would exchange for 144MHz hand-held or mobile transceiver. Can deliver if local. Tim. Tel: 01-300 8549. *B026*

Have TRS-80 model 1 level II 16K computer v.g.c., with over £200 of software. Would exchange for tower, h.f. beam, rotator or 70MHz TX/RX equipment, w.h.y? Ian M. Hopkins, Wraycastle, Ambleside, Cumbria. Tel: 0684 298254 (weekends). *B030*

Have Yaesu FT-290R and FT-790R portable multimodes, both v.g.c., owner going h.f. Could deliver 100km round London. Would exchange for anything related to radio or test gear. Tel: 07914 2823 evenings or weekends. *B034*

Have Murphy model DS602 40 channel; f.m. CB rig with magnetic mount antenna. Would exchange for 1920/1930s wireless equipment, magazines, books etc., w.h.y. A. J. Humphriss 0926 400876. *B039*

Have two valve 'scopes, Grundig G4 4MHz single ok, Telequipment D43 15MHz dual needs attention, 1MHz 4-digit counter/timer, a.c. bridge. Would exchange for neat little dual solid state 'scope with cash adjustment if necessary. Alan. Tel: 01-568 5458. *B058*

SWAP SPOT

Have assorted valves, reel-to-reel tape recorder Grundig and spares, B40 h.f. all-wave DX receiver. Would exchange for w.h.y. D. Lyndon Carter, 22 Cadleigh Gardens, Harbourne, Birmingham. *B064*

Have Microwave Modules 144mHz r.f. switched pre-amplifier, Grundig TK148 spool tape recorder v.g.c. Would exchange for Dressler ARA30 active antenna or w.h.y. Patrick Travers, 65 Cherry Tree Road, Wales Village, Sheffield S31 8LL. *B075*

Have Philips Skyrider personal stereo receiver, a.m./f.m. with headphones and internal speaker, new condition and boxed. Would exchange for Codar PR30 preselector or a.t.u. for RX. Paul. Tel: Southampton 694838. *A835*

Have 15 volumes of *The Living Countryside*, all bound, cost £170 to collect and in excellent condition. Would exchange for a radio receiver or scanner covering the Air Band. Tel: Worksop 482359. *A848*

Have old Mamiya s.l.r. 35mm, LG300 TX, comprehensive Mamiya NC1000 outfit in pro case. Would exchange for 12AVQ or 18AVT antenna or w.h.y. Tel: Dunstable 699781. *A878*

Have v.h.f. 8XY Jaybeam Yagi and Hirshman rotator. Would exchange for Global AT1000 a.t.u. or SR9 v.h.f. Marine RX. 23 Main Road, Old Hunstanton, Norfolk PE36 6HS. *A886*

Have 25 radio magazines dated between September 1949 and December 1955 (*Short Wave News/Listener, Radio Amateur*). Veteran s.w.l. operating again! Would exchange for w.h.y. Kirby. 21 Oakington Drive, Sunbury-on-Thames. Tel: Sunbury 788782. *A922*

Have a Standard C58, 144MHz multi-mode transceiver, NiCad charger and manual. Would exchange for a Micron QRP transceiver. Mr Keen, 34 Unwin Road, Isleworth, Middx. Tel. 01-560 8195. *A928*

Have a pair Tandy TRC1005 handheld CBs, 4W 40-channel, all accessories including external microphone, NiCads, charger, rubber ducks, etc. Cost over £260. Would exchange for Sony ICF7600D or working MSF clock. Tel: 01-368 6969. *A938*

Have a B40D h.f. receiver. Would exchange for a 144MHz transceiver. Also have a Trio DM-801 dip meter, as new. Would exchange with the B40D for a 144MHz multi-mode. Tony. Tel: West Bromwich 021-553 6907. *A943*

Have 180 copies of *Practical Wireless* 1951-1974. Would exchange for any WWII general coverage receiver, working or not. Darby. Chy-An-Avon, Trevarren, St Columb, Cornwall. Tel: 0726 860447. *A951*

Have Amstrad CPC 464 computer with green screen monitor & Amstrad DMP-1 DOT printer with £190 of software in v.g.c. Would exchange for Yaesu FT-209RH or w.h.y. Must be in good working order. Tel: Leyland (Lancs) 432040 6-7pm. *A957*

Have Decca marine h.f. transceiver 1·6-4MHz with built-in a.t.u., 30W output, 12V. Also have a v.f.o. for base/mobile 1·8/3·5MHz rig. Would exchange for compact oscilloscope or 144MHz synthesised handheld. Nigel G4PTT. Tel: Minsterworth (Glos) 376. *A962*

Have Minolta X300 35mm f1·7 s.l.r. and accessories, cost 4 months ago over £450 in mint condition. Would exchange for Trio TS-9130, TS-700S, R2000, FT-225RD, FL-2100Z, FRG-9600 or ICR70 in same condition. Tel: 0670 855953. *A963*

Have FT-7B h.f. rig with YC7B frequency counter and mobile bracket. Also have Daiwa h.f. auto a.t.u. and 10A p.s.u. Would exchange for 144MHz multi-mode (FT-480 preferred) and 20A p.s.u. (PS430 preferred) w.h.y. Joe. Tel: 061-202 5764 *A966*

Have Lowe NR56VFI 144MHz receiver, v.f.o. and Xtals for S20, R4 and R5, plus Wood & Douglas 430 to 144MHz converter (RX only). Would exchange for 144MHz linear amp to suit FT-290R. Tel: St Austell 64616. *A971*

Have 5m Pilot Cruiser, Grp Cathedral hull, 6-8 seat, cabin with toilet, canopy and cockpit cover, 50hp Evinrude outboard road trailer. Would exchange for Yaesu FT-757GX, FP-757HD p.s.u. and a.t.u. suitable. Tel: St Austell 64616. *A971*

Have Canon auto zoom cine camera plus two projectors. Would exchange for Yaesu FT-290R or FT-480R. Ian. "The Dormouse", 5 Sunset Walk, Bush Estate, Eccles-on-Sea, Norfolk NR12 0SX. *A972*

Have Yaesu 101ZD in mint condition, only used for transverting. Would exchange for TS-700, TS-770, FT-221, FT-225RD, Pye 430MHz TX/RX, HRO bandspread coils. W.h.y. G1KHN. Tel: Chorley (Lancs) 60679. *A978*

Have Leitz Pradovit CA2500 slide projector, standard lens, remote control. Perfect condition new price £370. Would exchange for good communications RX, unmodified FRG-7 or similar. Pensioner with new B licence studying for A wishes to listen and learn. G1WER. Tel: 0943 466493. *A984*

Have TS-530SP with AT-230 a.t.u. and Yaesu FT-209RH 5W handheld. Would exchange for programmable musical keyboard instrument(s) with full-size keys and/or shooting equipment (FAC holder) or large motorcycle or w.h.y. to value approximately £850. Tel: Halifax 68021 after 8pm. *A988*

Have general coverage h.f. RX Realistic 160 DX in v.g.c., very sensitive. Would exchange for v.h.f. scanner or 144MHz f.m. handheld transceiver. Tel: Deeside 811687. *A990*

Have Sinclair Pocket TV with mains adaptor. Would exchange for Realistic DX160 or good marine receiver. J. Rankin. 30 Broomfield, Methil, Fife KY8 2JG. *A997*

Have Yaesu FT-902DM all mode h.f. transceiver in mint condition. Would exchange for Yaesu FT-726 with modules must also be in mint condition. Tel: Irvine 217611. *B000*

Have CB radio, Amstrad, Oscar 11CM antenna, power and s.w.r. meter (unwanted gift). Would exchange for 48K Spectrum computer or w.h.y. Tel: Fawley 898675. *B001*

The 11-Year Sunspot Cycle—1

F. C. Judd G2BCX looks at the effect of the impending sunspot cycle 21 minimum on amateur radio DX on the h.f. bands

In recent history the occurrence of sunspots has been well recorded and the so-called **11-year cycle** is an important feature in the data at present available and used extensively in connection with ionospheric radio propagation[1]. However, not all the cycles have, or have had, the same maximum amplitude. There have been variations of the 11-year period itself. This is shown in the example of very early records (Fig. 1.1) which covers the years from 300 AD to 522 AD. (Variations have occurred in later observations, too.) Cycles have been as long as 15 years and as short as 8 years.

There are records earlier than 300 AD but these are not altogether reliable although the "11-year" period is predominant right back to 649 BC. It should be kept in mind that all the observations recorded cover only a minute span in the life of the sun and in the history of the earth itself. The earth's climate has always been of interest and related to solar activity, no doubt that will continue. However, the fact that the sun has behaved in a more or less regular fashion since positive observations were first begun is not necessarily proof that it will continue to do so in the future[2].

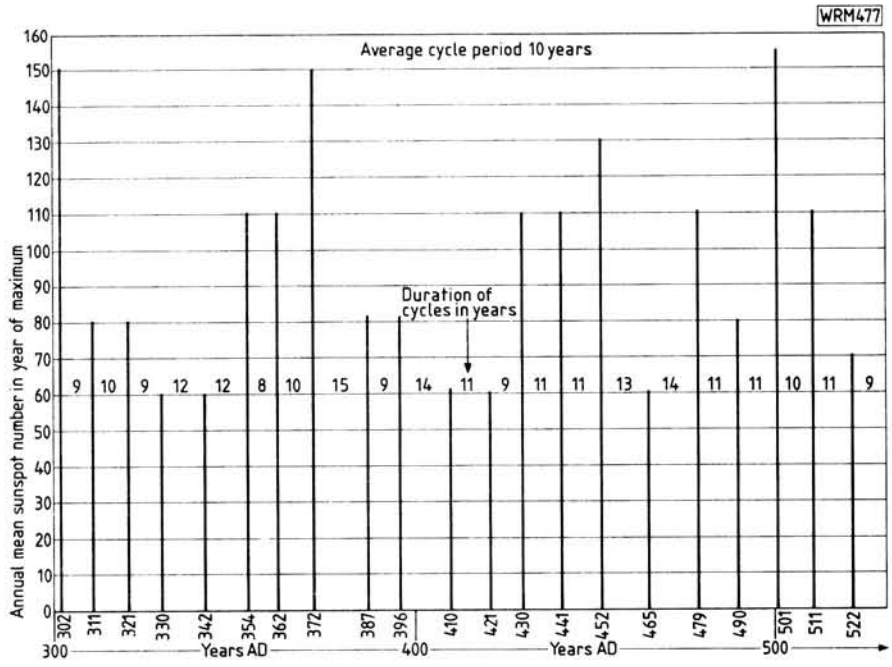


Fig. 1.1: Dates of sunspot 11-year peaks for the years 300 to 522 AD and mean sunspot numbers for each period maximum. Note variations in duration of cycles

The 18th and 19th Centuries

Sunspot records prior to the 18th century have revealed one rather surprising result (shown in Fig. 1.2), in that between about 1650 and 1715 AD very few sunspots occurred although observations were made. Had radio communication existed at this time, h.f. band DX conditions would have been very poor indeed. This chart shows nothing recorded in the lower portion, i.e. 1610 to 1650 AD, although estimates by Schove reveal that there was solar activity but with generally very low sunspot counts. It is interesting to note that the period 1645 to 1715 AD, known as a "Maunder minimum", corresponded with an exceptionally cold time in Europe. In 1683 and 1684 fairs were held on the frozen river Thames. The Maunder minimum also shows up in carbon-14 analyses of tree rings. The carbon-14 content indicates cosmic ray intensity at the time the wood was formed and because the cosmic ray flux on earth is modulated by solar activity, it is thought that carbon-14 analysis indicated solar activity as well. Such analyses, covering a period of around 7000 years, show recurring fluctuations that suggest times of either high, or low solar activity.

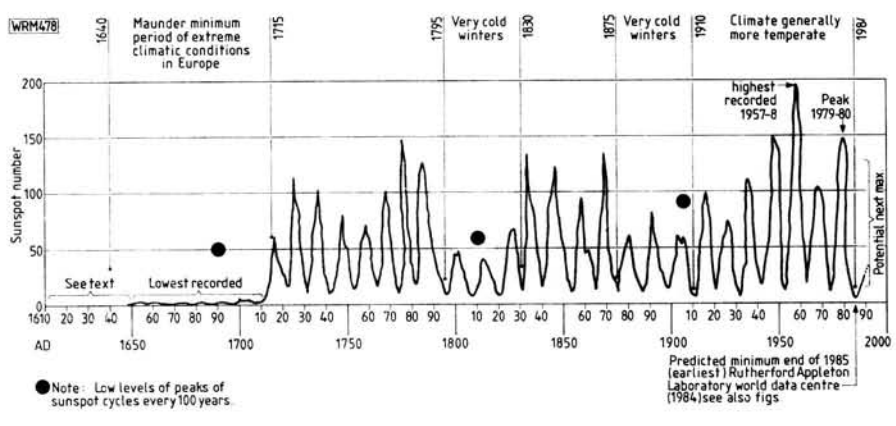


Fig. 1.2: The 11-year sunspot cycles since the year 1650 AD and up to December 1984. The lowest ever recorded were during the years 1650 and 1710 AD. Note climate conditions coinciding with periods of low maximums of sunspot cycles, e.g. 1650–1700 AD (see text)

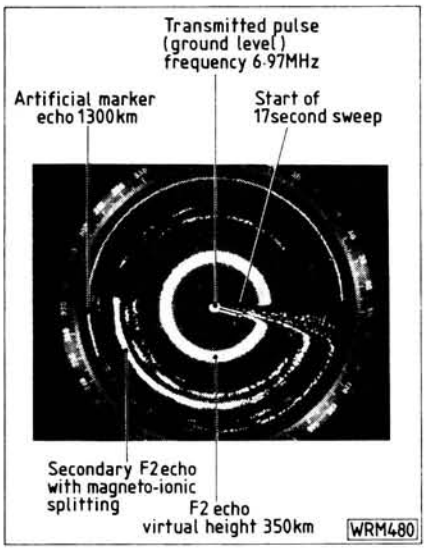


Fig. 1.3: Strong F layer echo with secondary echoes and magneto-ionic splitting. Critical frequency 6·97MHz. The display shows an F2 complex with Fo and Fx secondary echoes. Recorded June 1983. Note the constant amplitude of the F2 primary echo

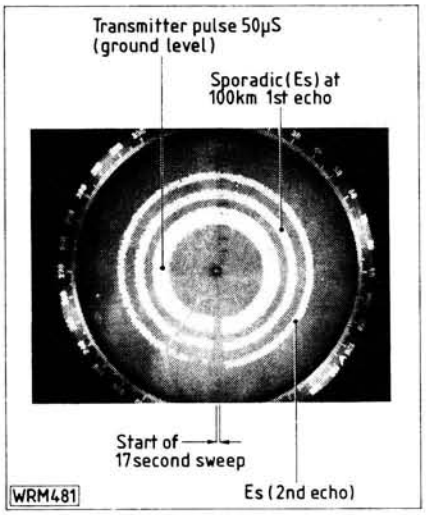


Fig. 1.4: Sporadic-E (Es). A good example of Sporadic-E with primary and secondary echoes. Recorded June 1983. Note the constant amplitude of the primary Sporadic-E. Similar Es clouds were observed during the summer of 1984, up to the end of August of that year and frequently lasting for periods of up to one hour

Reports of aurorae and sunspots seen with the naked eye (I have doubts about the latter) were quite frequent even during the very early centuries. The anomalies (cycles with low sunspot maximum) were found to correspond with exceptionally low winter temperatures. There are indications of this during later periods as well. Evidence of this nature therefore indicates in the long term, the activity of the sun and the terrestrial climate vary together[2].

More Recent Times

The recent predicted change to weaker sunspot cycles took place one cycle later than expected, it was forecast for the 1950s but actually happened in the 60s and 70s. So the forecast of the sunspot maximum that occurred in 1957/8 was wrong, although it proved to be the highest count ever recorded (approximately 200). The 1969 sunspot maximum occurred about 11½ years after its predecessor with a count of 107 against 190 in 1957/8 and 152 in 1947. However, from about 1950 and until fairly recently good DX conditions have prevailed on the h.f. amateur bands, especially 14, 21 and 28MHz and particularly during the all time high period of solar activity corresponding with the highest recorded sunspot maximum (1957/8). Predictions are not infallible.

The 1965 peak was lower, reaching to only a little over 100, although DX was still reasonably good. This was followed by another fairly high peak (1979/80), the highest sunspot count being about 150, which also produced good conditions, these continuing through 1981, 82 and 83. Despite falling sunspot numbers the F layer critical frequency regularly remained high, to at least 7MHz, or higher during daytime peaks (Fig. 1.3), the highest ever recorded by the Slough Ionosonde station being 22MHz. Sporadic-E (Es) was also observed very frequently during the summer months 82 and 83 (Fig. 1.4). The higher the F layer critical frequency, the higher the maximum usable frequency (m.u.f.). Readers should see previous articles in *PW* dealing with radio wave propagation.

From about the middle of 1984, DX in the higher h.f. bands (14, 21 and 28MHz) has been spasmodic, some days revealing completely dead bands especially on 21 and 28MHz. Near and far continentals have often been conspicuous on these bands and some early morning contacts (before dawn) with VK, ZL and VE (countries at similar distances) have been good on the 7 and 3·5MHz bands. There has also been occasional north/south 28MHz activity, e.g. with South Africa and South America. We are now rapidly approaching the sunspot minimum for the 11-year sunspot cycle 21, which has served so well for the past few years. The DX is diminishing and will continue to do so except for the rare occasions.

The End of No. 21

Beginning in June 1976 (date taken by the Observatoire Royal de Belgique, Sunspot Data Centre) the whole cycle is shown in Fig. 1.5, which is determined by observed and predicted sunspot counts. This and other relevant information has been taken from the *Sunspot Data Bulletin Number 7*, 1984, supplied to the author by the World Data Centre C1 for STP, Rutherford Appleton Laboratory, Chilton, Oxfordshire. It was originally compiled from observations made at the Locarno Specola Solare (Italy) and complemented by an international network, the final determination being made by the Observatoire Royal de Belgique, Brussels[3].

As can be seen, the sunspot count

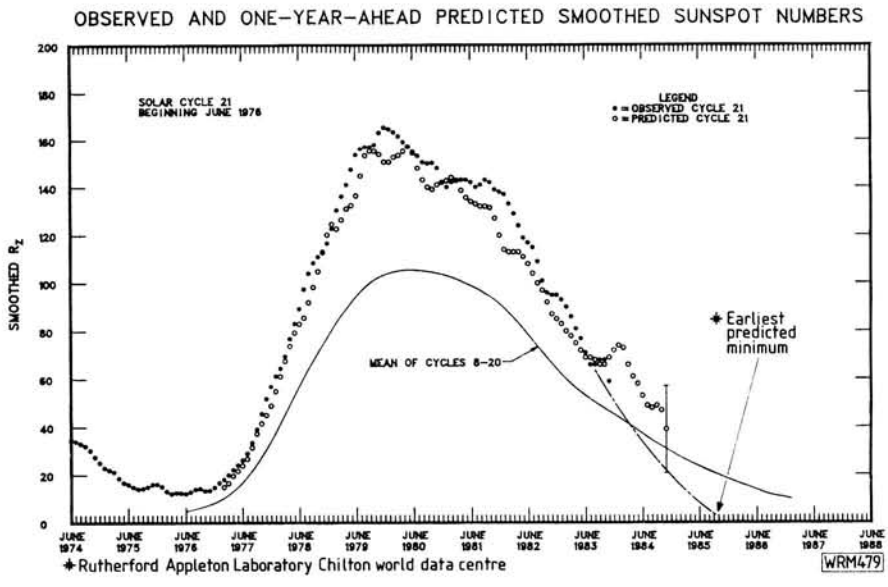


Fig. 1.5: Observed and predicted sunspot cycle counts for solar cycle No. 21 from June 1976. Note: Earliest predicted minimum between June and December 1985. Further information (Part 2) modified this time to a more probable later date, i.e. nearer to the end of the mean curve on cycles 8 to 20 which may mean that the minimum will occur toward the end of 1986

was about 170 at the peak in December 1979 and has gradually fallen to its lowest around June 1984 since when DX on the higher h.f. bands has declined. Even the 7 and 3·5MHz bands have been affected by the often very low F layer critical frequencies as in the example in Fig. 1.6. The highest levels for critical frequency were on July 2, 1984 (day 2), although lower on July 1 (day 1). The lowest recorded was for July 14 (day 14) which was the lowest for the month. The chart also shows the **average** daily plot and the **mean** for the whole month as 5·3MHz. The annotations provide further detail. Periods of very low critical frequency, lower than 3MHz, would affect short skip even on the 3·5MHz band and on frequent occasions during July, August and September (1984) this was found to be the case.

References

(1) Series of articles Radio Wave Propagation by F. C. Judd. *Practical Wireless* Jan '85–Sept '85.
(2) *Climate, Past Present and Future* by Prof. H. H. Lamb (2 volumes). Methuen Barnes Noble.
(3) *Sunspot Bulletin Number 7* Ed Resp. Dr. Andre Koeckelenburgh, Avenue Circulaire 3. B–1180, Bruxelles, Belgium.

Other References

The Upper Atmosphere and Solar Terrestrial Relations by J. K. Hargreaves Van Nostrand, Reinhold Co. USA.

Acknowledgements are due to the Rutherford Appleton Laboratory, World Data Centre, Chilton, Oxon. The Meteorological Library, Bracknell Weather Centre. The Boulder World Data Centre, Colorado, USA, for information supplied.

Next month F. C. Judd continues his look at the effect of Sunspot Cycle 21.

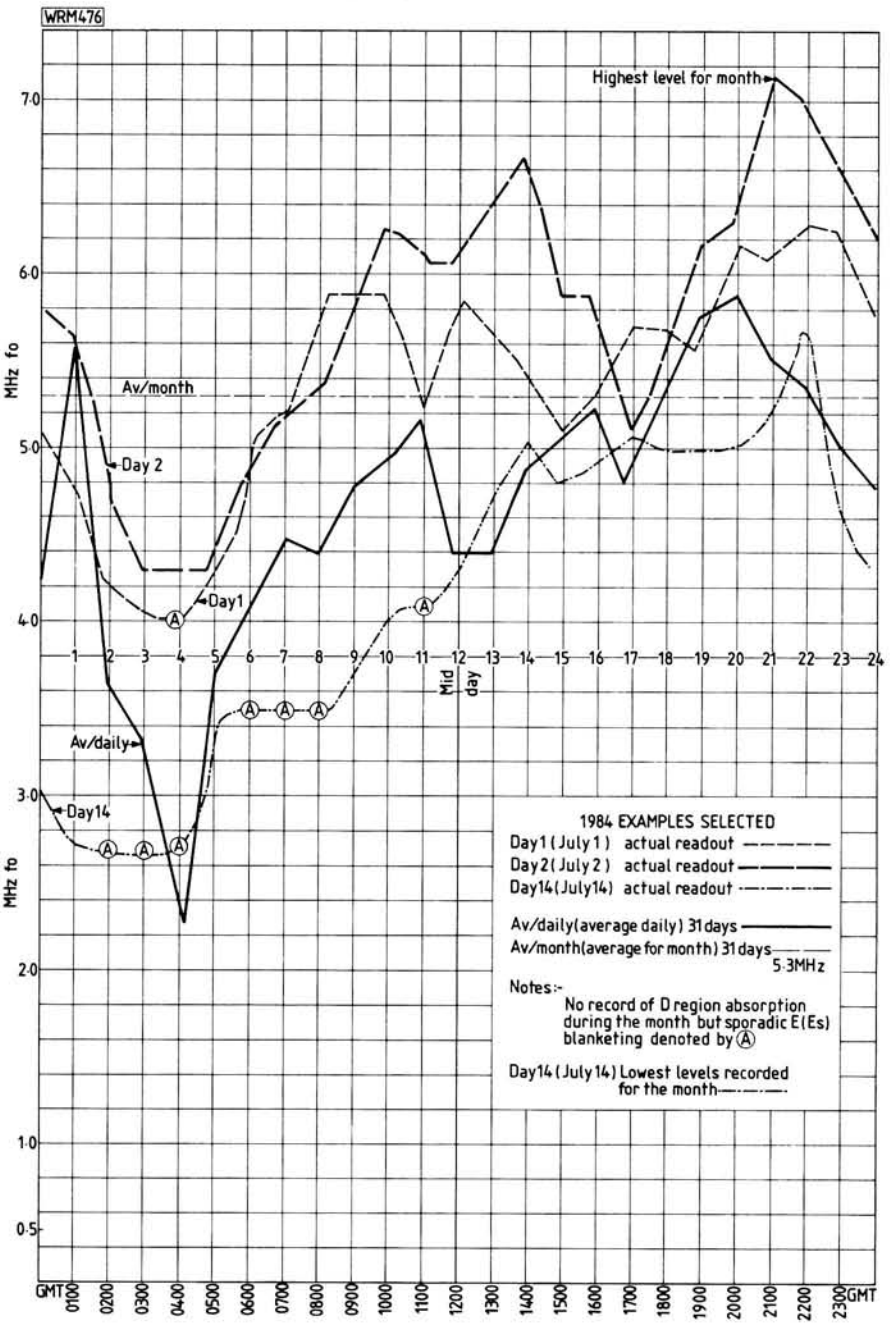


Fig. 1.6: Plots of critical frequencies for 24 hours on selected days during July 1984. Annotations in panel on diagram and in text provide further information. Note: No "D" region absorption (due to s.i.d.) observed during the month. During the higher levels of sunspots, critical frequencies have regularly been above 7MHz

Add-on Amplifier and Power Supply for the Auto-Notch Filter

Having built the Auto-Notch Filter described in Practical Wireless June 1984 and sampled the delights of using it with his Shimizu SS105S QRP rig, A. G. Martin G4EJA decided that it was time to build an audio amplifier and regulated power supply to cut the cost of batteries.

The circuit (Fig. 1) has been kept as simple as possible and provides for a good audio response when used in conjunction with the Auto-Notch Filter. As I am using a 10in hi-fi speaker rated 10W (8Ω) with a 1½in tweeter and crossover network the result is exceedingly pleasant to listen to. However, when used with a speaker pillaged from the "in-car" hi-fi system the result is equally as good.

The 9V regulator circuit is taken from the RS Components data sheet and adequately supplies the needs of the Auto-Notch circuit, the p.a. deriving its supply direct from the 13·8V shack p.s.u. The relevant data for using a fixed-voltage monolithic regulator such as the 7805 to give 9V is as follows:

$$V_{out} = VR + V1 + 0{\cdot}6$$

(where VR is the basic regulator voltage and V1 is the voltage on Tr1 base).

$$\text{Where } V1 = \frac{R6\ V_{out}}{R5 + R6}$$

$$\text{and } \frac{R5}{R6} = \frac{VR + 0{\cdot}6}{V_{out} - (VR + 0{\cdot}6)}$$

Therefore for 9V regulation using a 5V regulator

$$R5 = 5{\cdot}6k\Omega \text{ and } R6 = 3{\cdot}3k\Omega$$

Connecting Up

To help identify connections and components those on the Auto-Notch are printed in *italics* and those on the new board in **bold.** The new **+9V regulated** supply replaces the original *battery B1* in *Fig. 3* of the Auto-Notch article. A convenient place to connect the **0V line** is to the *negative end of C7* on the original Auto-Notch p.c.b.

Identify the wire between *S2 pin C* and *SK2* and unsolder it at *SK2*. Reconnect that wire to **Point A**. Connect to the output of the new amplifier, **Point D**, to the vacant contact on *SK2*. The wire connecting *SK2* to the *Auto-Notch p.c.b. (C5 etc.)* is removed and **Pin B** connected to *SK2*.

To reduce the risk of anything blowing if the speaker is unplugged while the amplifier is running a 15Ω 10W resistor can be connected across *SK2* which will have to be a switched type.

The new board can be fitted into an aluminium box measuring about 152 × 102 × 51mm with the audio amplifier mounted upside down above the Auto-Notch board. Fitted in this way no problems have been encountered with pick-up or hum.

I can now listen on the h.f. bands without being plagued by those infuriating howls and whistles and at the same time have an audio quality much improved on the basic Shimizu. ***PW***

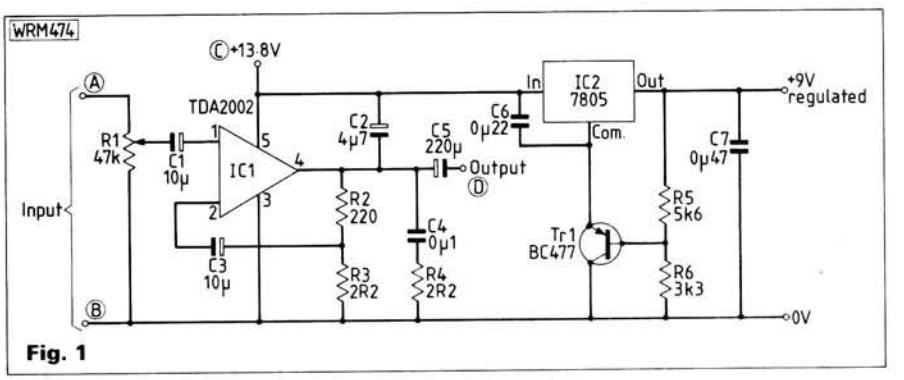


Fig. 1

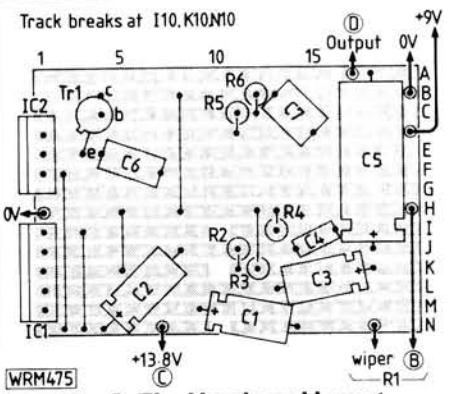


Fig. 2: The Veroboard layout

SHOPPING LIST

Resistors

¼W 5% Carbon film

2·2Ω	2	R3,4
220Ω	1	R2
3·3kΩ	1	R6
5·6kΩ	1	R5

Potentiometers

47kΩ log	1	R1

How Much? & How Difficult?
£8.50
Beginner

Capacitors

Polyester

0·1µF	1	C4
0·22µF	1	C6
0·47µF	1	C7

Electrolytic axial lead

4·7µF 63V	1	C2
10µF 63V	2	C1,3
220µF 25V	1	C5

Semiconductors

Transistors

BC477	1	Tr1

Integrated circuits

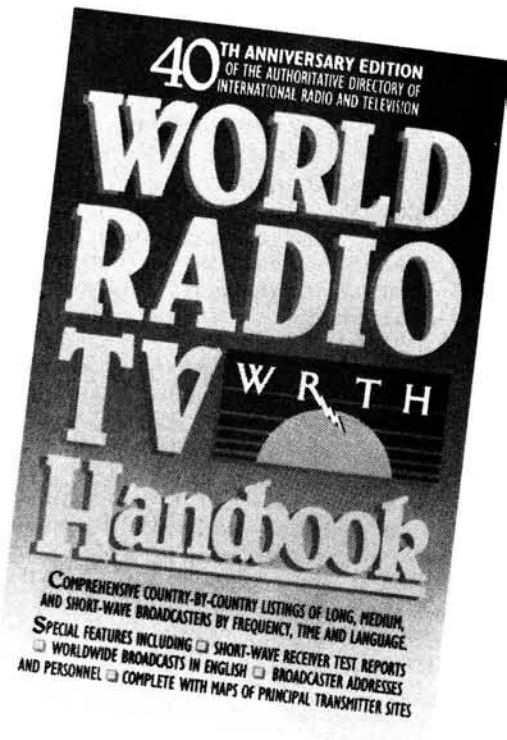
7805	1	IC2
TDA2002	1	IC1

Miscellaneous

Veroboard 0·1in matrix 14 strips × 20 holes; Metal box 152 × 102 × 50mm.

Peter Laughton looks at the story behind the World Radio TV Handbook as the 40th Anniversary edition arrives on the bookshelves.

The Secrets of Soliljevej



Most people get the pronunciation of the street name "Soliljevej" wrong, it sounds like "So-lill-ya-vay" to the English ear, trying to say "Hvidovre" is even worse. "Vid-ora", the closest approximation, turns out to be a suburb of Copenhagen 20 minutes from the famous Tivoli amusement park. Soliljevej number 44 is a detached house in a quiet residential area. A sign indicates that deliveries to the office should go round the back, the postman delivers more post here than the rest of the neighbourhood put together; anything between one and two hundred letters a day during the busy summer period. This is the home of Jens M. Frost, and the *World Radio TV Handbook*.

From Paper to Print

For the last forty years, the largest and most comprehensive English language directory to international radio and television had been based in Denmark, it has grown from a regular listening column in a daily Copenhagen newspaper. During the Second World War many Allied stations broadcast in Danish to occupied Denmark and after liberation there seemed no reason to suddenly stop listening. Not only did large stations like the BBC and Voice of America pay attention to the Danes, but also Radio Brazzaville in French Equatorial Africa had a programme once a fortnight.

O. Lund Johansen was a journalist as well as a radio enthusiast and his regular tuning tips proved so popular, that in 1946 he decided to publish the *World Radio Handbook*. In just under 100 pages it listed the times and wavelengths of shortwave broadcasts worldwide, plus European medium wave transmitters. Only a few copies of that first edition still exist, in fact the earliest copy that survives in the *WRTH* editorial offices goes back to 1948. Leafing through it is like listening to the past; Ireland had a 1·5kW transmitter listed on 9535kHz, Radio Dacia Romana was the forerunner of Radio Bucharest, whilst many more stations ran broadcasts in Esperanto than today. Other countries such as Gold Coast Colony, Belgian Congo and Dutch Guiana have long since disappeared.

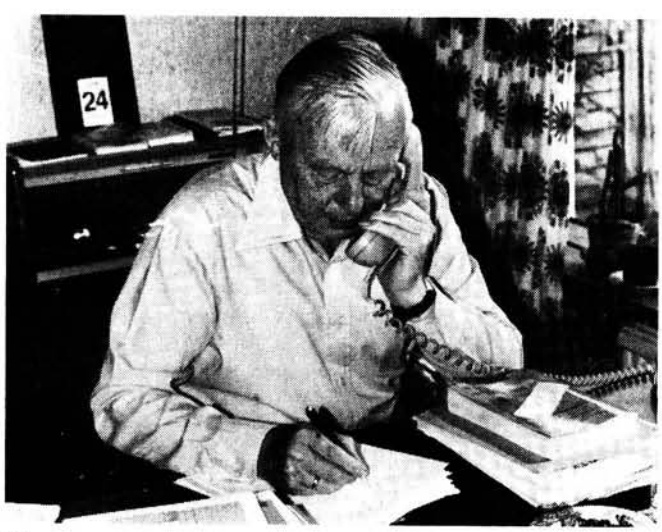
The current editor-in-chief, Jens Frost, began his career as the chief cashier in a local factory, as well as writing in his spare time. His fascination for radio lead him to contact Johansen to offer some corrections to his *World Radio Handbook*. This resulted later in Frost being appointed assistant editor of the *WRH* (television didn't appear until the fifties).

Present not the Past

Although the shelves containing previous editions of the *WRTH* are a directory of the past, the current *WRTH* staff are clearly geared to the present and future. From two offices on the ground floor of the house, work starts on the next edition just as soon as a new edition is published.

It's clear from the response that many readers imagine the editorial centre to be a 20 storey concrete block, full of people and computers. Although there is a gradual trend towards the use of computers, it's only in the last few years that the American publishers, Billboard, have decided to move in that direction.

Using the current edition as a basis, editors Jens Frost and Andy Sennitt first examine the response from readers. Updated information is put aside for inclusion in the *WRTH Newsletter* published three times during the year in May, September and November, and ultimately in the next Handbook. One copy is cut up, and each entry pasted onto a questionnaire form then, in March and April, these are posted in bulk from Copenhagen and London to the thousands of small stations in South America, Asia and Africa.



◀ Editor-in-Chief, Jens Frost, notes material from a WRTH monitor

Tivoli, the famous amusement park not far from the WRTH HQ ▲

The response is mixed and surprising. Stations large or small seem quite knowledgeable about who is working there, but details concerning the transmitter(s) and the operating schedule often bear little or no relation to what happens in practice. Mail often gets delayed and handwriting is difficult to read so by the time most of the questionnaires are returned, the autumn leaves are falling in Copenhagen.

It would be quite easy, and cheap, to take information from the International Frequency Registration Board quarterly publication put out from Geneva. Unfortunately, this proves to have so little bearing on the true situation on the bands, that the *WRTH* is forced to consider other alternatives. The book has always had a strong following within the radio hobbyist circles, and it is many of these enthusiastic listeners that help to make the book so authoritative. The monitoring reports, together with some 3000 official questionnaires returned by stations is the basic raw material for the next edition.

Team Work

Although two editors and a full-time secretary work all year round in Copenhagen, sections of the book are compiled by co-editors scattered throughout the world. They check the incoming data with their own observations. Variable frequencies and erratic schedules are reported as such, but if there is a doubt about a station identity, then the rule is to leave it out.

Different sections of the book have different deadlines and as each of these are completed, they cross the Atlantic to be computer type-set in Philadelphia. Now that this stage of the work is done on a computer, the time between the last deadline and the book appearing has been reduced. A few years ago editions were appearing as late as February but the 1986 edition was delivered to bookshops in the United States on December 27.

As well as editing the handbook, editor-in-chief Jens Frost despatches copies, too. A cool storeroom comes to life once a year as some 13 000 books are despatched to customers and agents all over the world.

Forward past Forty

The *World Radio TV Handbook* plans to expand its current operations. The former "How to Listen to the World" series of separate publications is clearly missed so research is currently underway examining ways of reaching new markets such as the travelling businessman and tourists. Both might benefit from knowing there are ways of keeping in touch with home. The trend in doing more and more of the editing work on computer has to continue.

Satellite trends too have not gone un-noticed. Whether this will lead to a World Radio TV Satellite Handbook isn't yet known, but clearly as more DBS services appear, space will have to be found.

The 40th anniversary is being celebrated quietly, yet with a feeling of pride. The task of compiling more than 600 pages of reference material each year is often a thankless operation —people usually write to complain rather than praise. Enthusiasm is a major driving force behind the *World Radio TV Handbook*, and despite recent competitors joining the field, the future looks secure.

Review of the Latest 1986 Edition

On the surface, the "vital statistics" of the *WRTH* 86 are similar to the 1985 edition. It's the same size, just over 600 pages, and its aim of being the most comprehensive guide to radio and TV broadcasting remains unaltered.

The style of this year's *WRTH* is much clearer than before, there are more illustrations, plus an experimental use of a red colour banner to make the country headings stand out better. Although often referred to as a "bible" for shortwave listeners, the *WRTH* is better described as a reference book of the airwaves. Unlike previous years, the editors have wisely grouped all the articles which are intended for perusal into a supplement at the end of the book.

The book is designed to work in three different ways.

(1) If you select a particular country, you can find details about the radio and TV system operating there, when and on what part of the dial it operates, address and personal information is also included, which is handy when you want to get in touch with a station. If that contact is to obtain a QSL verification card, then it's a good idea to check the station policy, often listed at the end of the entry.

(2) You can check the time, convert to GMT, and then examine the list of "Broadcasts in English" to see which stations are on to which target areas and where they are on the dial.

(3) Most enthusiasts spend time moving up and down a particular band. The listing in frequency order between 150–30 000kHz towards the back of the book is invaluable. If you hear a signal on a particular channel, the listing in the WRTH may be a clue to identification, though you shouldn't jump to conclusions.

New black lines dividing the reference section have made an improvement to the layout. Following criticism last year, the Indonesian listing has been completely revised and corrected. Other parts of the book are a useful supplement to everyday listening. World maps pinpoint major transmitter sites, details of the different TV systems used worldwide are included, plus current lists of DX programmes and clubs.

The 34-page supplement contains six articles. The regular equipment test reports by Larry Magne take up most of the room, previewing the ESKA RX99PL and JRC NRD 525 receivers. Reviews of the Sony ICF2001D, Yaesu FRG-8800 and Zenith SW-7800 are also included, though the latter is not available in Europe. The reviews are independent and hard-hitting, the new Philips 2999 for instance is described as one of the worst ever tested, "multiplying frequencies so badly it would seem the designers dropped a pocket calculator inside." The table of "Best and Worst" is useful, though it would be handy if the publishers came out with a separate book of all the *WRTH*

▲ **Andy Sennitt, the other full-time editor of the WRTH**

The main editors are assisted by monitors, like Finn Krone ▶

equipment tests so far. Many of the receivers reviewed in '84 and '85 are still available, yet the *WRTH* for those years is out of print. It's also curious why so many receiver manufacturers show their receivers tuned to ludicrous frequencies in their advertisements.

A composite article entitled "Technical Trials Ahead" looks at the problems facing the second session of the World Administrative Radio Conference on h.f. broadcasting next year. The article provides some food for thought on the proposal to let the computer take over much of the planning at the ITU.

"It appears it is very difficult to develop algorithms that can take into account all the various factors influencing signal strength in a particular area. If you take into account the wide fluctuations in reception conditions, such as those experienced during the past Northern Hemisphere winter, planning a reliable service for every user becomes technically impossible. Until now, frequency management has been in the hands of PTT organisations, or the stations themselves. In future, this work is being done by a central computer, but the task is so enormous that with the present state of technology, it would take 6 months to complete. Since the plan would only be valid for 3 months, some simplification and thus compromises are needed. In technical circles these may be accepted sooner or later, the politicians may be more difficult to please."

Soliljevej 44, home of the WRTH editorial offices

The *WRTH* editors have compiled a fascinating 9-page survey of the last 40 years of broadcasting. Whilst it is impossible to be complete, the use of photographs and some of the more unusual entries over four decades makes for interesting reading. The book concludes with a look at how DX programmes of the future might look, and a critique of current programming standards on shortwave.

Conclusions

The *WRTH* uses a tried and tested formula designed to make it simple to find information fast. It is clearly the most comprehensive source on radio and TV that exists. Although relatively expensive, compared to other books, this is a specialised publication offering a wealth of information. This year's anniversary edition has gone a long way to improve the layout of the book, and increase its appeal, it could go further though. The useful contents list by country, which used to be at the front of the book recently changed into an index hidden towards the end of the book, that has made it more difficult to find unless you turn down the corner of page 565.

A few of the photographs in the *WRTH* '86 have gone wrong, the review of the ICF2001D is illustrated with a shot of the old and unrelated ICF2001, likewise the Philips D-2999 review shows a photo of a different Philips set. The photograph of Prof. Dr Waldmeir, author of the article on Solar Activity gives the impression the author has spent too long examining sunspots at close range!

The GMT time conversion chart could be a bit more comprehensive too, there is no indication as to when summer and winter time start in each country, though such information is published by travel organisations. Perhaps the two could get together.

Overall though, the editors and publishers of the 40th edition should be congratulated on a job well done.

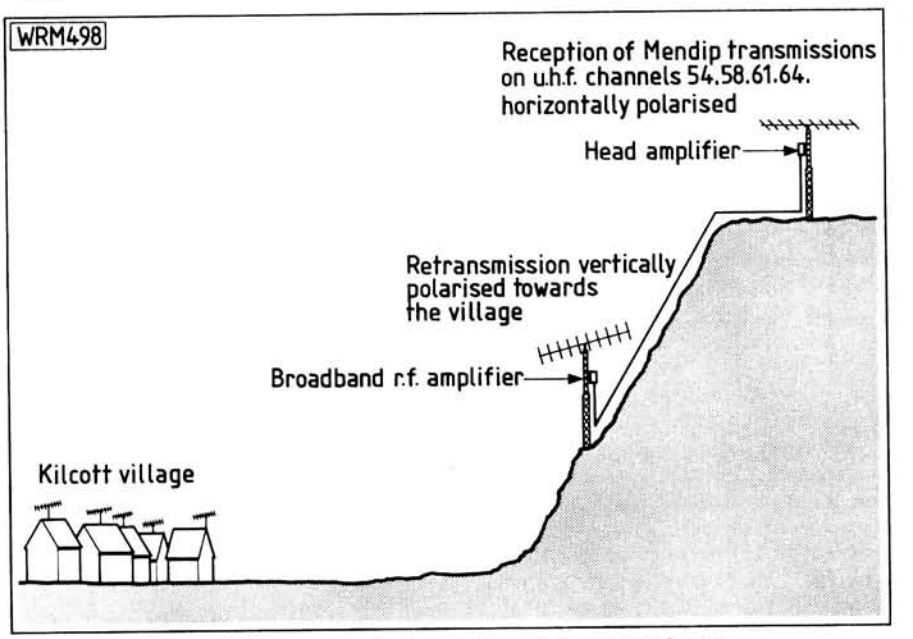
The 1986 *WRTH* is distributed in the UK through Pitman Publishing Ltd, 129 Long Acre, London WC2E 9AN. ISBN 0 902285 114.

Filling the Gaps– Self-Help TV

N. S. Cawthorne looks at a way of providing a usable TV signal where none exists at present

The UK's u.h.f. TV transmissions population coverage at about 99 per cent is one of the highest in the world. The one per cent of the population that cannot currently receive a satisfactory u.h.f. signal live mostly in outlying areas of the UK or in heavily screened locations such as valleys or low lying coastal regions where u.h.f. signals from main or relay transmitters cannot reach.

The BBC and the IBA are now working on a programme of fill-in repeaters that will in some cases cater for communities down to populations of about 200. As the size of population served by a new relay or main transmitter decreases, the "cost per viewer" of its installation increases dramatically. The cost of installation of a large city transmitter such as the BBC's London u.h.f. transmitter at Crystal Palace was measured in "pence per viewer", where coverage in the London area is several million viewers. But for smaller coverage areas, where the number of viewers served by the transmitter is small the cost per viewer will increase to ten, hundreds or even thousands of pounds per viewer. For some very small communities it will always be very expensive on a per capita basis to provide an adequate u.h.f. TV signal. It was with these very small communities in mind that the Self-Help Television scheme was devised.



General arrangement of an active deflector scheme

The Self-Help Television Scheme

The Self-Help Television scheme has been designed to enable small communities to club together in order to provide a usable u.h.f. TV signal for their community where none exists. Either a cabled system or a small TV rebroadcast transmitter can be used. Some schemes use a combination of both.

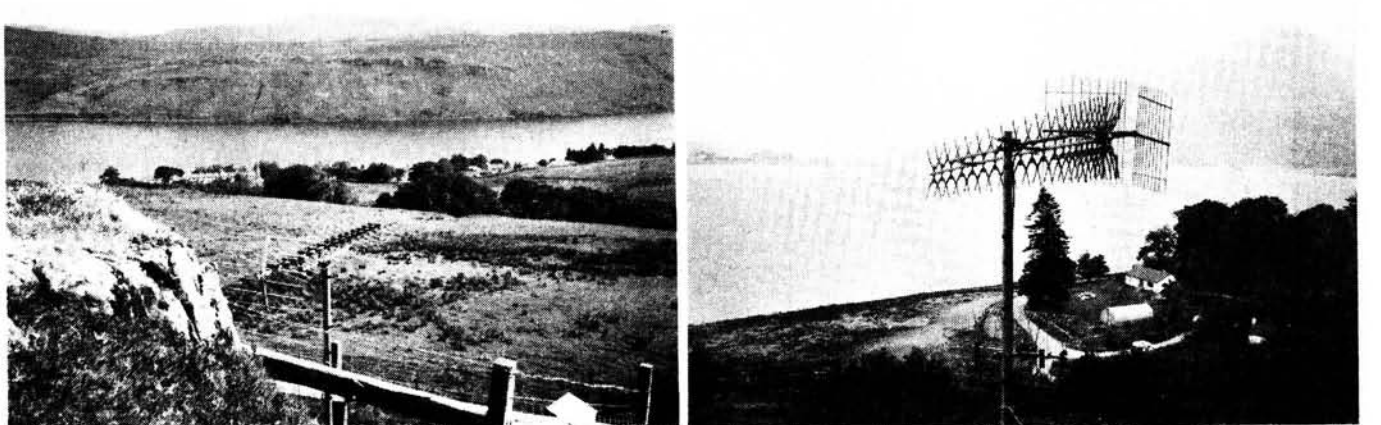
A wired distribution system involves a master antenna located at a good site, receiving signals from an existing broadcast transmitter, and a cable leading away to various houses to be served by the system.

A self-help transmitter also requires a receiving antenna erected on a good reception site. The transmitter site, which may be fed by cable from the receiving site, must be on a good line-of-sight path to the houses being served. The transmitting antenna radiates a multi-channel signal to serve the members of the small community.

Active Deflector

The majority of the self-help transmitter schemes installed are of the "active deflector" type where the four u.h.f. channels are received by the well-sited receiving antenna and are re-transmitted to the community on the same channels but on the opposite polarity. Where reception is from a horizontally polarised main transmitter site, the local community rebroadcast would then be vertically polarised.

Cross-polarisation helps to mini-



Views from the transmitting antenna towards the village of Carbost with Loch Harport in the background

mise the amount of directly received signal by the viewer's own receiver which would interfere with the locally rebroadcast transmission. A viewer in a remote valley may be able to receive a weak picture direct from the main transmitter under certain atmospheric or climatic conditions. The locally rebroadcast signal has to be crosspolarised with respect to the main signal to minimise the amount of direct signal received by the viewer. Receiving both the rebroadcast signal and the direct signal together causes "ghosting".

The transmitted power level of the rebroadcast signal is small, typically only a few milliwatts per channel with an e.r.p. of well under a watt. Very low powers are used to avoid any possible interference to viewers in other communities who are receiving a signal direct from the main transmitter or from another source. Systems planning is important so as to optimise reception for members of the community as well as to minimise the risk of interference to other viewers and possibly other services.

The "active deflector" system described rebroadcasts on the same channels as the signal received from the main station. Among the 200 odd self-help transmitter systems licensed so far there are only about 10 true transponder systems. The majority of the schemes rebroadcast on the same channels as the main transmitter, hence the expression "active deflector".

Transposers

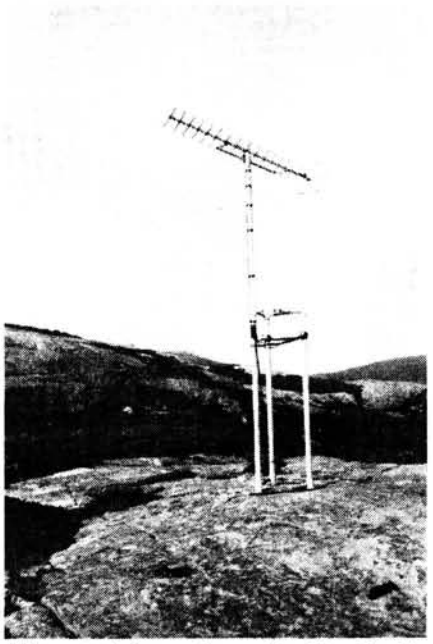
The use of transposers which rebroadcast on different channels to the main transmitter which is being relayed is relatively rare in the self-help television scheme because of the frequency planning problems involved, as well as the additional cost to the community members.

Transposers are only recommended when there is no other practical solution to the problem of ghosting. Where the physical constraints of the site are such that a simple rebroadcast system would produce an unacceptable level of ghosting to too many viewers, then a transposer may be the only solution. The installation of a transposer system requires extra careful planning to take account of not only other existing transmitters, but also those that are being planned.

Planning

The BBC and IBA are managing the systems planning aspects of the self-help scheme on a combined basis. Depending on its area and location a particular self-help scheme will be designated as either a BBC or IBA responsibility.

A joint BBC/IBA publication *Self-help Televison* sets out the background to the scheme and is a guide on how to proceed. The BBC/IBA are concerned with the transmitter schemes and some of the frequency planning aspects. Licensing of transmitter schemes is handled by the Home Office through its Television Planning Group.



The receiving antenna for the South Glendale active deflector scheme

Home Office Licensing

The licensing of both self-help wired distribution systems and self-help transmitters has been handled by the Home Office who produce guidance notes for applicants. Since the recent enactment of the Cable and Broadcasting Act, the responsibility for licensing of the wired system passes to the newly created Cable Authority.

The Home Office licensing of transmitter schemes is in two phases. The formal licensing procedures commence with an Initial Enquiry Form which is obtained from the broadcaster designated for the area and is completed by the applicant. On the basis of this completed form, the project is submitted after assessment by the broadcaster to the Home Office Television Planning Group for their approval. Once approved the Home Office issues an "approval in principle" in the form of a Test and Development Licence. The fee is currently £50. This licence permits the applicants to install their system and carry out operational tests.

A further fee of £50 is payable to the Home Office when the full licence is issued by the Home Office. The full licence for the scheme is issued after national and international clearance of the scheme have been received. The broadcaster also checks on the operation of the system after the issue of the "aproval in principle" and before the issue of the full licence.

Coverage

In September 1985 a total of 211 licences have been issued by the HO and 173 have been formally approved. Others are still at the planning or test and development licence stage. Given the relative technical simplicity of the systems used, it is probably reasonable to assume that there are also a number of schemes in operation which have not been notified to the broadcasting authorities or to the Home Office before being set up.

Estimating the exact numbers of viewers benefiting from the licensed schemes is not easy. Schemes installed include coverage of holiday chalets and hotels with their seasonal populations as well as, in one case, an army camp. One estimate suggests that there are about 9000 viewers now receiving a satisfactory picture where there was none before, thanks to the self-help television scheme.

Stop-Gap Measure

In some cases the self-help schemes were only intended as temporary measures while awaiting the arrival of a BBC/IBA installed transmitter. Three of the original self-help schemes have already closed down because they are now served by a BBC/IBA transmitter.

Some other current self-help schemes will also prove to be only stop-gap measures until a local BBC/IBA transmitter is installed. However for the majority of self-help schemes the communities are so small (one scheme in Scotland is reputed to have only one viewer!) that no relay transmitters are currently planned nor are they likely to be for many years. For these small pockets of viewers the self-help scheme will be their only means of a satisfactory u.h.f. television picture for many years to come.

Finance

The costs of equipment installation, maintenance and the licence fees have to be borne by the community group. For some areas a grant may be possible through the appropriate body e.g: Development Commission for Rural England, Highland and Islands Development Board or the Mid Wales Development Board. Local Regional or County councils have also been able to assist community groups with financing their schemes.

Subject only to any financial support that might be available to communities from the above bodies, it is the communities that have to raise the finance for the scheme. In many cases much of the work such as trenching and cable laying or the installation of aerial masts can be done by the local people who are in the community to be served by the scheme. "Self-help" is the name of the scheme and a certain degree of self-help within the community to be served will reduce the total costs of bringing in a u.h.f. TV signal to where none existed before. **PW**

Many thanks to Mr P. E. Lonsdale, Head of Liaison Section Engineering Information Department of the BBC, for the photographs in this article.

Weather Watch—1

Meteorological broadcasts have become much more in the public eye since the TV weathermen began using pictures from satellites to illustrate the finer points of forecasting in their daily bulletins. It is certainly true that the satellite pictures and other data provide a wealth of information for the forecaster in addition to tremendous visual impact for the man in the street. Despite the hi-tech appeal of satellite meteorology, it is only one small aspect of the continuing distribution of information for meteorological purposes. At the risk of making a pun, it could be described as the tip of the iceberg. In this series, Jeff Maynard G4EJA looks at these and many other weather transmissions.

We shall come back later to the role of satellites in weather information distribution, but the main aim this month is to describe the scope and range of weather information available on the h.f. bands and readily receivable by any station equipped with the simplest short wave receiver.

Before moving on to describe these transmissions let me make it clear that to receive them requires a special licence. There is no test needed for this, only the approval of the Meteorological Office who require an undertaking that any information received will not be put to any commercial use. A brief note describing the terms under which the licence will be issued is available from: Meteorological Office (Licensing), London Road, Bracknell, Berks RG12 2SZ. Following approval of the Met Office, the licence will be issued by the Department of Trade and Industry for the sum of £5.00 and is permanent (i.e. there is no annual fee). The licence is "for reception of meteorological information transmitted from special service stations". These special service stations are further clarified as "listed world meteorological stations". The licence does not provide for the disclosure of information received, and the examples in this series of articles are reproduced by permission of the Meteorological Office.

Equipment

Having said that any short wave receiver will be adequate, let me describe the equipment in use at G4EJA for meteorological broadcast (and general short wave) reception. The basic receiving system and options are shown in Fig. 1.1.

Two antennas are currently available for short wave reception—an inverted V and a three-element triband beam (a trapped dipole is ready for installation as and when time permits). The inverted V is the one mostly used for meteorological work. The main receiver, a Trio R-1000, is fed via the send-receive antenna relay in the station transmitter to ensure that the receiver is always muted when transmitting (safety first!).

The audio output of the R-1000 can be fed directly to the printing/display equipment or to a Datong filter type FL/1. The active filtering available from the Datong can be useful in restricting the incoming bandwidth to minimise noise and/or adjacent channel interference. I have found it less useful for removing heterodynes and the like from the sort of signals of interest here. In practice the Datong is calibrated for the centre frequency and bandwidth of the two main types of signal received (RTTY and facsimile) and can be switched in and out quickly as desired.

Following the filter the audio is fed both to the facsimile machine (of which more later) and to the RTTY set-up. This consists of two demodulators and a printer. The RTTY terminal unit (t.u.) is a professional model from Dovetron with fully tunable filters only 80Hz wide. A selectable alternative to the t.u. is a Morse to Baudot converter from Xitek. It is currently very difficult to find many meteorological transmissions using c.w.

RTTY

The principle requirements for RTTY reception other than the antenna and receiver, are the t.u. and some form of display. The t.u. converts incoming audio signals to the mark/space coding of the Baudot 5-unit code. The t.u. output can be ±80 volts for traditional electromechanical equipment or t.t.l. for modern microprocessor-based equipment.

Commercial RTTY uses either medium shift (that is 450Hz between the mark and space frequencies) or wide shift (850Hz separation between mark and space). Transmission speed is usually 50 baud. (A good 100 baud signal is frequently available from Potsdam on 3·211 or 7·890MHz).

For a detailed description of the workings of RTTY, together with circuit and construction suggestions for simple receiving equipment, the reader is referred to *Introducing RTTY* published by *Practical Wireless* at £1.00 (plus 60p post and packing by mail order).

It is not necessary to use a printer for receiving RTTY broadcasts. A home computer linked to a television set or monitor makes an ideal visual display. Software is available from a number of sources to convert incoming Baudot code to the ASCII code needed for computer display. When the content of RTTY meteorological messages is discussed later, further uses of the home computer will become apparent.

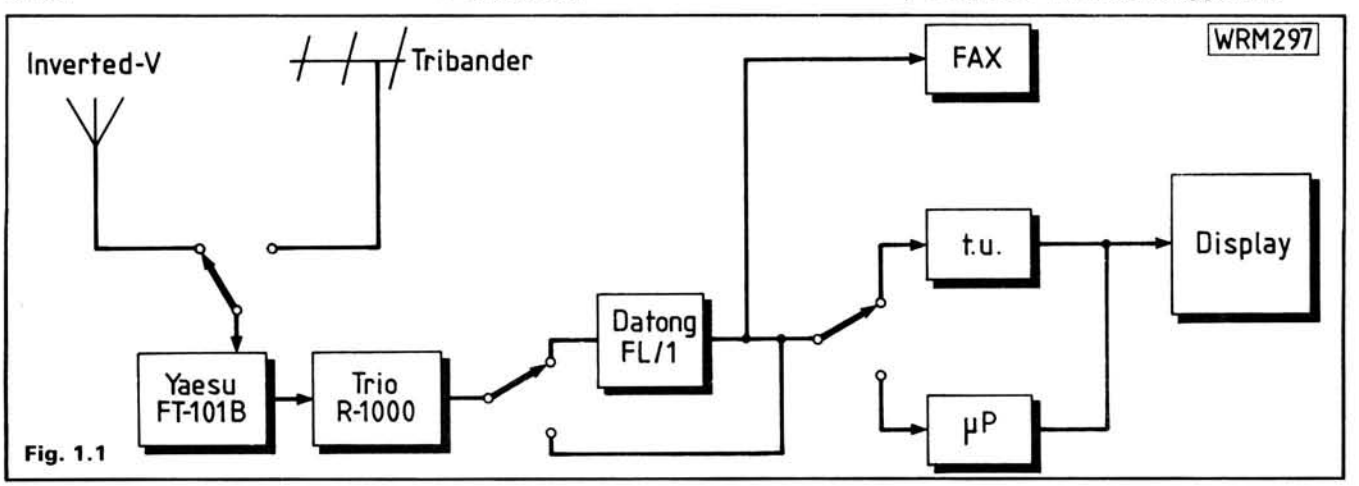


Fig. 1.1

Where to Listen

RTTY meteorological broadcasts must be the easiest signal of all to find, even on today's crowded h.f. bands. The familiar "jingle bells" sound of RTTY can be heard on almost any of the fixed service bands. For example, around 3·0MHz, 4·5MHz, 5·5MHz, 8·2MHz, 11·4MHz, 13·6MHz, 14·4MHz, 17·6MHz and 18·2MHz.

For an initial test or even just to find out the sound of an RTTY station, the broadcasts from Bracknell are strong and have a reliable schedule. Callsigns, frequencies and operating schedule are as shown:

GFL26 4·489MHz 0000–2400
GFL22 6·835MHz 1800–0600
GFL23 9·886MHz 0000–2400
GFL24 14·356MHz 0000–2400
GFL25 18·230MHz 0600–1800

Each of these stations radiates 10kW at 50 baud. Other reliable RTTY broadcasts include the following: Paris Meteo 4·013MHz and 8·163MHz; Sofia Meteo 4·813MHz and 11·063MHz; Prague Meteo 4·336MHz. Incidentally, those readers with no RTTY or facsimile equipment may still find some Morse traffic from the German weather station DDH8 on 13·657MHz or 11·039MHz.

The best place to listen clearly depends on the time of day and the reason for listening. During daylight hours the higher frequencies will be favoured, whilst the lower ones are preferable after dark. If accurate data is required for weather forecasting then Bracknell is the best choice since it provides a good signal and plenty of data. For meteo DXing then it's a question of listening wherever the fancy takes you.

What do You Get?

The casual RTTY observer first tuning to a meteo broadcast on h.f. may think he has discovered some secret traffic—perhaps between embassies or from base to spy in the field! The reason for this is that RTTY meteo messages consist principally of 5-figure groups as shown in Fig. 1.2. Little of the messages will be found in plain text. However, the messages are in coded form for brevity and not for secrecy.

```
NNNN
ZCZC 333 13900
SMRR1 RUTK 301200
AAXX 30121
36982 41699 32505 11010 21121 47055 58001 70272 83500=
38262 42998 80504 10229 20080 40111 57014 8802/=
38353 42997 53602 10222 20061 40115 57003 80001=
38388 42998 80903 10228 20054 40083 58015 880J2/=
38392 42698 71106 10231 20055 40099 57004 82530=
38413 32998 81102 10247 20058 40094 57012 83035=
38457 32998 63202 10247 20011 40083 57013 80001=
38507 42998 83105 10195 20078 40071 58010 82088=
38545 42598 70306 10239 20053 40072 57020 83970=
38613 42699 61801 10238 20036 40076 57017 82202=
38656 42698 70504 10205 20106 40097 58006 87500=
38687 42797 80204 10263 20040 40046 57013 8497/=
38696 32899 80906 10221 20056 40071 55002 8335/=
38750 42997 62504 10188 20125 40078 58021 80001=
38763 41597 70601 10205 20109 40083 57013 70182 82260=
38836 42699 70903 10245 20064 40064 58027 85508=
38880 41798 23604 10218 20098 40081 57015 70381 82100=
38895 42997 22704 10267 20080 40047 52002 80001=
38927 32797 80000 10296 20070 40049 55008 8235/=
38954 42999 82906 10153 21012 40490 57012 80001=
38974 42998 53406 10239 20070 40041 53004 80002=
```

Fig. 1.2

The instructions necessary for decoding are readily available in the *Admiralty List of Radio Signals, Volume 3,* about £8 from HMSO, or in the *List of Meteo Codes* available from Joerg Klingenfuss, Panoramastrasse 81, D-7400 Tuebingen, Federal Republic of Germany. Of the two only Herr Klingenfuss' publication includes decoding examples.

Unfortunately, obtaining the decoding manuals is very much the easy part. The instructions for decoding are very lengthy and complex and, frankly, require a certain dedication to meteorology to decipher in any significant quantity.

The main reason for the complexity is the tremendous range of data that can be encoded. There are over 30 basic types of report and just one of these (the synoptic report from Weather Stations) has over 50 different formats. Within each of these formats the coded data (that is the 5-figure groups) can take on almost 200 different meanings depending on its position within the format and the particular format.

If that was not enough, some of the data designators can be repeated any number of times and the information can be represented by 1, 2, 3, 4 or 5 digits of the 5-digit group. Many designators represent a simple numeric value (such as, say, wind speed) but a great many more themselves need to be translated (such as the present weather indicator).

In Part 2 of this series we shall look at the detail of decoding this meteorological data, with real-life examples to illustrate the methods used.

County Antrim

Lagan Valley ARS: Jim Jackson GI4TCS, Shantara, 21 Carnreagh, Hillsborough, Co. Down. Meets 2nd Mondays, 7.30pm in the Rathvarna Teachers Centre, Pond Park Road. Lisburn, Co. Antrim. March 14—Hamfest at Grove AC, Knockmore, Lisburn, 7.30pm and S2 talk-in.

Avon

Bath & District ARC: L. Lear G3FIH (Bath 837539). Meets alternate Wednesdays, 7.45pm in Englishcombe Inn, Englishcombe Lane, Bath. April 16—AGM.

Bristol ARC: D. Gully G4YOC (Bitton 4116). Meets Tuesdays, 7.30pm in the YMCA, 6 Park Road, Kingswood, Bristol.

City of Bristol RSGB Group: C. R. Hollister G4SQQ (Bristol 508451). Meets 4th Mondays, 7.30pm in the small lecture theatre, University Walk, UoB, Clifton. March 24—Visit to Bristol Weather Centre

North Bristol ARC: Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol. Meets Fridays, 7pm in the Self-Help Enterprise, 7 Braemar Crescent, Northville. April 18—Bring and Buy.

Bristol (Shirehampton) ARC: Ron Ford G4GTD (Bristol 770504). Meets Fridays, 7.30pm in Twyford House, Lower High Street, Shirehampton.

Gordano AR Group: John Davies G3LJD, 273 Down Road, Portishead. Meets 4th Wednesdays, 8pm in The Ship, Redcliffe Bay, Portishead.

Berkshire

Newbury & District ARS: M. J. Fereday G3VOW (Newbury 43048). Meets 2nd Tuesdays at Newbury Technical College.

Buckinghamshire

Milton Keynes & District RS: Dave White G3ZPA (M Keynes 501310). Meets 2nd Mondays, 7.30pm in The Meeting Place, Hodge Lea, North M. Keynes. March 13—Junk Sale.

Cambridgeshire

Cambridge & District ARC: Brian Davy G4TRO (Cambridge 353664). Meets Fridays, 7.30pm in the Visual Aids Room, Colleridge CC, Radegund Road, Cambridge.

Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursdays, 7.30pm in Southfields Junior School, Stanground, Peterborough. March 20—Simple Antennas by G4OO.

Cheshire

South Cheshire ARS: Chris Wiseman G1PUV (Kidsgrove 73185). Meets 2nd and 4th Mondays, 8pm in the Victoria Club, Gatefield Street, Crewe.

Clwyd

Conwy Valley ARC: N. Vicars-Harris GW4VVW (Conwy 636376). Meets 2nd and 4th Thursdays, 8pm in the Green Lawns Hotel, Bay View Road, Colwyn Bay. March 13—Construction Contest Judging.

Rhyl & District ARC: Melfyn Allington GW1AKT (Nantglyn 469). Meets 1st and 3rd Mondays, 7.30pm in the Mona Hotel, Market Street, Rhyl.

Cornwall

Cornish RAC: Tony Bevington G4ZUI (Stithians 860572). Meets 1st Thursdays, 7.30pm in the Treleigh Church Hall, Redruth. Following Mondays is computer section, 3rd Mondays is constructor's workshop.

Plymouth ARC: A. J. G. Veale G4SCA (Plymouth 337980). Meets 1st and 3rd Mondays, 7.30pm at Plymouth Albion RFC, Beacon Park, Peverell, Plymouth. March 17—BT Installation at Goonhilly by G3KJK.

CLUB NEWS

Compiled by Eric Dowdeswell G4AR
Reports to: Eric Dowdeswell,
57 The Kingsway, Ewell Village,
Epsom, Surrey KT17 1NA
PLEASE MARK "CLUB NEWS"

Cumbria

Carlisle & District ARS: Tony Leach G4WOQ (Scotby 500). Meets Mondays, 7pm in Uppersby Parish Hall, Uppersby Road, Carlisle.

Eden Valley RS: Alison Telford G4XPO, Ivy House, Culgaith, Penrith. Meets 3rd Thursdays, 7.30pm in the Kings Arms, Temple Sowerby. March 20—AGM.

South Lakeland ARS: Dave Warburton G6LKB (Barrow-in-Furness 54982). Meets 1st and 3rd Thursdays, 8pm in the NORWEB S&SC (rear of Ormsgill Hotel), Barrow-in-Furness.

Derbyshire

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

Buxton ARS: Tony Briggs G8YHX (Buxton 6800). Meets alternate Wednesdays, 8pm at Haddon Hall Hotel, London Road, Buxton. Next meetings March 19 and April 2.

Glossop & District ARG: G. Sims G4GNQ, 85 Surrey Street, Glossop. Meets last Thursdays, 8pm in the Nags Head Hotel, Charlestown Road, Glossop. March 27—Fibre Optics.

Devon

Torbay ARS: Brian Wall G1EUA (Teignmouth 78554). Meets last Saturdays, 7.30pm in the EEC SC, Ringslade Road, Highweek, Newton Abbot. March 8—Annual Dinner Dance; 29th—Digital Recording.

Dorset

Poole RAS: Phil Dykes, 68 Egmont Road, Poole. Meets last Fridays, 7.30pm at Commander House, Constitution Hill Road, Poole. April 25—AGM.

Dyfed

Carmarthen ARS: A. F. Dowling GW3GUE (Carmarthen 883460). Meets 2nd and 4th Fridays, 7.30pm in the Carmarthen Boat Club, The Quay, Carmarthen.

Essex

Loughton & District ARS: John Mattison, Aylmers Farm, Sheering Lower Road, Old Harlow. Meets alternate Fridays, 7pm at Loughton Hall, Rectory Lane, Loughton. Next meetings March 14 and 28.

Stanford-le-Hope & District ARC: J. R. Thompson G4OVG (S-I-H 642312). Meets Mondays, 8pm in St Joseph's Parish Rooms, Scratton Road, S-I-Hope.

Vange ARS: Mrs D. Thampson, 10 Feering Row, Basildon. Meets Thursdays, 8pm in Barstaple CC, off Long Riding, Basildon. 1st Thursdays—Junk Sale.

Glamorgan

Bridgend & District ARC: Trevor Morgan GW4SML, 4 Rhiw Tremaen, Brackla, Bridgend. Meets 1st and 3rd Fridays, 7.30pm in the YMCA, Angel Street, Bridgend.

Rhondda ARS: John Howells GW4BUZ (Tonypandy 432542). Meets Thursdays, 7.30pm in the NUM Club, Tonypandy, March 20—AGM; April 3—Get-together with other clubs.

Greater Manchester

South Manchester RC: Dave Holland G3WFT (061-973 1837). Meets Mondays and Fridays, 8pm at Salemoor CC, Norris Road, Sale. March 7—Visit to Jodrell Bank; 14th—Aurora by G3USF; 21st—Bring and Buy.

West Manchester RC: Dave Comac G1IOO (Bolton 24104). Meets Wednesdays, 8pm in Tyldesley Miners WC, Meanley Road, Gin Pit Village, Astley, Tyldesley.

Gwent

Abergavenny & Nevill Hall ARC: J. B. Davies GW4XQH (Abergavenny 4655). Meets Thursdays, 7.30pm in Pen-y-Fal Hospital, above male ward 2. The club is a registered RAE centre.

Gwynedd

Merion ARS: Ken Judge GW4KEV, Tyddyn Mawr, Arthog. Meets 1st Thursdays, 7.30pm at Dolserau Hall Hotel, Dolgellau. April 3—AGM.

Hampshire

Amateur Radio & Computer Club: Trevor Tugwell G8KMV (Fareham 43031, ext 2591). Meets every 4th Friday, 8pm in the Crown, Bishops Waltham. Next meetings—March 7 and April 4.

Basingstoke ARC: Dave Burleigh G4WIZ (Tadley 5185). Meets 1st Mondays, 7.30pm in Forest Ring CC, Sycamore Way, Winklebury. March 8—GB4BLE operating from Basingstoke Library Exhibition; April 7—Propagation by G3LTP.

Fareham & District ARC: Brian Davey G4ITG (Fareham 234904). Meets Wednesdays, 7pm in Porchester CC, Westlands Grove, Porchester, Room 12. March 12—Updating on 50MHz by G4JCC; 26th—Amateur Radio in France by FE5GC.

Horndean & District ARC: Dan Barnard G4RLE, 36 Guildford Road, Fratton, Portsmouth. Meets 1st Thursdays, 7.30pm in Merchiston Hall, London Road, Horndean. April 3—Film Show by G4BEQ.

Winchester ARC: Robert Stone G4FPC (Winchester 64747). Meets 3rd Saturdays, 7.30pm in the Log Cabin, Stockbridge Road, Winchester

Hereford & Worcester

Bromsgrove ARS: Alan Kelly G4LVK (021-455 2088). Meets 2nd and 4th Tuesdays, 8pm at The Hundred House, Stourbridge Road, Bromsgrove. April 8—Surplus Sale by Auction.

Bromsgrove & District ARC: Norman Westwood (Bromsgrove 73847). Meets 2nd and 4th Fridays, 8pm at the Avoncroft AC, Bromsgrove.
Kidderminster & District ARS: Tony Hartland G8WOX (Kidderminster 751584). Meets 1st and 3rd Tuesdays, 8pm at the Vice President's Club, Harriers Football Ground, Hoo Road, Kidderminster. March 18—Keeping it Clean by G4MD; April 1—Radio Regulations by G4PZA.

Hertfordshire

Borehamwood & Elstree ARS: Tony G0DDJ (01-207 3809). Meets 3rd Mondays, 7.30pm in The Wellington, Theobald Street, Borehamwood. March 17—Constructors' Evening.
Cheshunt & District ARC: John Watkins G4VMR (Dane End 250). Meets Wednesdays, 8pm in the Church Room, Church Lane, Wormley. March 19—Surplus Equipment Sale.
Stevenage & District ARS: Frank Wilson G4ISO (Baldock 892765). Meets 1st and 3rd Tuesdays, 7.30pm at Sitec Ltd, Ridgemond Park, Telford Avenue, Stevenage. March 18—AGM.
Verulam ARC: Hilary Claytonsmith G4JKS (St Albans 59318). Meets 2nd and 4th Tuesdays, 7.30pm in The RAFA HQ, New Kent Road, off Marlborough Road, St. Albans. March 25—Intermodulation, Phase Noise and Dynamic Range by G3RZP.
Welwyn Hatfield ARC: Dave Fairbank G0AII (Welwyn Garden 326138). Meets 1st and 3rd Mondays, 8pm in Knightsfield Scout HQ, Welwyn Garden City. March 17—Workshop Techniques.

Highland

Inverness ARC: Brian Adam GM1GFX (Inverness 242463). Meets Thursdays, 7.30pm in the Cameron Youth Club, Planefield Road, Inverness.

Humberside

Hornsea ARC: Richard Gutteridge G4YTV (Skirlaugh 62498). Meets Wednesdays, 7.30pm in The Mill, Mill House, Atwick Road, Hornsea.
Hull & District ARS: Cliff North G4PEP (Hull 77249). Meets Fridays, 8pm at the West Park Recreation Centre, Walton Hill, Hull.

Isle of Man

Isle of Man ARS: Anthea Matthewman GD4GWQ (Douglas 22295). Meets Mondays, 8pm in the Howstrake Hotel, Harbour Road, Onchan; Tuesdays in the Peverill Court Hotel, Ramset; Thursdays in the Tynwald Inn, St Johns; Fridays at the Perwick Bay Hotel, Port St. Mary.

Kent

Biggin Hill ARC: Bob Senft G0AMP (Farnborough 57848). Meets 3rd Tuesdays, 8.30pm in Downe Village Hall, High Street, Downe.
Bredhurst R&TS: J. Scott G4ZTF (Medway 374670). Meets Thursdays, 8pm in Parkwood CC, Parkwood Green, Rainham. March 20—AGM; 22nd—Rainham Rally with talk-in by GB4RRR (S22); April 3—Active Filters by G4EGH.
Cray Valley RS: B. Rowe G4WYG, 19 Maderia Park, Tunbridge Wells. Meets 1st and 3rd Thursdays at Admiral Seymour Hall, Admiral Seymour Road, Eltham. April 3—Construction Contest.
Darenth Valley RS: L. F. W. Thomas (Swanley 63368). Meets last Wednesdays, 8pm in Crockenhill Village Hall, near Swanley.
East Kent ARS: A. G. Stone G4UPJ, 86a Joy Lane, Whitstable. Meets 1st and 3rd Thursdays, 7.30pm in Herne Bay Youth Centre, The Cabin, Kings Road, Herne Bay.

Lancashire

Fylde ARS: H. Fenton G8GG (Lytham St Annes 725717). Meets 1st and 3rd Tuesdays, 7.30pm in the Kite Club, Blackpool Airport.

Leicestershire

Welland Valley ARS: Judith Bay G6OFZ, WVARS POB 16, Market Harborough. Meets Mondays, 7.15pm in Welland Park CC, Market Harborough.

Lincolnshire

Sleaford & District ARC: Dave Beilby G2HHK (Sleaford 304454). Meets 3rd Sundays, 7.45pm in Hale Magna Village Hall, Great Hale.

London

Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton. Meets 3rd Tuesdays, 7.30pm in Chiswick Town Hall, High Road, Chiswick. March 18—Members' Test Equipment.
Grafton RS: John Kaine G4RPK, 74 Camden Mews, London NW1. Meets 2nd and 4th Fridays, 8pm in the SCC Training Ship Wizard, White Hart Lane, Wood Green, N22. March 14—Early Days of Radio by G8DR; 28th—no meeting.
Southgate ARC: Bob Snary G4OBE, 12 Borden Avenue, Enfield. Meets 2nd Thursdays, 7.30pm in the Holy Trinity Church Hall, Green Lanes, Winchmore N21. March 13—TV and video Techniques by G8NGF.
Wimbledon & District ARS: George Cripps G3DWW (01-540 2180). Meets 2nd and last Fridays, 7.30pm in the St John Ambulance HQ, 124 Kingston Road, Wimbledon. March 14—Surplus Equipment Sale; 28th—no meeting.

Lothian

Leith Nautical College AR&EC: Susan Beech GM4SGB, The College, 24 Milton Road East, Edinburgh. Meets Tuesdays, 5pm in Room T2-4. Open to past and present members and staff of the college.

Merseyside

St. Helens & District ARC: Alan Riley G6MXT (051-430 9227). Meets Thursdays, 7.30pm in St. Helens ITC, Water Street, St Helens.
Wirral ARS: R. E. Bridson G3VEB, 14 Zig Zag Road, Wallasey. Meets 1st and 3rd Wednesdays, 7.45pm at Club HQ, Ivy Farm, Arrowe Park Road, Birkenhead. March 5—Weather Satellite Pictures on your TV.
Wirral & District ARC: Gerry Scott G8TRY (051-630 1393). Meets 2nd and 4th Wednesdays, 8pm in Irby Cricket Club, Irby.

Middlesex

Edgware & District RS: John Cobley G4RMD (Hatfield 64342). Meets 2nd and 4th Thursdays, 8pm in Watling CC, 145 Orange Hill Road, Burnt Oak, Edgware. March 27—AX25 Packet Radio Demo by G4RMD.
RS of Harrow: Dave Atkins (Rickmansworth 779942). Meets Fridays, 8.15pm in the Roxeth Room, Harrow AC, High Road, Harrow Weald. Talk-in using GB3HR on RB14.

Northumberland

Borders ARS: Mrs M. Bottomley GM1IRN, 4 Home Farm Cottages, Ladykirk, Berwick-on-Tweed. Meets 1st and 3rd Fridays, 8pm in the Tweed View Hotel, Berwick-on-Tweed.

Nottinghamshire

Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812). Meets 1st Fridays and 3rd Tuesdays in the Victoria SC, Mansfield. April 4—Construction Competition.
ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604). Meets Thursdays, 7.30pm in Sherwood CA, Woodthorpe House, Mansfield Road, Sherwood. March 13—Meteor Scatter; 20th Constructors' Cup; 27th—Path Losses by G4OUB; April 3—AGM.
Worksop ARS: Carole Gee G4ZUN (Worksop 486614). Meets 2nd and 4th Tuesdays, 7.30pm in the Sub-Aqua Club, The Maltkins, Gateford Road, Worksop. March 11—Secret Listeners Video; 25th—Darts and Dominos with the Sub-Aqua Club; April 8—VHF Now and Then by G4UM.

Oxfordshire

Vale of White Horse ARS: Janet Baker G4SYL (Didcot 816845). Meets 1st and 3rd Tuesdays, 7.30pm in the Upstairs Meeting Room, Waterwitch, Cockroft Road, Didcot.

Shropshire

Salop ARS: Simon Pryce G6OMJ (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell. March 20—DF Hunt; April 3—Construction Contest.
South Shropshire RC: G. Cowan, 5 Woodrows, Woodside, Telford. Meets Thursdays, 8pm at the Brosley SC, Brosley. New members and visitors welcome.
Telford & District ARS: Tom Crosbie G6PZZ (Telford 597506). Meets Wednesdays, 8pm in Dawley Bank CC, Bank Road, Dawley, Telford.

Somerset

Yeovil ARC: Eric Godfrey (Yeovil 75533). Meets Thursdays, 7.30pm in The Recreation Centre, Chilton Grove, Yeovil. March 13—FET Circuits by G3MYM: 20th—Modulation by G3GC: April 3—j-Notation by G3MYM.

Staffordshire

Stafford & District ARS: Tony Bairstow G4RSW (Stafford 46306). Meets Tuesdays, 8pm in the Coach and Horses Motel, Weston (A51).

Strathclyde

Ayr AR Group: R. D. Harkness GM3THI (Ayr 42313). Meets alternate Fridays, 7.30pm in The Wellington Leisure Centre, Wellington Square, Ayr. March 21—Bring and Buy: April 4—RAYNET by GM3DZH.
Helensburgh ARC: Dave Reid GM0BZF, 28 Bainfield Road, Cardross, Glasgow. Meets Mondays and Thursdays, 7.30pm in the Cairndhu Nursing Home, Old Cairndhu Hotel, Rhu Road, Helensburgh.
West of Scotland ARS: Ian McGarvie GM4JDU (Brediland 2708). Meets Fridays, 7.30pm at 154 Ingram Street, Glasgow. March 21—Display of WWII Equipment by GM2CHN; April 4—Expedition to the Orkneys by GM4NUN.

Suffolk

Felixstowe & District ARS: Paul Whiting G4YQC (Ipswich 642595). Meets 2nd and 4th Mondays, 8pm in the back room, Feathers, Walton High Street, Felixstowe. March 10—Halley's Comet; 24th—AGM; April 7—Social Evening.

Surrey

Sutton & Cheam RS: Alan Keech G4BOX, 26 St Albans Road, Cheam. Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. March 21—Constructional Contest.
Thames Valley ARTS: John Peglar G3ENI (East Horsley 4279). Meets 1st Tuesdays, 8pm in

the Thames Ditton Library, Watts Road, Giggshill, Thames Ditton.

Sussex

Brighton & District ARS: Peter Turner G4IIL (Brighton 607737). Meets 1st and 3rd Wednesdays, 8pm in the Seven Furlong Bar, Brighton Racecourse.

Chichester & District ARC: C. Bryan G4EHG (Chichester 789587). Meets 1st and 3rd Tuesdays, 7.30pm in the North Lodge Bar, County Hall, Chichester. March 18—AGM and Constructors' Trophy Presentation.

Crawley ARC: Dave Hill G4IQM (Crawley 882641). Meets 2nd and 4th Wednesdays, 8pm in the United Reform Church, Ifield Drive, Ifield, or in members' homes—details from Dave.

Hastings Electronics & RC: Dave Shirely G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings. Meets Fridays, 8pm at Ashdown Farm CC, Downey Close, off Harrow Lane, March 8—Dinner Dance at the Horseshoe Inn, Windmill Hill, Herstmonceux.

Horsham ARC: Paul Drawmer G4YFY, Treforest, Dragon Green, Shipley, Horsham. Meets 1st Thursdays, 8pm in the Guide HQ, Denne Road, Horsham. April 3—Mechanical TV Systems by G3PVH.

Southdown ARS: R. Wilson G1BAB (Eastbourne 890234). Meets 1st Mondays, 7.30pm in the Chaseley Home, Southcliffe, Eastbourne. Meets Tuesdays and Fridays in the clubrooms, Wealdon Council Offices, Vicarage Field, Hailsham. March 8—Combined clubs Dinner and Dance at the Horseshoe; April 7—VHF Matters by G8VR.

Mid-Sussex ARS: C. R. Cook G1FRF (Hassocks 2937). Meets Thursdays during school time, 7.30pm at Marle Place AEC, Leylands Road, Burgess Hill.

Worthing & District ARC: Roy Jones, WADARC, POB 599, Worthing. Meets Wednesdays, 7.30pm in Lancing Parish Hall, South Street, Lancing. March 12—Micro-processors; 26th—RTTY Matters.

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. March 10—RSGB by Region Rep G8MWR; 24th—Satellites by G4ROA.

Stratford-on-Avon & District ARC: David Boocock G8OVC (S-o-A 750584). Meets 2nd and 4th Mondays, 7.30pm in the Baptist Church, Payton Street, S-o-A. March 10—Buying Second-hand Equipment by G4LVK; 24th—AGM and Film Time.

West Midlands

South Birmingham RS: Matthew Twyman G6KOA (021-458 1941). Meets 1st Wednesdays, 8pm at the West Heath CC, Hamstead House, Fairfax Road, West Heath. HF Activity on Thursdays, v.h.f. on Fridays.

Coventry ARS: Robin Tew G4JDO (Coventry 73999). Meets Fridays, 8pm in Baden Powell House, 121 St Nicholas Street, Radford, Coventry.

Dudley ARC: John Tisdale G4NRA (Kingswinford 278300). Meets 1st, 2nd and 4th Mondays, 7.45pm in the Allied Centre, Greenman Alley, off Tower Street, Dudley. March 24—Modern Aviation by rep from RAF Cosford.

Midland ARS: Tom Brady G8GAZ (021-357 1924). Meets every night in Unit 5, Henstead House, Henstead Street, off Bromsgrove Street, Birmingham. March 18—Operation Raleigh Saga by G4AAL.

Stourbridge & District ARS: Malcolm Davies G8JTL (Lye 4019). Meets 1st and 3rd Mondays, 8pm in the Robin Woods Centre, School Street, off Enville Street, Stourbridge.

Walsall ARC: Linda Price G6HZI (Walsall 32607). Meets Wednesdays. 8pm in the Forest School, Hawbush Road, Bloxwich, Walsall.

Wolverhampton ARS; Keith Jenkinson G1OIA (Wolverhampton 24870). Meets Tuesdays, 8pm in Wolverhampton Electricity S&SC, St Marks Road, Chapel Ash, Wolverhampton. March 11—The Decibel; 18th—Demo of Home-Brewed RTTY.

Cover Date	Deadline	For events from early
June	March 15	May
July	April 15	June
August	May 15	July

Wiltshire

Blackmore Vale ARS: M. R. Bailey, 11 Brines Orchard, Templecombe. Meets 2nd and 4th Tuesdays in the Bell and Crown Inn, Zeals. March 11—Amateur TV.

Salisbury R&ES: Neil Underwood G4LDR (Salisbury 22809). Meets Tuesdays, 7.30pm in Grosvenor House, Churchfield Road, Salisbury.

Swindon & District ARC: Dave Ineson G4ZAZ (Swindon 37489). Meets Thursdays, 7.30pm in Oakfield School, Marlowe Avenue, Swindon.

Yorkshire

Halifax & District ARS: D. L. Moss G0DLM (Halifax 202306). Meets 3rd Tuesdays, 7.30pm in the Running Man, Pellon Lane, Halifax. March 18—Junk Sale; April 15—Radio in the RNSCC by G4SCC.

Keithley ARS: Mrs K. A. Conlon G1IGH (Bradford 496222). Meets last Tuesdays, 8pm in the Victoria Hotel, Keithley.

Pontefract & District ARS: Colin Mills G0AAO (Pontefract 43101). Meets Thursdays, 8pm in the Carleton CC, Pontefract. March 16—6th Annual Components Fair; 20th Constructional Matters by G3RJV; 27th—Project Evening. Mondays in winter are c.w. classes.

Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield. March 20—Things to do with a TV set by G4OTL; April 3—Preliminary AGM; 17th—AGM.

Todmorden & District ARS: J. Gamble G6MDB (Todmorden 2494). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden. March 17—Astronomy by Eric Lord.

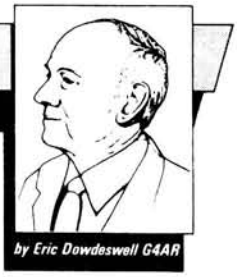
North Wakefield RC: Steve Thompson G4RCH (Leeds 536633). Meets Thursdays, 8pm in the White Horse, East Ardsley. March 13—Visit to Skelton Grange Power Station at 7pm; 20th—Visit to the Pontefract club for G3RJV lecture; April 3—SSTV by G4FBA.

White Rose ARS: Steve Clack G4YEK (Harrogate 884481). Meets Wednesdays, 8pm in Moortown RUFC, Moss Valley, King Lane, Leeds. April 2—Satellite Communications.

ON THE AIR

AMATEUR BANDS

Reports to: Eric Dowdeswell G4AR, 57 The Kingsway, Ewell Village, Epsom, Surrey KT17 1NA. Logs by bands in alphabetical order.



by Eric Dowdeswell G4AR

Further to my notes on automatic gain control (a.g.c.) last month some readers may be wondering why a.g.c. is needed in the first place. On the h.f. bands the signal arriving from some distant spot will have been propagated by means of an ionised layer or layers of air high above the earth, the signal going up to a layer and being reflected down again. Sometimes this reflection may occur as many as three times before it reaches the receiver.

The length of the signal path may vary quite quickly giving rise to fluctuations in the strength of the received signal, otherwise known as QSB or fading. It is not unknown for the signal to take more than one path so the two signals arrive in such a way that the phase of one relative to the other may add or subtract giving rise to even deeper fading and distortion quite frequently.

One answer to fading, although not very suitable for the average amateur, is to employ two antenna systems spaced a number of wavelengths apart feeding separate receivers, their output being combined to produce a more level signal output, often called "Diversity" reception. The way the amateur can overcome the QSB problem to some extent is to use two antennas, one horizontally polarised and the other vertically polarised with a simple changeover switch feeding the receiver. Due to the long path length of the average DX signal the original antenna polarisation at the transmitter may be changed quite considerably before it reaches the receiver. Flipping the switch will immediately show which is the better antenna at any moment.

General

An example of what can be achieved by a special event station was shown by the Exmouth ARC when it organised station GB4HB from Hayes Barton, East Budleigh, Devon, for a month last autumn, the birthplace of Sir Walter Raleigh. A total of 1163 QSOs were made with 1007 different stations on the bands from 1·8MHz to 430MHz including QSOs via Oscar-10. Special QSL cards featuring the 16th century Elizabethan farmhouse have been sent for all QSOs and s.w.l. reports, via the RSGB Bureau.

From the RAIBC journal *Radial* comes news of a new award, the Great Western Steam 150 Award. Work or hear GB4GWR, representing Didcot, and 20 other amateur stations in different locations formerly served by the Great Western Railway. Claim by copying log entries countersigned by two other amateurs. The fee is £2 of which a small donation is made to the Didcot Railway Centre. Details from John O'Hagan G4PFY, "Brubell", 27 Colne Close, Wantage, Oxon.

The Derby and District ARS, incorporating the Derby Wireless Club 1911, is issuing a special Commemorative Certificate on the occasion of its 75th anniversary celebrations. Special event station GB3ERD will be active each month. Contact GB3ERD and four other Derby stations (two for stations outside UK) during 1986. Log details certified by two other amateurs plus SAE 230 x 160mm and 75p to G4HDP, 97 Woodlands Road, Allestree, Derby. Special QSL cards will be issued for contacts with GB3ERD, sent via the RSGB Bureau or to G4HDP.

G4RQT of the Biggin Hill ARC quotes some interesting information from an HMSO booklet No. 1011 1985 on planning permission for towers and antennas in connection with Town and Country Planning. The main point that emerges is that a free-standing tower or mast not exceeding 15m in height above ground level does not need planning permission. For an installation on a building less than 15m high the mast or tower must not be higher than 6m above the highest point of the house. Other combinations of tower height against building height are quoted in the booklet which costs £1.35 from HMSO. This news won't come as a great relief to many amateurs, many of whom have had their hobby curtailed by the prospect of having to obtain planning permission for a mast or tower. **The legislation unfortunately does not cover Amateur Radio.**

DX Bands

Reports on radio conditions on the h.f. bands seem to range from "very poor" to "very good" but there have been some bright periods with patches of solar activity leading to speculation that we might have got over the period of minimum activity in the sunspot cycle but I think that this is very unlikely to come to pass for many months yet. Sunspots belonging to the new cycle usually presage the change and, as far as I know, these have not appeared yet.

Melvyn Dunn BRS86500 of Grimsby found plenty of DX on both 7 and 3·5MHz but complained of c.w. around 3·8MHz and just lower where most of the DX appears. As it is a shared band I suppose we just have to put up with that. Melvyn has a Yaesu FRG-7700 fed from a 40m-long wire, finding, at the high end of the band, such as SU1ER (QSL Box 33, Cairo Airport), AP2AR, JH7FMJ, TL8CK (QSL F6EWM), ZF2IB/MM (QSL PA0DS), VK2AVA, YB2BLI, ZD7BJ (QSL Box 54, St Helena), and KH0AC on the Marianas with cards to K7ZA. Catches on 7MHz were YN1SI, HH7PV, OX3AH, JW0A (QSL SP2HMT), V44KAC (QSL WB2LCH) and TI5FBP. On 14 and 21MHz it was just KP4AD and EA8ALY, respectively.

Robert Parsey of New Malden, Surrey, also runs an FRG-7700, plus a.t.u. from a 50m-long antenna betwen 5 and 7m above ground. Starting on 1·8MHz we find CU1CB on the Azores with cards to N2DUR, KA1PE, SV1PL and VE3KQS. Favourite band seems to be 3·5MHz with AP2SQ, FM5WD, HH7PV, HP3FL (QSL POB 76, David, Panama), J28EI, OA4BHM, TF5TP (QSL DL7MQ), TI8CBT, WP4AZT, YBOJH, ZC4MR and ZD7CW (QSL, N4CHD). Worthy of note on 14MHz was VKODJ at the Mawson Base with cards to VK3DYL.

A first letter from **Sias Pretorius ZS6-1410** s.w.l. of Sundra in the Transvaal who uses an ex-Army C16 valved receiver with a 60m-long wire antenna and a.t.u., copying EI3FP, EA3LL and OH1QZ on 28MHz, and TZ6FFE and VP2EX on 14MHz with ZD8FM and G3IFB on 21MHz. In the last six months Sias has logged 73 countries but I have asked him to concentrate on UK stations some of whom would be pleased to know that they had been heard in ZS6.

George Hitchins of Frimley in Surrey has been very active with his Panasonic RF3100LBE receiver running with a 20m-long antenna, logging, on 21MHz, 3B8FP and 3D6BW. Down to 14MHz and A71BK, CX8CX, D2DPA (Angola), TU2OC, TZ1BU, VP8ST, and 6W8NF. On 7MHz c.w. brought a lovely catch in BU2QO (China) and D5SJZ in Liberia, with s.s.b. from CO7GC, DU9RG, HC5KA, HK1FGE, HP1XSO, A3FTN on Tonga, and TZ6LPY. Down to around 3·8MHz and AP2SQ, JT1BW for another rare one, KH0AC (Marianas), TL8GK, WP4ATF, XT2BR, 8R1RPN, ZC4MR and TG9RZ.

Beacon watchers on 28MHz may like to know that the GB3RAL beacon on 28·215MHz is at the Rutherford Appleton Laboratory and there is a possibility it may transmit ionospheric propagation data in due course which would prove a boon for DXers.

From Kuala Lumpur, Malaysia, **Ghazalie Abdullah 9M2-65505** writes to say that he has a Trio R-2000 and Panasonic RF3100 receivers plus a Hy-Gain Thunderbird TH6 antenna and inverted-V wire antenna. His shack is in a recording studio where he does "voice-overs" for commercials, documentaries and radio shows. Unfortunately a promised photograph was not enclosed. Sticking to 14MHz he caught DL3EA, VK6RI, VK3XV, YB3KV, VU2NDR, ZS1JO, VI5AQZ, OE5CA, VU2AIG, BY4AOM and VS6IC. Again, I have asked Ghazalie to listen particularly for UK stations.

The Ex-G Radio Club was formed many years ago for amateurs born in the UK but domiciled abroad and it runs several nets that could be of interest to s.w.l.s and licensed amateurs. The World-Wide net is on Sunday at 1900Z on 14·347MHz with net controllers W8PR, WA1HMW, WA6GLF and G4HW, the New Zealand net on Thursdays at 0730Z on 3·650MHz, the Pacific net on Saturdays at 0500Z on 14·346MHz with ZL3QA, ZL1BAD and ZL2BKI. The c.w. net is on Saturdays at 1830Z on 14·065MHz. Club calling frequencies are 14·346, 21·230, 28·450 and 28·850MHz. The UK secretary of the Ex-G

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).

RTTY and CW TRANSCEIVE

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,
Caernarfon, Gwynedd LL54 7RF.
Tel. 0286 881886

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 OEM'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!

Top Tips from Antex

The ANTEX range of Soldering Irons and Accessories has a reputation in 69 Countries throughout the World for Quality at a very Competitive Price.

The Element/Bit design gives higher Thermal Efficiency and Lower Power Consumption and a large selection of Iron and Chrome or Iron and Nickel plated bits is available for each soldering tool.

Model XS 25W **£7.48**
Inc. VAT plus P&P
Total Price £8.03
28 days delivery

ANTEX products, which range from sophisticated, highly accurate Temperature Controlled Units to a selection of advanced Miniature Soldering Irons, are used throughout the Electronics Industry, in Education Establishments and by Discerning Amateurs – all the Irons exhibit exceptionally low leakage currents, and therefore are suitable for use on Static Sensitive Devices

ANTEX TOP TIP

The ANTEX TCSU-1 soldering station, designed and made in England, meets the latest requirements in temperature-controlled soldering of sensitive circuits and semi-conductors.

TCSU-1 **£79.25**
inc. VAT
plus P&P
Total Price £82.17

ANTEX

MADE IN ENGLAND

Antex (Electronics) Ltd Mayflower House
Plymouth, Devon Tel 0752 667377

Please send me a colour brochure ☐
I wish to order _____ Model TCSU-1 _____ Model XS
I enclose cheque/PO _____

Name _____

Address _____

_____

_____ Tel _____ PW/2/86

Club is **F. Fletcher G2FUX**, 53 St Ives Park, Ringwood, Hants.

Phil Dykes G4XYZ (Poole, Dorset) reports as usual on his QRP c.w. work using 3W using an 8m vertical and radial counterpoise. He made his first two-way QRP QSO to the States in spite of much QRM. The log showed on 7MHz c.w. EA8BCJ, KA1DWX, K3TKS running 5W, UO5ONM, WA4FNA, W9TKV, PZ1AV for a new country, and YV5JUJ. With helpfrom the local gang Phil has got his 28MHz quad plus 144MHz five-element beam up to 7m above ground level. On the stocks are a 28/50MHz rig and a 50MHz quad inside the 28MHz one.

Other DX reported on the h.f. bands from various sources include 4X4NJ, PY1RO, DH2BEN/C56, OE7RKH/YK, JY9MG and VK6HD on 1·8MHz, with ZF2IB/4X, V2ACW, PJ7A, HS1A, T77C, CT2CQ, VP2MEV on 3·5MHz. Finds on 7MHz included 8RIZ, VP2VCW, CY0SAB on Sable Island, and VP8AL. CY0SAB also appeared on 14MHz with 6W1AE, 5T5SL, V2A, and DL4HAL/ST2.

Logs from readers are very welcome and should reach me direct around the 15th of the month. Don't forget that if you have never submitted a log to this column then sample log sheets are available from me for an s.a.e. which show the format required. Good DXing and see you next month.

VHF Forum

It may not be generally known that planning permission was required to mount dish antennas on top of or in the front of a house. As from March 1 this is no longer required provided the dish does not exceed 900mm in diameter. The exemption will not apply in Special Development Order areas such as national parks, nor for listed buildings. So watch out where you use that satellite dish!

Phil Dykes G4XYX of Poole keeps to QRP on the h.f. bands and has now extended this principle to v.h.f. Using a 5-element Yagi he used just 100 milliwatts to work a mobile station 50km away.

Larry Smith G4OXY was a 50MHz permit holder and took advantage of a sporadic-E opening on December 27 last to work LA6QBA near Oslo with 59 signals both ways on s.s.b. He used 40W to a two-element beam from his location in Portishead. Although LA has been on the 50MHz band for around a year this is the first time Larry has heard one. It is understood that LA may be getting an allocation soon on the 70MHz band.

Now that the 50MHz has been released for general use many operators will be wondering which of the many aspects of the band to concentrate on with a wide selection available. Don't forget that some phenomena like sporadic-E and meteor scatter occur much more frequently on 50MHz than they ever do on 144MHz, where the band can remain virtually dead for very long periods as far as long distance propagation is concerned. Meteor scatter should be very exciting with several intense meteor showers coming along at predictable times during the course of the year.

RTTY

Reports: as for VHF Bands, but please keep separate.

First, a reminder about the BARTG Spring RTTY Contest which takes place between 0200GMT on March 22 and 0200GMT on the 24th. It's on all amateur bands from 3·5 to 28MHz. Although the total life of this event is 48 hours, only 30 hours of operating time is permitted with breaks of not less than 3 hours. An s.a.e. to Peter Adams G6LZB, at 464 Whippendell Rd, Watford, Herts WD1 7PT, will bring a copy of the rules and don't forget to send your entries to Peter by May 31. Contests create activity on all bands and they are an ideal time for s.w.l.s and licensed amateurs to copy or work a large number of stations.

"At the time of writing, the paid up membership stands at 3120 and is still creeping up," writes Pat Beedie GW6M0J the BARTG membership secretary, in the winter 1985 Issue of their quarterly journal *DATACOM*. *DATACOM* is free to members and has over 100 pages of general interest and technically informative articles, especially on computing, for the RTTY enthusiast. The 1986 subscription for the British Amateur Radio Teleprinter Group is £7 for UK members and £10 overseas. Readers interested should send an s.a.e. to Pat at Ffynnonlas, Salem, Llandeilo, Dyfed, Wales.

In Oslo, **Mushtag Ahmed** is equipped for RTTY using an Icom R71E receiver, long wire and multiband dipole antennas, Telereader CWR-670E terminal, Commodore C64 computer and a Star SG10C printer. Mushtag has been a broadcast listener for many years and decided to extend the scope of his station into the world of datacomms.

Bob Borzych G4WWD in Liphook, uses a modified Trio 430S, a Tono 5000E computer and G5RV antenna for his AMTOR and RTTY work. He says that when DX hunting he never uses more than 50 watts. Between December 15 and January 6, Bob heard or worked AMTOR stations in 5 continents, Africa, Europe, India and both Americas. At 2200 on December 15 he heard LU7PB and PY2BWA using AMTOR on 28MHz.

Between December 15 and January 12, Dave Coggins in Knutsford copied RTTY signals from 5 countries on 3·5MHz, 10 on 7MHz and 19 on 14MHz, ranging from the Americas, through Europe and Scandinavia, to the Middle East and USSR.

"Data communications mode has been really excellent, with 49 prefixes logged," writes **Len Fennelow G4ODH** from Wisbech about the month prior to January 10. Len's RTTY log, which also covers 5 continents, includes Estonia (a new prefix for him) and signals from Australia on three occasions. "A gratifying number of these countries are now being heard regularly on AMTOR," said Len. His AMTOR score for this period is 7 countries on 3·5MHz, 4 on 7MHz and 21 on 14MHz.

Details from the logs of Bob, Dave and Len were added to my own log to compile the monthly RTTY list, Fig. 2 and the

Fig. 1: AMTOR

Country (Prefix)	Band (MHz) 3·5	7	14	21	28
Argentina (LU)					X
Alaska (KL7)			X		
Australia (VK3, 5)			X		
Balearic Is (EA6)			X		
Belgium (ON4,6)			X		
Brazil (PP, PY)			X		X
Canada (VE2, 3, 4)			X		
Canary Is (EA8)			X	X	
Costa Rica (TI2)			X		
Cyprus (5B4)			X		
England (G)	X		X		
France (F5,6,8,9)		X	X		
W. Germany (DF, DJ, DK, DL)	X	X	X		
Greece (SV0, 1, 3)			X		
Guernsey (GU)	X				
Holland (PA)	X		X		
India (VU2)			X		
Indonesia (YB)			X		
Italy (I, IK, IT)		X	X		
Kuwait (9K2)			X		
Malaysia (9M)			X		
Marshall Is (KX)			X		
Portugal (CT1, 4)			X		
Scotland (GM)	X				
Spain (EA)	X		X		
Sudan (ST2)			X		
Sweden (SM)	X		X		
Switzerland (HB9)		X	X		
Togo (5V)			X		
USA (W)			X		
Wales (GW)			X		

Country (Prefix)	Band (MHz) 3·5	7	14
Austria (OE)		X	X
Balearic Is (EA6)			X
Belgium (ON)	X		X
Botswana A2)			X
Brazil (PP7,PP8,PY)			X
Bulgaria (LZ)			X
Canada (VE)			X
Canary Is (EA8)			X
Ceuta & Melilla (EA9)			X
China (BY)			X
Cyprus (ZC4, 5B4)			X
Czechoslovakia (OK)		X	X
Denmark (OZ)	X	X	X
England (G)	X	X	X
Estonia (UR1)			X
France (F)	X	X	X
French Guiana (FY7)			X
Finland (OH)			X
E. Germany (DM, Y2–9)	X	X	X
W. Germany DF, DJ, DK, DL)	X	X	X
Gozo & Comino (9H4)			X
Greece (SV)			X
Holland (PA)	X		X
Hungary (HA,HG)			X
S. Ireland (EI)			X
Israel (4X4, 4Z4)			X
Italy (I)		X	X
Kuwait (9K)			X
Lebanon (OD)			X
Luxembourg (LX)	X		X
Malta (9H1)			X
Nigeria (5N)			X
Norway (LA)	X	X	X
Oman (A4)			X
Poland (SP		X	X
Portugal (CT1)			X
Rhodes (SV5)			X
Rumania (YO)			X
Sardinia (IS0)			X
Scotland (GM)		X	X
Sicily (IT9)			X
Spain (EA)		X	X
Sweden (SM)	X	X	X
Switzerland (HB9)		X	X
USA (K,N,W,)			X
USSR (UA,UB,UK,UT,UZ)			X
Wales (GW)			X
Yugoslavia (YU)			X

Fig. 2: RTTY


THE BRITISH AMATEUR RADIO TELEPRINTER GROUP

VHF/UHF
CENTURY AWARD

This certificate has been awarded to

on the submission of proof of having heard/worked Amateur Radio Stations on the Mhz Band using RTTY as a mode of communication. Extra endorsements are attached herewith.

Fig. 3: BARTG VHF/UHF Century Award

information from Bob and Len was used for the AMTOR chart, Fig. 1. Among the interesting RTTY stations that I copied during this period were, "DEUTSCHEN AMATEUR FERNSCHREIB GRUPPE" on 3·5MHz at 0924, VE3HEQ on 14MHz printing, "THIS STATION IS A MEMBER OF THE RAG CHEWERS CLUB" at 1630 on December 15, "CQ FOR THE INTERNATIONAL AMATEUR RADIO NETWORK DE K1MAN," at 1536 on the 21st and a Mail Box instruction list from IK6CLX at 0916 on the 29th. I also received "IK6BSBN-MAIL-BOX EXPERIMENTAL AUTOMATIC RTTY STATION" at 0904 on the 31st, a strong signal from Italy "THIS IS I8CEE-QRP-QRP" at 0850 on January 2 and two new countries for me, Botswana A22BW in QSO with UT5RP at 1315 on December 15 and during the peak of QSB, China BY1PK, working into France at 0930 on the 28th.

Don't forget an s.a.e. to G6LZB will bring details of BARTG's v.h.f. contest on April 12/13 when a good number of active stations could help you toward the VHF/UHF Century Award, Fig. 3. For this prospective applicants require confirmation of 100 different stations heard or worked on 144MHz, 50 on 432MHz or 10 on 1296MHz. An s.a.e. to Ted Double G8CDW, 89 Linden Gardens, Enfield, EN1 4DX, for more information about this award.

SPACE & SATELLITES

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


by Pat Gowen G3IOR

For the Beginner

Having covered the means of tracking the satellites and reading the telemetry in earlier issues, we can now pursue the use of the transponders and the basic station requirements.

The System

All of the USSR "Radio" satellites have transponders, that is to say a means of transferring the stations heard from the 145MHz uplink band to the appropriate position on the 29MHz downlink band. They are non-inverting, so that u.s.b. transmitted into them comes out as u.s.b., and a signal 10kHz from the l.f. edge of the uplink returns 10kHz from the downlink lower band edge.

Unlike terrestrial f.m. repeaters which transfer a single signal within the same band, transponders linearly repeat a whole 40kHz section of one band to a proportional section on another. In the simplest analysis, this is performed by r.f. amplification of the upcoming signal from the 145MHz band antenna, mixing this with a 116·5MHz oscillator to produce an i.f. at 29MHz. This is carefully shaped to limit spillover, a.l.c. controlled, and then amplified to a watt or so for transmission via the 29MHz band antenna. The power is derived from solar cells, charge regulated to a NiCad battery, and then broken down to the voltages required by the specific functions.

Basic User Aspects

As both the battery capacity and the solar cells are limited in power, it is essential that the power output is tailored to limit the consumption, and yet for the transponder to maintain linearity. For this reason, automatic gain control (a.g.c.) is applied at the i.f. to attenuate the incoming signals to a level that the system can cope with, and this is why the recommended effective isotropic radiated power (e.i.r.p.) must not be exceeded. QRO could drain the battery, cause non-linearity and hence distortion, and this can attenuate sensibly powered stations out of the transponder. The satellites have a wide dynamic range, and a −10dB attenuator can be placed in the front-end by ground command, yet still many insensible users succeed in running uplink powers of over one thousand times that which is needed.

The reason is usually that their receiving systems are totally inadequate, and they are completely unaware of any signal less than S9, missing much DX and causing much QRM by their excessive presence. It will follow that a good receiving system is the first pre-requisite of any effective satellite station, and we shall concentrate on this aspect fully.

A good guide is not to exceed an effective radiated power of more than 100 watts maximum, that is to say 100 watts to a ground plane or dipole, 25W to a 2-el beam, 10W to an 8-el beam, or 1W to a bay of four 13-element Yagis. Also ensure that your return signal is always less strong than the beacon.

The Transponders

All of the "RS" Radio series have Mode "A" transponders, that is to say using the top end of the amateur 145MHz band for an uplink, and transmitting the downlink back at the top end of the 29MHz band, in the section allocated to the specific use of the Amateur Satellite Service. Each transponder has a 40kHz bandwidth, with the lower 20kHz used for c.w., the upper 20kHz for s.s.b., with a meeting ground for mixed and other modes in the centre of the passband. At greatly reduced sensitivity, signals may be heard outside the passband by a good receiving system on the proviso that high power users are not overdriving the a.g.c. and thus limiting sensitivity.

The satellites show amazing sensitivity and signal-to-noise ratio, having been designed with the USSR power level of some 5 watts to a 10dB gain antenna in mind. Your author has worked VE5XU and others merely by keying the press-to-talk on a hand held TR-2400 transceiver running 1·5 watts to a rubber-duck antenna. Ten watts to a simple dipole, turnstile or mobile whip antenna normally gives an adequate signal on the proviso that "alligators" (all mouth—no ears—small brain) are not on also.

The 40kHz wide passbands are shown on Information Table 1, and are given for all of the "RS" group in case RS-6 and RS-8 should be resurrected back to life as was RS-1 earlier. It will be noted that RS-5 and RS-7 have beacons that can mark either end of the downlink passband, although they are normally found on the high end only. They also have "ROBOT" automatic calling and answering devices, about which more in the next article. In addition to the 40kHz QSO transponder, each satellite has a further mono-frequency transponder with an uplink on 145·850MHz and a downlink on 29·351MHz ± Doppler shift. These are intended for inter-communication of the command stations, but may be used for QSOs when not needed by the controllers on a single signal basis. This will sometimes be heard as a continuous c.w. signal, and is invaluable as a precise Doppler measurement and propagation trans-ionospheric investigation source. (Its output value is present on telemetry channel "MU" or "WU" when under command.) Bulletin board information will be heard on the ROBOT frequencies when events of general interest and orbital information are given out.

In non-eclipse times the "RS" satellites are on continuously, and may be used on any day except Wednesdays, when the system is reserved for special pre-determined scientific, technical, educational and research use only, and run-of-the-mill QSOs may not be made. During eclipse times, when power is at a premium, two days per week operation is programmed. Each Monday is a special QRP day, when users are requested not to run more than 10W e.i.r.p. On other days, the maximum of 100W e.i.r.p. is more than sufficient, particularly when the satellite is well above the user's horizon and consequently the range and the thicker angular ionised path are both reduced.

Hearing the Satellite Signals

Although only running output powers in the milliwatt range, being line of sight with a small path loss, the signals from the transponders and beacons are adequate.

Table 1

Parameter (MHz)	RS-5	RS-6	RS-7	RS-8
Uplink l.f. edge	145·910	145·910	145·960	145·960
Uplink h.f. edge	145·950	145·950	146·000	146·000
Downlink l.f. edge	29·410	29·410	29·460	29·460
Downlink h.f. edge	29·450	29·450	29·500	29·500
l.f. beacon	29·331	29·411	29·341	29·461
h.f. beacon	29·452	29·453	29·501	29·502
Robot uplink	145·825	nil	145·835	nil
Robot downlink	29·331	nil	29·341	nil

Unfortunately, much of our receiving equipment is not! Those with some of the older 29MHz band receivers may find that both the sensitivity and the signal-to-noise ratio are very poor on the band, and particularly so at the high end where we hear the satellites. A quick peak of the r.f. front end and the mixer will often work wonders but, if all else fails, then a simple low cost m.o.s.f.e.t. front end will bring about a dramatic improvement in both gain and signal-to-noise ratio.

Such an aid is shown in Fig. 1. It uses a 40673 m.o.s.f.e.t. 12·7mm FX3015 toroids wound with 3·5 and 16 turns of 26 s.w.g. enamelled copper wire, and 40pF ceramic trimmers. If self-oscillation occurs, a ferrite bead placed on the lead of gate 2 plus some good screening will cure the problem. A basic kit consisting of the p.c.b., ferrite bead and two toroids is available from AMSAT-UK (G3AAJ QTHR) for £1.85 UK, £1.90 Europe, and £2.00 outside Europe. Some 20dB of signal-to-noise improvement will be found to occur on "deaf" receivers, and a marked improvement even on "good" ones.

Listening Antennas

Obviously, the capture requirement of the receiving antenna is dependent upon the uplink sending antenna. There is no point in using a high angle RX antenna that only captures the downlink of the satellite when high in the sky, if the uplink is via an antenna (such as a long high Yagi) which is only effective when the satellite is at or just above horizon. For this reason, it is better that v.h.f. stations with modest h.f. receiving capability use a simple low angle uplink antenna on 145MHz. Conversely, those using uplink non-elevation adjustable Yagi's, etc. optimising when the satellite is closest to the horizon (and giving optimum DX possibility at maximum range) should employ a good low angle receptor on the 29MHz downlink, so that they are capable of hearing the satellite when it is hearing them.

Satellite Antennas

The antenna in Fig. 2 shows a crossed dipole for 145MHz uplink or 29MHz downlink. It gives all round radiation, eliminating fade outs that can occur when the satellite antenna turns to opposite polarisation. It consists of two half-wave dipoles at right angles, fed at 90°, with a matching section for the coaxial feeder. It is nominally a high angle radiator, and is best used in conjunction with a similar antenna for the other satellite link. Constructional details are as follows:

AB, CD, EF, GH, all 14–16 s.w.g. Cadmium Copper or Brazing Rod (or similar), each 480mm long.

EG, 405mm 72 ohm TV feeder coaxial cable

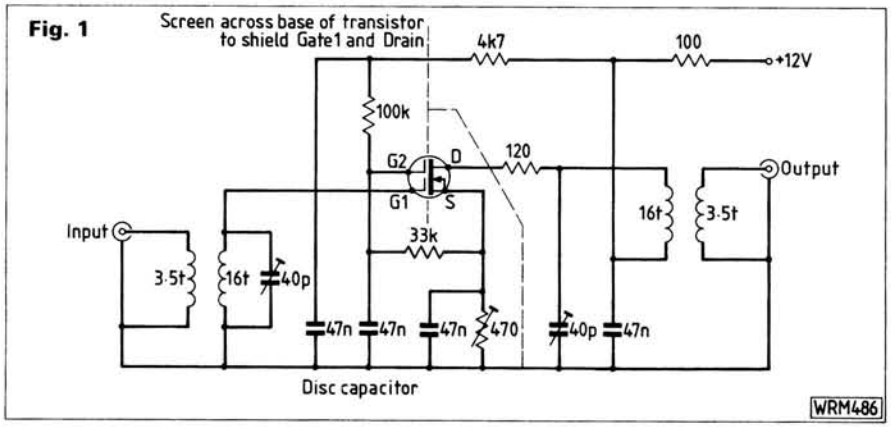
GI, 320mm 52 ohm coaxial cable.

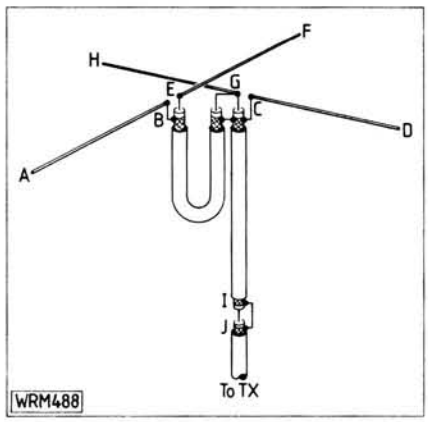
J, 72 ohm TV cable to TX.

If a 52 ohm feed is desired, then a conventional matching system is required, as in any handbook.

At 145MHz, the antenna may be mounted above a wire mesh or chicken netting reflector as shown in Fig. 3, in which case the impedance will lower, needing 52 ohm cable. Whilst the dipole lengths remain the same, EG now becomes 320mm of 52 ohm cable, with GI a matching section to bring the G junction combination of 26 ohms back to the J section of 52 ohm feedline.

Fig. 1





◀ **Fig. 2**

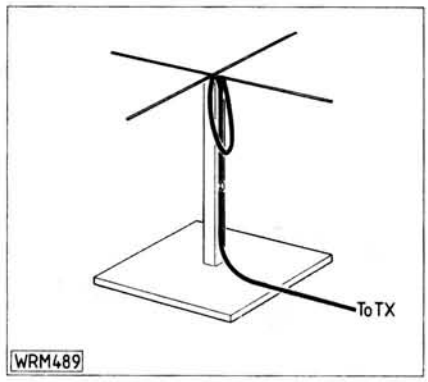


Fig. 3 ▲

The antenna may be varied in height above the mesh reflector between a quarter wavelength (480mm) and a half wavelength 965mm for a preferred angle of radiation. The ideal height to give an input level reasonably constant to the angular path loss, e.g. to provide a "mushroom" radiation pattern, would be at one third of a wavelength, viz. 305mm. The minimum reflector size would need to be 1·07 x 1·07m.

For those without an h.f. antenna, this crossed dipole is quite good as an all-round receiving antenna for the 29MHz downlink. Multiplying all lengths given for 145MHz by 4·95 will re-model it for receiving the satellites. It may be arrayed as a dual inverted "V" from a central mast for simplicity of construction and erection, and made of any conductive wire.

Operating

When you have studied the orbits, and have calculated the time of "AOS" for the next pass, set your receiver to just above the beacon frequency, and await the signal as the satellite rises above your horizon. The 29MHz downlink signal, dependent upon the low angle capability of your antenna, will frequently be audible before your 145MHz uplink will have access due to the greater re-angulation characteristic of the lower frequencies.

Set your receiver then to an unused frequency in the passband, say 29·480MHz if using "RS-7" (20 kHz below the beacon) and then tune your transmitter to the appropriate uplink frequency, which will be 145·980MHz, i.e. 20kHz below the upper passband edge. Check that both your transmit and receive antennas are optimised for the azimuth direction, and then activate the transmitter, which signal should be now heard on the downlink chosen at the receiver. You may need to slightly adjust your RX or TX frequency to allow for the Doppler shift, which places your signal slightly higher, by only a few kHz, at the start of the pass.

Do NOT leave your transmitter on if you are unable to hear it, or swish widely up and down the band to try to locate it, as you may cause severe QRM to established QSOs. When you have located your own signal, you may call "CQ" or re-net onto any station already calling "CQ". If he was say 5kHz higher than your signal, then you need to move your TX frequency 5kHz higher, and zero beat on him. You may then proceed with the QSO in the usual manner, remembering that "full break" is possible on satellites, as you and the other station can hear both your own and the other transmission. If transmitting telephony and monitoring with a loudspeaker, keep your audio gain well down, or severe feedback will result and consequent poor readability will result.

If using beams, do not forget in your initial enthusiasm, to turn your antenna and if you have the capability to elevate it so you can follow the passage of the satellite across your sky. It will also be necessary to correct your transmit and receive frequency from time to time during the pass to allow for the Doppler drift, or else you may encroach onto an adjacent QSO. Above all else, do not run more than 100 watts of effective radiated power, or you will be categorised ". . . an alligator . . ." (A rather dangerous animal with a very large mouth, small brain, and with no apparent ears!)

When you make out your QSLs for contacts via satellites, be sure to mark your card with "QSO via RS-5 (or 7, etc.)" and to write the frequency as 145/29MHz. Thus your QSL will qualify for OSCAR-DXCC, OSCAR-WAS, or any of the many other available awards specifically for through-satellite QSOs. Already G3IOR and G6RH have "OSCAR-DXCC" whilst G4CUO has worked forty-eight of the US states all using the mode "A" satellites only, long before OSCAR-10.

Experimenters should note that the satellites provide a highly effective means of determining the value of comparative antennas, speech systems, etc. as one may report one's own signals over the 3000 plus kilometre open path.

Operating Ethics

Here follows a list of helpful points to keep in mind when you are operating via satellites:

1: Do not activate your TX until you can hear the satellite signals, as you may not have a low enough angle from your RX antenna to realise that you are in fact accessing, and you may be causing severe QRM to another who CAN hear.

2: Keep your power to that minimum required for effective communication, and give maximum attention to improving your received downlink.

3: Do not transmit on a Wednesday unless you have specific permission for a listed experiment or educational demonstration.

4: Keep the middle of the pass, around TCA, for local stations, e.g. those from Europe, and reserve the far horizon skimmers the ultimate DX stations who have only a few fleeting moments of mutual access, e.g. W5, 7, UA0, JA, South America, etc.

4: Listen, especially for those weak ones, as much as possible, rather than calling CQ, as this will provide a more sensitive passband that will not only permit marginal access of even sub-horizon signals, but help keep the battery well charged.

5: Keep to the l.f. end for c.w., h.f. for s.s.b., and spread out over the passband, keeping to the satellite band plan. If you do run RTTY, try not to "hunt and peck" as continuous carrier without content wastes battery power and puts up the a.l.c. level.

In the next "getting started" section there will be described a low outlay and simple but effective receiving antenna that can be used with your 145MHz system within confined space to capture those low angle signals and optimise DX, and the way to work the automatic "ROBOT" system on the Mode "A" RS satellites.

Data-Dumps

For a signal with a difference, please try monitoring around 166·002MHz using u.s.b. or c.w., pointing your antenna east from UK. Sooner or later you will hear a Dopplering satellite signal, which has some very special properties including a form of modulation that we are likely to hear a lot more of in the future. Do not be surprised if it comes on suddenly at S9. That is because a silent but by no means inactive intelligence gathering system has been instructed by an uplink command to dump all the data it has collected during the previous orbit. Normally the signal is switched off again by ground command after about 3 minutes.

GM4IHJ has been monitoring this phenomena, and has discovered that there is evidence of a spectrum of f.m. subcarriers extending over 1MHz of bandwidth as a "spread spectrum" signal. In theory a relatively weak signal spread over a large bandwidth is just as effective as the more normal powerful narrowband signals we are used to. More to the point it should only be discernible on special receivers, but if your equipment is sensitive enough you will almost certainly find it, as the dumping point is often very close to the UK and well within line-of-sight of the satellite concerned.

All this is supposed to be a new "more secure way" to pass data, and its use by satellites is becoming more common, particularly as in this case it is found upon frequency bands which are not designated for satellites at all. We have had reports of similar happenings in the amateur 144MHz band, where such manifestations are most unlikely to be noticed, as any monitor would expect to see signals sporadically popping up and down intermittently all over the band on any panoramic adaptor. Thus, if your local authority v.h.f. services complain of radio "canaries" every 96 minutes or so, you may find that a real space intruder is using spread spectrum in their allocated band, and it is not your transmitter problem!

New HF Satellite

COSMOS 1686 has arrived, and has been heard by GM4IHJ transmitting a very healthy signal on 19·955kHz that sounds initially like c.w., but is actually several tone signals with clock-like ticks, dot and ripple sequences. Its approximate 93 min. orbital period and 57 degree inclination places it within range of the UK for some 5 orbits per day. Each day gives AOS some 24 minutes earlier and so it would appear to have originated from SALYUT-7 like "ISKRA". The interesting thing is that despite the current solar flux minimum, it appears frequently well below horizon often antipodeal, but is not missing above horizon as were the earlier ISKRA satellites in similar orbits in higher sunspot years. (See *PW* August 1985). Propagation students may find this satellite to be very useful as we (hopefully) now start to climb out of the solar minimum.

Satellite and Space Clinic

Practical Wireless enthusiasts will be very welcome at the RSGB "Workshop" to be held at Wrangholm hall, near Motherwell, on 13 April 1986. GM4IHJ will be holding a satellite and space clinic, and looks forward to meeting and chatting to some of our readers there, showing the new software, and running some real time reception on most satellite bands.

QL Computer Program

John Branegan GM4IHJ has been busy for the past year making even more new computer programs, and has just completed a very comprehensive satellite version for the Sinclair QL machine. With the enlarged memory available, John has produced a program called "SATS" to provide fast data access to all the current popular satellites and the new forthcoming ones to boot. It is aimed at ALL space experimenters and enthusiasts, and not merely for the radio amateur, as recent experience on the DP0SL mission has evidenced that more than half the participants using GM4IHJs "SHUTTLE" program were not amateurs.

The satellites contained include OSCAR 9, 10, 11, RS 5, 7, 9 and 10, the Shuttles, SALYUT, Phase IIIc, JAS-1, Navsats, Weathersats, Arsene, ISKRA, SRET-2, with up to over thirty satellites in the one program.

From each and any of these one may get footprint maps, detailed Doppler, decay, squint angle, AOS tables, skytracks, etc. In addition it can use the entire satellite catalogue to provide data on what is in range at any one time, or when each satellite comes into range, or where they all are at any instant on a world map.

Those interested should note that it is for the powerful QL machine only, and that the sole rights to distribution are with SARUG, the Sinclair Amateur Radio Users Group. All enquiries to Secretary Paul Newman G4INP (QTH Page 55, December 1985 *PW*), with an s.a.s.e. Third-World countries, where Western currency is difficult to obtain, should write to GM4IHJ direct at 8 Whitehills, Saline, Fife KY12 9UJ, Scotland, who will arrange a free microdrive of the program and instructions.

Current Satellites

OSCAR-10 is now at apogee deep in the southern hemisphere, and spends very little "on" time above the level of your author's roof! Even so, some very nice DX is still available, probably superior in condition to many of the depressed h.f. bands at this low point of the solar cycle. In the past year, the following DX stations have been worked from Europe via satellites:

CO2JT—QSL via P.O. Box 1, Havana, Cuba.
DP0GVN—QSL via operator DG5SL, DJ6ZN or DARC.
FR3AE & FR4DA—QSL via Bureau.
FT8XA—QSL via F6FYD.
FT8XB—QSL via P.O. Box 83, F-95103 Argenteuil.
GD4CUO & GD4ZHG—QSL via G4CUO QTHR or RSGB.
HK4CZE—QSL via P.O. Box 52849, Medellin.
KA2MUM/PJ7—QSL via K2PEG.
KV4FK—QSL via Bureau.
LU1AHC/CX—QSL via LU4AHC QTHR.
PJ2MI—QSL via K2PEG.
S83H—QSL via QTHR.
SU3AM—QSL via P.O. Box 33, Airport, Cairo.
TR8KMJ—QSL via P.O. Box 129, Port Gentil, Gabon.
VK0AG—QSL via VK5LP.
VP8ALJ—QSL via P.O. Box 68, Port Stanley, Falklands.
WA2ZIS/FS—QSL via K2PWG.
WA0NZI/HI8—QSL via AMSAT QSL Bureau, Ohio, USA.
XQ0ZFZ—QSL via P.O. Box 13312, Santiago, Chile.
YI1BGD—QSL QTHR.
4S7AG—QSL QTHR or Bureau.
5B25OA—QSL via 5B4OA or P.O. Box 99111, Mombasa.
6W1CK—QSL via DL1HH QTHR.
7P8CM—QSL via P.O. Box 949, Maseru.
8Q7AV—QSL via Bureau.
9K2DZ—QSL QTHR.

"RS" 5 & 7

Whilst we await the launch of RS-9 and 10, the older pair are still giving good service, having survived the last eclipse thanks to gentle nursing by the command station RS3A. The current eclipse period commenced on January 23 for RS-7, and January 27 for RS-5, from which RS-7 emerges on April 4, and RS-5 on April 8. The next following eclipse period is from May 23 until August 5 for RS-7, and from May 27 until August 8 for RS-5, so we know when the curtailed two-day opera-

Satellite	OSCAR 9	OSCAR 10	OSCAR 11	RS 5	RS 7
Epoch Time	85350·16522408	85339·48343138	85348·60320533	85349·00018117	85344·03951701
Inclination	97·6449°	26·3143°	98·1718°	82·9702°	82·9608°
RAAN	342·2427°	106·3450°	52·9291°	206·6812°	203·7427°
Eccentricity	0·0002826	0·5980812	0·0014432	0·0008775	0·0022456
Arg of Perigee	24·6013°	67·1792°	27·0012°	73·6220°	354·7446°
Mean Anomaly	335·5380°	343·6648°	333·1944°	286·5885°	5·3403°
Mean Motion (r.p.d.)	15·27862012	2·05856070	14·62011564	12·05061042	12·08694601
Decay Rate (r/d²)	$1{\cdot}803^{e-05}$	$1{\cdot}7^{e-07}$	$9{\cdot}8^{e-07}$	4^{e-08}	4^{e-08}
Epoch Rev	23301	1867	9539	17568	17561
SMA (km)	6857·307	26105·466	7061·900	8033·805	8017·686
Anom Period (min)	94·249349	699·517872	98·494433	119·496021	119·136794
Apogee (km)	484·740	35344·080	698·266	1682·100	1657·722
Perigee (km)	480·865	4117·703	677·882	1668·000	1621·713
Beacon (MHz)	145·825	145·810	145·826	29·451	29·501

Table 2

tion transponder periods are likely to commence.

Bill Kelly of Belfast made the most of the period of continuous operations, and listed over a hundred QSOs, including UP2BAW, UC2OX, UA9AJT, UV9FB, UZ0FCR, RB5QU, OK6AA, UA2FL, GB2SAT, RB3AG, UL7CCY, G3IOR (!), and many European stations. Most fascinating was a station speaking Chinese on two occasions!

ISKRA-4

UA3CR reports that due to the delay caused by the illness of one of the SALYUT-7 crew (see last month for details) they now have a little more time in hand to work on "ISKRA-4". This will now mean that a transponder, probably Mode "A", may well be complimented by a Mode "J" transponder also!

AO-10 Amnesia

The harsh radiation of outer space has caused OSCAR-10 to lose some memory, probably due to an energetic cosmic ray or the debris resulting from it rupturing the depletion layers of the solid state memories. Although the units are housed in a brass box, and are tantalum coated on the top, gamma and cosmic rays can go straight though this. The results are not serious, and unless the problem escalates enormously, no effect on the satellite's operations is likely.

EME results

We conclude this month's column with results from the use of the oldest satellite of all. The last "Moonbounce" contest produced good levels of activity on 144, 432 and 1296MHz, despite rather inclement weather in Europe due to the lateness of the event, and a 90° Faraday rotation that stayed put for long periods over the transatlantic paths. Claimed scores for 432MHz were DL9KR 86 QSOs and 32 multipliers, K2UYH 71/27, WA1RWU 64/25, G4EZN (operated by G4EZN, G3CWI and G3IOR) 63/25, K1FO 61/23, F9FT 56/26, and DJ6MB 54/25.

VHF BANDS

Reports to: Ron Ham BRS15744, Faraday, Greyfriars, Storrington, West Sussex RH20 4HE.

by Ron Ham BRS15744

Thirteen-year-old **Owain Betty BRS88158** from Rhayader uses a Trio 9R-59D for listening on the h.f. bands and an Acorn Electron computer in conjunction with his activities in the Echo Lima radio club. In addition to his schoolwork, Owain is studying the early work of Marconi and plans to write about his findings. The tone of Owain's letter is enthusiasm and an eagerness to learn more about the subject that has thrilled the hearts of us old timers for many years. Although the technology of radio equipment for Owain's generation has changed from the valves of my early days to the chips of the 1980s not everything has changed so much. Natural disturbances on the sun and within the earth's atmosphere are still happening and their effect on the paths of terrestrial radio signals will always require periods of dedicated and patient observations by enthusiasts of all ages.

Solar

Enthusiasm for the subject is no less in the world of optical astronomy and members of their specific groups such as Auroral, Meteor and Solar are keen to co-operate and exchange information with like minded people in the world of radio. The instruments used by **Bob Anderson** and his fellow astronomers in Johannesburg are housed in two observatories, Figs. 1 and 2, presented by Christos Papadopoulos and members of the late Gil Jacobs family respectively. A triplex of 152 and 178mm Cooke refractors and a 305mm Tinsley Cassegrain are installed in the former and a 305mm Newtonian reflector in the latter. Both domes are at the highest point in Johannesburg on part of the old Bezydenhout farm which was left to the people of the city for such a purpose. Christos, who was President of the Astronomical Society of South Africa in 1974/5, also gave the Tinsley telescope to the group. "All paid up members of the society are free to use these observatories providing they satisfy the curator that they have undergone instruction and are fully capable of operating the equipment," said Bob. He adds, "The whole site is more than one could ask for as we have an uninterrupted view over Johannesburg on all points of the compass and our headquarters was the original library for the old Union Observatory." When this observatory was replaced by a new one at Sutherland in the Karoo, the Council of Scientific and Industrial Research and the National Institute of Telecommunications Research donated a Grubb Parson 673mm refractor and the Cooke assembly to Bob's group. I am always pleased to use their solar observations in this column.

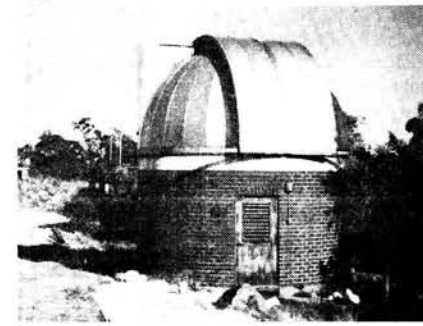
"My observations of the sun tend to confirm that sunspot minimum is very close upon us," writes **Ron Livesey** from Glasgow. He is the auroral co-ordinator for the British Astronomical Association. He reported that the American scientists at Boulder Observatory, Colorado, reported a magnetic storm in the higher latitudes on December 13 and minor storms on the 27th and 28th.

"At first glance the sun's disc looked quite featureless," writes **Cmdr. Henry Hatfield** in Sevenoaks. After very careful inspection with his spectrohelioscope at 1125 on the 29th he found two small filaments and a quiet prominence in the northern hemisphere but nothing in the southern half. **Patrick Moore** in Selsey, reports a blank disc from his observations on December 19, 23, 25, 28 and 29 and January 6, 11 and 12.

One of Ron Livesey's contributors, Karl Lewis, using his magnetometer in Saltash recorded magnetic storms on days 13, 14, 28, 30 and 31 and severe storms between 0700 and 1000 and around 1700 on the 19th. Observers aboard the Dutch weathership, *Cumulus,* at station LIMA (57°00'N and 20°00'W magnetic latitude 63) reported auroral glows between 0120 and 0320 on the night of December 9/10 and again at 0130 on the 13/14th.

Dave Coggins from Knutsford, received auroral signals from LA1SV, OH9VC and SM3RAB on 28MHz between 2130 and

Fig. 1



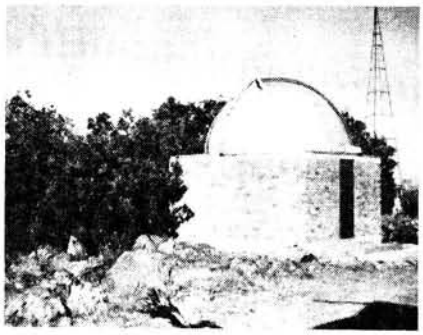


Fig. 2

2315 on January 6. He writes, "The event lasted to approximately 0000GMT and tone A signals were also present on the 50 and 144MHz bands." This may have been associated with the two groups of sunspots seen by Bob Anderson in Johannesburg between the 13th and 17th inclusive. Although the overcast skies prevented further solar observations on the 18th and 19th, they had gone when Bob checked the sun at 0720 on the 20th. I recorded small bursts of radio noise from the sun at 143MHz during my midday observations on December 16 and 24.

Meteor Scatter

Every day, large numbers of tiny particles from interplanetary space collide with the earth's atmosphere. As they burn up, the brief trail of ionised gas which is left behind can reflect radio signals over a great distance for up to a few seconds. During the earth's annual orbit around the sun it periodically encounters great swarms of these particles, known as meteor showers. Then, perhaps only for a few hours, the rapid increase in this temporary and random ionisation can produce some really interesting and often thought impossible DX QSOs.

From his QTH in Cheshire, **Dave Coggins** can receive signals, via meteor trail reflection, every day from the 28MHz beacon GB3RAL with his beam facing north or south. In Walsall, **Gordon Pheasant G4BPY** heard "pings" of signals from the German 28MHz beacons DF0AAB and DL0IGI on December 18 and 20 and 16, 17 and 26 respectively. Between December 15 and January 12, **Norman Hyde G2AIH** from Epsom Downs logged the UK 50MHz beacons GB3SIX and GB3RMK daily via m.s. Often the "pings" were very frequent as well as being long duration and extra strong.

During the evening of January 3 the predicted peak of the Quadrantids meteor shower, I monitored the frequencies of the broadcast station at Gdansk 70·31MHz, with and SX20ON and the TV sync pulses on Ch. R1 49·75MHz using an ex-army R216 v.h.f. communications receiver. I heard many bursts of signals on both frequencies. Although most of the "pings" were independant on each frequency, some were actually simultaneous. I did note on several occasions that some "pings" produced a signal, first from Gdansk on the higher frequency and then a burst of sync immediately followed on the lower band. At 2255, I slowly tuned the R216 between 68 and 73MHz and heard a fair number of meteor "pings" from several east-European broadcast stations that operate daily within this band.

Bob Matthews G3ZNZ in Driffield is the holder of several awards for his work on the 144 and 432MHz bands. He has installed a scanning receiver and asks, "where can I find the frequencies of these broadcast stations?" The only place I know Bob, is the *World Radio TV Handbook* which lists several stations in such countries as Bulgaria, Czechoslovakia, Hungary, Poland and Romania that use the 66 to 73MHz range.

The peaks of future major showers to look out for are the Lyrids on April 22, Perseids on August 12, Orionids on October 21, Leonids on November 17, Geminids on December 14 and Ursids on December 23. Obviously some events will be more rewarding than others, but which ever way it is, I will be pleased to have your reports as would Dr. John Mason, 51 Orchard Way, Barnham, W. Sussex PO22 0HX. John runs his own system for observing meteors by radio, he is a council member of the British Astronomical Association and assistant director of their meteor section.

The 50MHz (6m) Band

During short periods of Sporadic–E around 1715 on December 24 and 0753 on the 27th, Gordon Pheasant heard the Gibraltar beacon ZB2VHF on 50·035MHz and held a QSO with LA6QBA. Between December 15 and January 11 Norman Hyde logged the beacons in Cyprus 5B4CY on 50·498MHz, England GB3NHQ on 50·050MHz, Gibraltar, Scotland GB3RMK on 50·060MHz and Wales GB3SIX on 50·020MHz. Both **Len Fennelow G4ODH** in Wisbech and I received signals daily, at varying strengths from GB3NHQ.

The 28MHz Band

"Conditions during the period under review have now reached an all time low," writes Norman Hyde. During short openings on December 14 and 21 he heard stations in Sweden and worked stations in Germany. Dave Coggins received signals from Germany and Italy around 1815 on the 21st and Germany again on January 4. "Most of the bands seem to be in poor shape at the moment," writes Dave on January 12. He added, "virtually nothing heard on 28MHz, that is until I built a 2-element beam."

I found a bit of activity at the c.w. end of the band between 1600 and 1700 on January 11 when I copied a QRP station SM0DJZ calling CQ, LA2CBA working into Germany, OH3SR in QSO with an HB9 and SM4TU calling G. Although these signals were strong enough for my TONO 550 terminal to read I feel sure they would have been much stronger had I been, like Dave, using a directional beam instead of a fixed long wire antenna.

"The month was the worst it has ever been, apart from the occasional mobile on 29·6MHz and c.w. from local stations, there was no activity at all," writes Douglas Maxwell from Hamilton on January 13. To add to his gloom, recent high winds wrote off his 28MHz antenna. I bet you're not the only one that suffered antenna damage Douglas, I was concerned about my lot when the anemometer on my roof was showing an average wind speed around 30 knots with frequent gusts pushing the needle over 50.

Propagation Beacons

"Can it really get worse?" asks Len Fennelow. "Nothing doing," said **Fred Pallant G3RNM** in Storrington and "A rather quite month," remarked Gordon Pheasant. However something is always better than nothing and my thanks are due to **Chris van den Berg,** The Hague, Dave Coggins, Henry Hatfield, Norman Hyde, **Bill Kelly** in Belfast, **Ted Owen** in Maldon, Fred Pallant and Gordon Pheasant for their dedicated watch on the 28MHz beacon band which enabled me to compile the monthly reception chart, Fig. 3. Gordon logged the Australian beacon VK6RWA at 1200 on the 18th and IY4M, the Marconi beacon, on the days indicated in Fig. 3. On December 21, Bill Kelly noticed that the 27MHz Citizens Band was open, so he immediately checked 28MHz and found good signals coming from the German and Norwegian beacons, DF0AAB and DL0IGI and LA5TEN. Apart from that, Bill, like the others, found the band generally poor.

"14MHz beacons have not been so prominent as they were last period, particularly those from the Americas," writes Len Fennelow. His log of the beacons on 14·100MHz is included with Fred Pallant's in Fig. 4. At a distance of 318km, Chris van den Berg has received signals from the Wrotham beacon GB3VHF on 144·925MHz on December 15, 16, 21, 22, 30 and 31 and January 4, 7, 8 and 9. With a vertical dipole feeding the v.h.f. converter in my Trio R2000, I can hear this beacon, at consistent strengths, every day and even a slight change in signal strength tells me that something has disturbed this 67km path.

Tropospheric

The atmospheric pressure began this period on December 15, high, at 30·4in (1029mb), gradually falling to a low of 29·3 (992) on the 25th and apart from a plummet to 28·9 (978) on January 2, the pressure then hovered between 29·5 (998) and 30·1 (1019) until the 13th, when a fall began and the period ended at 29·7 (1005) with gale force winds in many parts of the UK. The slightly rounded readings on our monthly pressure chart, Fig. 5, were taken at noon and midnight from a Short and Mason barograph installed at my QTH. The barometer readings recorded by Paul Burnett G1DAT in Cleveland are similar to mine showing peak highs on December 16, 20 and 30 and January 10 and lows on days 21, 25, 31, 2 and 5. Having moved QTH in December, Paul was limited to using a Slim Jim antenna with his 480R. However, come spring he hopes to have a large Yagi for 144MHz on a 10m tilt-over mast. Although v.h.f. conditions were variable to say the least, Chris van den Berg heard stations working through the Norfolk Broads repeater GB3NB on R1 on most days between December 15 and January 8.

Band II

My thanks to one of our readers in Bahrain, Bob McCreadie, for his Christmas card, Fig. 6 and good wishes. Bob is the Breakfast Show DJ for Bahrain's Radio 1 and his station serves some 500000 English speaking people in Bahrain, the eastern province of Saudi Arabia. "During the summer, when owing to the humidity, the v.h.f./u.h.f. signals go mad we are often received all around the Gulf with our 2·5kW stereo on 96·5MHz and 500W on 93·3MHz," writes Bob. So, keep a listen out for his voice on Radio Bahrain during the forthcoming Sporadic–E season. Bob is also a licensed amateur with the callsign

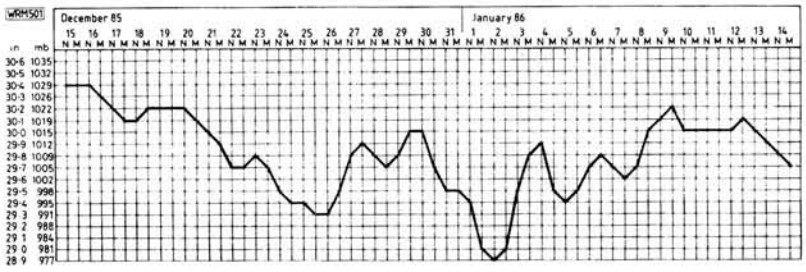


Fig. 3

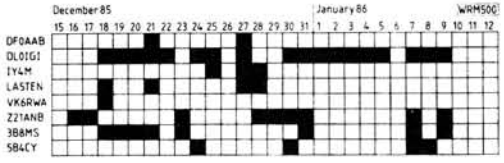


Fig. 4

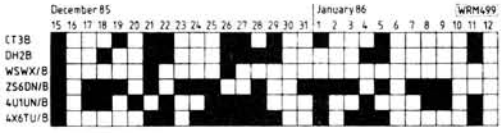


Fig. 5

Fig. 6

A92CX and is active on the h.f. and v.h.f. bands and would be pleased with reports via P.O. Box 702, Manama, Bahrain.

During a tropospheric lift on December 16 and 17, **Harold Brodribb** in St. Leonards on Sea, using the Band II section of his Plustron TVR5D and a Bush VHF80, listened to the transmissions from the Belgian station at Egem and French stations in Dieppe, Caen, Paris, Normandie and Rouen and Radio Devon between 90 and 106MHz. At times there were so many foreign stations in the band that his locals, BBC Radios Kent and Sussex were inaudible. Harold has shown many times that it pays to know, in detail, the behaviour of your favourite band under all atmospheric conditions. He found signals still excellent from France on the 18th, but well down on the 19th and says that when conditions decline the signals from Abbeville, Caen, Paris and Rouen are the first to go, but the signals from Boulogne and Neufchatel are usually most persistent.

Reports by the 12th please

TELEVISION

Reports: as for VHF Bands, but please keep separate.

by Ron Ham BRS15744

At 1815 on December 17, during a tropospheric opening, **Major Rana Roy** watched a farming programme and election results from Jalandhar TV on Ch. 9. He also saw a mixture of pictures from Mussoore and Pakistan TV at 1900 on Ch. 10. Then at 1915 he returned to Ch. 9 and saw a caption, Fig. 1, in Punjabi and Hindi, which translated means, "Thanks for your letters", a statement which I endorse every month.

Band I

Some 2 years ago, after 32 years of searching the s.w., m.w. and v.h.f. bands, **Tony Mancini** from Belper received a Spanish test card while working on an old dual standard Bush receiver and became "hooked" on DXTV. Since then Tony has installed a system using a Ferguson 30033 for Band V, a Hitachi for Bands I, III and u.h.f. and an Italian Elbe which is fully tunable through all v.h.f. and u.h.f. TV ranges. Tony converted the Ferguson for switchable 5·5 and 6MHz sound and gives his thanks to Thorn's technicians for their advice and says, "I phoned them for details and nothing was too much trouble for them." He also uses a D100 converter from the stables of Keith Hamer and Garry Smith and comments, "it is an absolute dream and I would recommend it to anyone." Like many of us last September, Tony received pictures from Czechoslovakian Television so he decided to send them a report. In due course a reply came from their Chief of Inspectors Dept, Jan Vacek, wishing Tony every success with his hobby and enclosed a QSL card, Fig. 2, photos of their test patterns and a booklet of information about television in Czechoslovakia.

A correspondent to Jack Hum's "Four Metres and Down" column in the July 1967 issues of the RSGB's *T and R Bulletin*, wrote, "In 1960, at the age of 14 my attention was caught by reading of the success of Ian Becket of Buckingham in receiving broadcast television pictures from the Soviet Union. To try to do likewise, I made the necessary 625 line modifications to an old GEC set and received my first sporadic-E signal from Leningrad in July 1961 and after that from several other European countries." The writer also told Jack that a gathering of all known UK TVDXers, 10 in all, was held in Poole during the summer of 1962. Any recollections readers? If so let's hear about them.

On most days between December 14 and 29, Tony Mancini received various television signals from Europe and Scandinavia in Band I. He identified test cards from Czechoslovakia CST, Finland YLETV1, Germany ARD-1, Norway NRK, Spain RTVE, Sweden TV1 and Yugoslavia JRT. Additionally he saw a play from Germany, cartoons, films and news from Norway and sport from Spain. He received TV1 from Sweden again on January 1.

Despite the heavy rain squalls causing screams of precipitation static around 50MHz at 0820 on January 2, I saw many bursts of pictures on Ch. R1 49·75MHz. During one long burst at 0835 several R1 stations appeared together. I also saw many "pings" of pictures on Ch. R1 between 2000 and 2200 on the 3rd, while the Earth was passing through the peak of the Quadrantids meteor shower.

In New Radnor, **Simon Hamer** received test cards from Austria ORF-FS1 on December 22 and January 5 on Ch. E2 48·25MHz, Czechoslovakia RS-KH on Ch. R1 and Italy on Ch. 1a 53·75MHz on the 27th. Then he saw Germany ART-GRUNTEN on E2, Sweden TV1 SVERIGE on Ch. E3 55·25MHz and Spain RTVE with a chessboard pattern on January 9,11 and 12, respectively. During recent sporadic-E seasons, Steve Green in Malvern and Len Eastman G8UUE in Bristol have logged test cards (in colour) from the Belgian French service RTBF-1 at Liege on Ch. E3 and Hungary MTV-1 Budapest on Ch. R1 (Fig. 4) and Yugoslavia JRT RTV-LJNA (Fig. 5) on Ch. E3, respectively.

Tropospheric

Although there were no major openings between December 15 and January 14, there were various minor events. Tony Mancini received pictures in Band III from France Canal Plus on Ch. F9 on December 16, 17, 21, 22, 27 and January 1 and 3 and also Germany ARD on Ch. E9 on days 16 and 17. He can also receive consistent and good quality pictures from Ireland RET-1 on a daily basis. While the atmospheric pressure was falling on the 16th, **Harold Brodribb** in St. Leonards-on-Sea logged French pictures on Chs. F5, 6, 7 and 9, Belgian teletext from Wavre on Ch. E8 and negative pictures from Le Havre, Lille and Reims on several spots in the u.h.f. band. Between 0830 and 1000 on the 17th, Harold saw a test card change from SWF-BADN to ARD/ZDF on Ch. E9, test cards from Luxembourg RTL and Belgium RTBF-1 on Chs. E7 and 8 respectively, plus some transmissions from France in Band III.

I received the Dutch test card PTT-NED-1 on Chs. E4 and 5 around 0845 on December 21 and a fair bit of co-channel interference on a few u.h.f. channels during the evening of January 9.

Report from India

"Teletext was launched in Delhi on Ch. 7 by the P.M., Mr. Rajiv Gandhi, on 14 November 1985. Called INTEXT, the service offers information about the prices of essential commodities, aeroplane and train timings, share prices, foreign exchange fluctuations and special news from India and abroad," writes Rana Roy. He adds, "This service is available from 0900 to 1400 and again from 1500 to 2200, with about 80 pages of information transmitted in English in a cyclic mode. Existing colour TV sets require a decoder to receive the information." Readers may like to know that Mr. Ranjiv Gandhi and his wife became licensed amateurs in 1975 with the callsigns VU2RG and VU2SON, respectively.

TV-DXing . . . . FM-DXing

Aerial Techniques carries a vast range of aerial equipment for local, fringe and TV/FM Dxing installations, and with it the experience! We've a customer consultancy service to advise on and resolve difficult reception problems, we will also plan systems. UOSAT, Airband & Marine aerials stocked, also our own exclusive range for Wideband Band 1 **TV-DXing.**

Examples from our range:

DXers – LABGEAR CM6022/RA UPCONVERTERS (ideal TV-DXing) mains powered, limited stock at this special price **£22.50**

ANTIFERENCE UP1300 VHF masthead amplifier (40-230MHz) for Bands 1, 2 & 3. Gain 19dB, Noise 2.5dB **£16.90**

Matching Power supply unit for use with above amp (12v) **£11.25**

TRIAX 'Omni-FM' 88-108MHz Omni-directional FM Aerial **£12.33**

TIME SIGNAL STATIONS High quality 80 page book, features complete listing of time signal stations around the World, illustrated throughout **£2.95**

WHETHER YOUR NEED IS FOR LOCAL OR FRINGE RECEPTION, ALTERNATIVE CHANNELS, TV/FM DXING, OR FOR A DISTRIBUTION SYSTEM, AERIAL TECHNIQUES IS THE 'ONE STOP' ADDRESS FOR ALL EQUIPMENT.

AERIAL TECHNIQUES IS UNIQUE – TRY OUR COMPREHENSIVE 1986 CATALOGUE AT 65p.
SAE with all enquiries please. ACCESS & VISA welcome.
All prices inclusive of VAT and Carriage **Delivery 7-10 days.**

Access

AERIAL TECHNIQUES (PW)
11, Kent Road, Parkstone,
Poole, Dorset, BH12 2EH. Tel: 0202 738232.

BARCLAYCARD VISA

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 pre-wound 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, **£18.80.**

V.L.F? EXPLORE 10-150 KHz, Receiver **£25.20.**

*Each **fun-to-build** kit (ready-made to order) includes ALL parts, case, pcb, instructions, by return postage (Europe same, Giro 21-923-4000) and list of other kits.*

CAMBRIDGE KITS
45 (PD) Old School Lane, Milton, Cambridge.

R. WITHERS COMMUNICATIONS LTD.

AGENT TO THE STARS!

YAESU ICOM TAIT

RWC are main agents/distributors for Yaesu, Icom, Kenwood, M. Modules, Jaybeam, Tonna, Revco Antennas, Cleartone, Mutek, AKD, Drae, FDK, Welz, Tait and Neve Radiotelephones to name but a few! We also stock a wide range of B.T. approved cordless telephone and telephone systems!

TUNE INTO OUR SPECIALIST SERVICE!

★ We manufacture our own range of VHF/UHF beam antennas, inc. the famous ARM Multi Pb (140-800MHz).
★ We're the only company in the UK that produces modular VHF/UHF Raycom power amplifiers (15-50 watts output).
★ We supply a large range of specialist RF power transistors/modules imported directly from Japan.
★ We supply/repair amateur/business radio systems.
★ We check transceivers on our spectrum analyser – £12.50 for a comprehensive report while you wait!
★ Only supplier of modified Revco RS 2000 60-520MHz extended coverage scanning receiver modified by RWC.
★ Probably the UK's largest seller of used radio equipment.
★ We offer the largest selection of radio allied services under one roof. *CALL NOW FOR FULL DETAILS.*

EXPORT AND TRADE ENQUIRIES INVITED

584, Hagley Rd. West, Quinton, Birmingham B68 0BS.
Tel: 021-421 8201 (24hrs) Telex: 334303-TXAGWM-G

S.E.M.

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

YOU CAN NOW HAVE LF, MF, HF, VHF, UHF WITH ONE RECEIVER

NEW H.F. CONVERTER for use with the Super Scanners. 100KHz-60MHz input. Tune your receiver between 100-1 and 160MHz for L.F. to U.H.F. on one RX. **£38.** We can also supply the FRG9600 and ICR7000.

NEW S.E.M. WIDEBAND PRE-AMPS. Following a lot of development work and evaluation of the devices available, we have produced 2 new WIDE BAND PRE-AMPS with a very high dynamic range. Covering 3-40MHz or 20-400MHz. Measurements: GAIN 9dB, N.F. 1.5dB. 3rd order IP(INPUT) +30dBM. Each pre-amp in 3 types. Basic pre-amp **£30**, straight throu. when off **£35**, R.F. switched **£40**. All Ex-Stock.

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.

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. Uses Curtis chip. R.F. proof. Sidetone etc. **£45.** A first class twin paddle key **£17.50 Ex stock.**

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

RF NOISE BRIDGE. Adjustable 0-infinity ohms, 3" × 1½" × 2" only. S0239s, 1-170MHz. Neat, accurate & economical. **£39.50 Ex Stock.**

3 WAY ANT. SWITCH + 4th position to EARTH. 1kW. SO239s. Good to 2 metres. **£19.80.** Ex-Stock.

S.E.M. 2 METRE TRANZMATCH. 5½" × 2", 3". SO239s. **£29.50 Ex stock.**

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, the easy way.
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.
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.**

SENTINEL AUTO 2 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" × 2¼" × 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 (Users say it's the best filter you can buy). 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. **£69.50 Ex stock.**

12 MONTHS COMPLETE GUARANTEE INCLUDING ALL TRANSISTORS.

Prices include VAT and delivery. C.W.O. or phone your credit card number for same day service. Ring or write for more information. Place orders or request information on our Ansaphone at cheap rate times.

Goods normally by return.

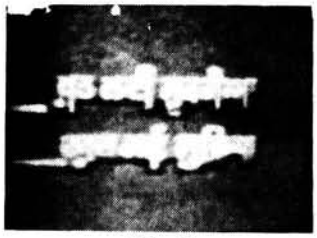


Fig. 1

Fig. 2

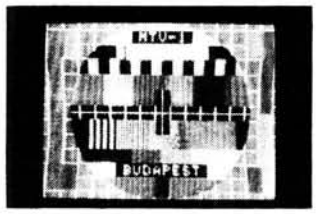


Fig. 3

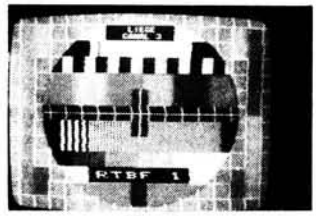


Fig. 4

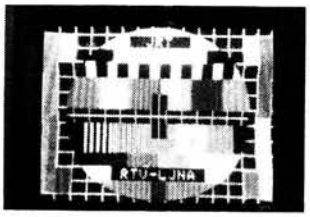


Fig. 5

Fig. 6

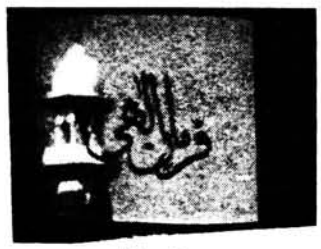


Fig. 7

Fig. 8

Fig. 9

Fig. 10

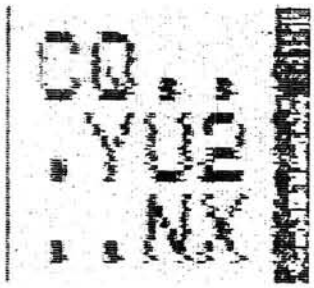


Fig. 11

Fig. 12

From his QTH in India, Rana received pictures from Pakistan TV on Ch. 10, during the evenings of December 3, 4, 11 and 13. He watched the news and a play in Urdu, a cricket match, commercials (Fig. 6), a closing programme of prayer called Farman-e-Ilahi (Fig. 7), a programme announcer (Fig. 8) and a children's film (Fig. 9).

"At 1930 on December 17, there was news in Punjabi on Ch. 9 and I switched to Ch. 10 at 1950 and saw the programme *The World of Survival* from Mussoorie, a distance of about 580km," said Rana. He usually takes a portable TV receiver with him when he travels around India. During past sporadic-E disturbances, Rana has received pictures from Madras, Dubai, Tehran and Bangkok, at distances of approximately 1823, 2414, 2526 and 4940km, respectively. The signals he receives via tropospheric openings are usually between 240 and 800km from his location.

SSTV

In Knutsford, **Dave Coggins** uses a Trio 1000 communications receiver, half size G5RV antenna, Hamgear PM11A pre-selector and a Sinclair Spectrum computer with Scarab software for SSTV. He copied pictures on 14·230MHz fron DL6NH and I4JXE on December 22 and DF3PU on the 29th. Down in Bude, during December, **Lester Curno** added new stations F6BFK, SM5EEP, YU1CS and YU2NX to his score of slow-scan signals received in addition to some of the regulars like GJ4YCR, I1CEL, I1LGA, I3XQW, IC8POF and YU1DYK. Lester also logged the captions "NAME NISSE ITH FAGERSTA", "MY NAME FILIPPO", "G3MGF DE HA1ZH" and despite QRM on the band, he watched a few scenes, boats, rivers and buildings around Hamburg from a DL4 and a DK3.

I received good pictures from I4JXE on December 22, YU1DYR on the 28th, I8GYN, OH6ZS (Fig. 10) and YU2UX (Fig. 11) on the 29th. Then in January I saw SM5EEP (Fig. 12) on the 5th and I8XYZ and YU1DYK on the 12th. Among the captions I copied were "HAPPY NEW YEAR" on the drawing of a bell, "YUICS DE SM5EEP", "NAME GABRIELLE", "QTH FERRARA", "CQ CQ DE I4JXE" and "DEAR NIEL I AM SORRY NO RECEPTION VERY QRM". Most SSTV enthusiasts are aware of the problems caused by QRM and sometimes QSB, especially around 14·230MHz and that is why some of the captions may appear out of sequence because they may have been copied at the peak of a fading signal. I feel that these reports can be of great importance to the station that originated the caption.

For **Richard Thurlow G3WW** in March, 1985 brought first time two-way QSOs with 49 stations, ending with ZS6CAR on New Year's Eve. It brought his grand total of such stations to 2109. This massive figure was achieved by working on all bands from 1·7 to 28 and 144MHz. Between 1555 and 1740 on December 28, G3WW and G4HPY in Luton exchanged superb 24 seconds, single frame colour pictures with DK3UG and DL4HCU. Richard was off to a good start for 1986, by working two new stations IK5DNF and YU5EF on 8 seconds monochrome and a 24 seconds colour exchange with G4GOZ and GD4HOX on January 1. "G6OHM in Wimblington and G0CCS in Kings Lynn are both active on 144·5MHz f.m. SSTV, with Spectrum computers," said Richard.

Reports by the 12th please

MW BROADCAST BAND DX

Reports to: Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, W. Sussex RH20 4NS

by Brian Oddy G3FEX

Since the earliest days of radio, the ingenuity of amateur experimenters has been very much in evidence. Although there has been a marked decline in home construction during the last two decades, the true amateur has nevertheless continued to build various items. One such ingenious experimenter—**Jim Brown** of Acton, London—has combined modern technology with a device used by nimble-fingered ladies long before radio was discovered!

Jim decided to build the "W–Q" m.w. loop antenna detailed in November '85 *PW*. However, daunted by the complexity of the actual loop construction, he decided to use one metre of 26-way computer colour coded tape cable to form the loop, squeezed snugly between two wooden rings of a 300mm diameter embroidery frame (available from most haberdashery stores). By joining the end of one wire to the start of the next a coil is formed. Since all of the turns are not required to give the

Freq. (kHz)	BBC/IBA	Station	Andy Kennedy: Leicester	Philip Rambaut: Macclesfield	Derek Thoamley: Birmingham	Stuart Brooks: Carluke	James Sneddon: Motherwell	David Middlemiss: Eyemouth	Chris Dix: Bristol	Alan Merritt: Abingdon
603	IBA	Invicta Sound	X							
630	BBC	R. Bedfordshire	X		X					X
666	IBA	Devonair Radio				X				
666	BBC	R. York	X	X		X				
756	BBC	R. Cumbria				X				
756	BBC	R. Shropshire	X	X	X					X
774	BBC	R. Kent	X							
774	BBC	R. Leeds	X	X		X				
774	IBA	Severn Sound	X		X					
792	IBA	Chiltern Radio	X	X						X
801	BBC	R. Devon	X	X		X			X	
828	IBA	2CR				X				
828	BBC	R. WM		X	X					
837	BBC	R. Cumbria				X				
837	BBC	R. Leicester	X	X	X					
855	BBC	R. Devon				X				
855	BBC	R. Norfolk	X							
855	BBC	R. Lancashire		X		X				
873	BBC	R. Norfolk	X	X	X					
936	IBA	GWR	X	X						
954	IBA	R. Wyvern	X	X		X				X
990	BBC	R. Devon				X				
990	IBA	Beacon Radio	X		X	X				
999	BBC	R. Solent				X				X
999	IBA	Red Rose Radio		X		X				
999	IBA	R. Trent	X			X				
1026	IBA	Downtown Radio				X				
1026	BBC	R. Cambridgeshire	X	X	X					X
1035	BBC	R. Sheffield	X	X		X				
1035	IBA	North Sound Radio				X		X		
1035	IBA	West Sound				X				
1107	IBA	Moray Firth Radio				X		X		
1107	BBC	R. Northampton	X		X					X
1116	BBC	R. Derby	X	X		X				
1116	BBC	R. Guernsey							X	
1152	IBA	R. Clyde				X				
1152	IBA	BRMB	X			X			X	
1152	IBA	Plymouth Sound				X				
1152	IBA	Piccadilly Radio		X						
1161	IBA	R. Broadland				X				
1161	IBA	R. Tay				X		X		
1161	IBA	Viking Radio		X						
1161	IBA	GWR								X

Freq. (kHz)	BBC/IBA	Station	Andy Kennedy: Leicester	Philip Rambaut: Macclesfield	Derek Thoamley: Birmingham	Stuart Brooks: Carluke	James Sneddon: Motherwell	David Middlemiss: Eyemouth	Chris Dix: Bristol	Alan Merritt: Abingdon
1161	BBC	R. Bedfordshire	X							
1170	IBA	Swansea Sound				X				
1170	IBA	R. Tees				X				
1170	IBA	Signal Radio	X	X						
1242	IBA	Invicta Sound				X				
1251	IBA	Saxon Radio	X			X				
1260	IBA	GWR				X				
1260	IBA	Marcher Sound		X		X				
1260	IBA	Leicester Sound	X			X				
1260	BBC	R. York						X		
1278	IBA	Pennine Radio				X				
1305	IBA	R. Hallam	X							
1323	BBC	R. Bristol	X							X
1323	IBA	Southern Sound	X							
1332	IBA	Hereward Radio	X	X		X				
1359	BBC	R. Solent				X				
1359	IBA	CBC				X				
1359	IBA	Mercia Sound	X	X	X					
1368	BBC	R. Lincolnshire	X			X				
1431	IBA	Essex Radio	X						X	
1431	IBA	Radio 210				X				X
1449	BBC	R. Cambridgeshire	X	X						
1458	BBC	R. London	X			X				X
1458	BBC	R. WM	X		X					X
1458	BBC	R. Manchester		X		X				
1458	BBC	R. Cumbria				X	X			
1476	IBA	County Sound	X	X			X			
1485	BBC	R. Merseyside	X	X	X	X	X			
1485	BBC	R. Humberside				X				
1485	BBC	R. Sussex					X			
1503	BBC	R. Stoke-on-Trent		X		X				
1521	BBC	R. Nottingham	X	X		X				
1530	IBA	Pennine Radio	X	X						
1530	IBA	R. Wyvern	X			X				
1548	IBA	Capital Radio	X			X				
1548	IBA	R. Forth	X			X				
1548	IBA	R. City		X						
1557	IBA	Hereward Radio	X			X				X
1557	BBC	R. Lancashire				X				
1584	BBC	R. Nottingham	X	X		X				X
1584	BBC	R. Shropshire	X						X	
1584	IBA	R. Tay	X			X		X		
1602	BBC	R. Kent				X				

best *Q*, the outer two wires of each side are wired in parallel. The centre junction of the tape wires provides the centre tap.

A most ingenious idea!

DX Report

Note: All frequencies in kHz: Time UTC (GMT).

Transatlantic DX. There has certainly been plenty to interest the dedicated m.w. DXer during the winter nights; in fact, **Graham Powell** of Pontypridd says—"I can only describe December as the best month for DX in my seven years in the hobby". From New York, Graham logged WNBC 660; WOR 710; WABC 770; WINS 1010; WHN 1050; WNEW 1130; and WQXR 1560 between 2330 and 0445. The memory station from Boston, WMRE 1510, was heard as early as 2308 and another one from Boston, WHDH 850, by 0030! The 5kW station WLAM 1470 in Lewiston ME was a rare one for Graham, at 0017. To top all the early signals, CKVO 710, Clarenville must head the list at 2029—so take heart, those of you who feel that late night DXing is not for you!

Using a CR100 receiver with an outboard frequency meter, **Andy Kennedy** of Leicester has been exploring the band and was delighted to discover the Caribbean Beacon 1610 from Anguilla at 0419—broadcasting Christmas songs on December 12. Later, he logged CJYQ 930, St. John's, Nfld—a station which he heard several times in January, but much earlier, at 0130. From the USA, WINS 1010 and WHN 1050 from New York, along with WMRE 1510, Boston were all received well.

Recapturing "the days of old" with a vengeance (see *PW* "On the Air", March '86), **George Morley** of Redhill, Surrey must be enjoying many sleepless nights! His impressive list of Canadian stations, received on his Trio R2000, includes: CKPR 580, Thunder Bay, Ont; CBNA 600, St. Anthony, Nfld; CBGY 750, Bonavista Bay, Nfld; CJYQ 930, St. John's, Nfld; CBM 940 Montreal; CKNB 950, Campbellton NB; CHNS 960, Halifax and CKCW 1220, Moncton NB. The USA, too, is well represented in his logs: WRKO 680; WHDH 850 and WBZ 1030—all from Boston; KDKA 1020, Pittsburgh PA and New York's WNBC 660 and WABC 770.

"Transatlantic DX was possible but far from excellent", says **Jos Pot** of Alkmaar, Holland, "so I designed and built a m.w. a.t.u. to match my 25m wire antenna to my Collins 51J–4 receiver. The results are very good—I have a 7–15dB improvement". A good tip, I feel, for users of wire antennas on m.w. His log of DX includes Canadian VOCM 590, St. John's; CKYQ 610, Grand Bank, Nfld; CBGY 750; CJYQ 930; CBM 940 and CKCW 1220; also, American WNBC 660; WABC 770; WBZ 1030; WHN 1050; WBAL 1090, Baltimore, Md; WCAU 1210, Philadelphia, Pa and WMRE 1510. One of his rarer DX stations was ZDK 1100, Antigua.

First-hand news of the USA and Canada was received by **Simon Hamer** of New Radnor, Wales via WHN 1050, New York and CBA 1070, Moncton, NB using his Grundig Satellit 1400SL receiver. "Pop" music charts, too, were clearly received from CJYQ 930 of St. John's, Nfld. Other interesting stations mentioned were the Caribbean Beacon 1610, Antigua with a religious programme; WMRE 1510 from Boston with a programme of "oldies" and WCAU 1210 from Philadelphia.

Reporting from Randburg, South Africa, **Leo Gieske** says "there is a high static

level in the southern hemisphere just now as it's summertime and conditions for DXing are difficult". Leo uses either a Box Loop or 40m long wire antenna with his Drake SPR4 and Hallicrafter SX100 receivers and has QSLs from CBE 1550; CKLM 1570; CBJ 1580; WTOP 1500; WMRE 1510; WKBW 1520; WCKY 1530; WPTR 1540; WOKJ 1550, WQXR 1560 and Radio Muhler 1260, Brazil—a most remarkable achievement!

Bill Kelly of Belfast has been keeping a regular check on the band. Good signals were received from Radio Globo 1220, Rio, S. America at 0100 and the Caribbean Beacon 1610, Antigua, with Evangelist programmes at 0230 on two nights. Canada's CBNA 600, St. Anthony; CIYQ 680, Grand Falls, Nfld. and CJYQ 930 were regular signals; however, CKLM 1570 was heard only once, broadcasting in French, and Bill noted their station ident mentioned Fort Laurier, Quebec. Signals from the USA were WCAU 1210; WGAR 1220, Cleveland, Ohio; WMRE 1510 and WQXR 1560, New York, which was received on three nights between 0230 and 0330.

Other DX: Leo Gieske has received a QSL for his reception of ILR Capital Radio 1548, London, in Randburg, South Africa! Station 6WF of Perth 720, Australia has also QSLed, as has Taiwan 1000, too!

Simon Hamer and Graham Powell both report hearing Radio Beijing 1521, with a programme in Russian and time signals at 2100—Radio Mercury, also on 1521, makes reception impossible in the south of England, even with a good loop antenna, but **Tim Shirley** of Bristol confirms that it is audible there too!

Graham has also noted a DX signal on 600 at 1635, which he thinks is CBS, Luchiang, Taiwan: however, Tim Shirley says he hears KBS South Korea on that frequency at 1635—more reports, please, on this one. Tim says that Radio Algeria can be heard on 1000 at 2000.

Julian Wood of Buckie, Scotland reports that Radio Sweden's Solvesborg transmitter 1179 is a good signal there at 2100 and **Robert Fields** of Immingham, Lincs has been hearing it too, using his Hitachi TRK-5110E cassette radio with a 4m wire antenna. He also received Alger, Algeria 981; Marnach, Luxembourg 1440 and Monte-Carlo, Monaco 1467—which was also a new one for **Margaret Sadler** of Leeds.

John Ratcliffe of Southport, Queensland, Australia says "For several weeks now, no DXing has been possible on m.w. or l.w. due to almost continual electrical storms—static all the time, day and night. Temperatures have been in the top 20's and low 30 degrees C. Sunrise is 4.30 am and sunset 6.30 pm".

A DX programme was enjoyed by Andy Kennedy from BRT2, Belgium at 2200 on 1512. Other stations in his log were RTE1 Ireland 567; RTE2 Ireland 612; Vilnius USSR 666; AFN Frankfurt, Germany 873; Milano, Italy 900; RSI Solvesborg 1179; Prague, Czech. 1287; Radio Ulster 1341; Manx Radio 1368; Lushnje, Albania 1395; Bastia, France 1404; Marnach, Luxembourg 1440; Monte-Carlo, Monaco 1467; Stargard, Poland 1503 and Alma-Ata, USSR 1503.

Philip Rambaut of Macclesfield, Cheshire and **James Sneddon** of Motherwell, Lanarkshire both report good reception of Manx Radio 1368 Foxdale IOM—this station has an attractive QSL.

Local Radio DX

There has been plenty of activity here, as can be seen from Fig. 1. Andy Kennedy has built a simple loop antenna from odds and ends; he says—"I am delighted with the results, pulling in several personal firsts".

Derek Thomley of Birmingham says—"I find Radio Merseyside is a very good signal on my car radio as far south as Coventry—I have even identified it in Bristol!"

Following a recent move, **David Middlemiss** of Eyemouth, Berwickshire has yet to fix up a suitable antenna for his Eddystone 7173 Mk.2 receiver and is surprised at his results with just a short wire from a window to a coal bunker!

Chris Dix of Bristol mounts his Grundig 1400SL receiver on a revolving cake-stand when DXing—a good tip.

New BBC Relays

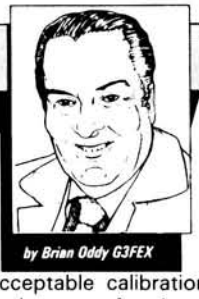
Simon Hamer reports that two new 1kW relay stations have commenced operation in Wales at Llandrindod Wells 1125 and Forden 882. These have apparently improved reception considerably of BBC Radio Wales.

QSL Addresses

BBC Radio Cambridgeshire: Broadcasting House, Hills Road, Cambridge, Cambs. CB2 1LD.
BBC Radio Furness: Broadcasting House, Hartington Street, Barrow-in-Furness, Cumbria LA14 5FH.
BBC Radio Merseyside: 55, Paradise Street, Liverpool L1 3BP.
Radio Polonia: English Section, P.O. Box 46, 00-950 Warsaw, Poland.

SW BROADCAST BANDS

Reports as for Medium Wave DX, but please keep separate



by Brian Oddy G3FEX

For the Newcomer SWL

One of the problems associated with the simpler type of short-wave receiver may be the difficulty in setting the tuning dial or pointer accurately to a particular frequency detailed in Broadcast Station Schedules or Listening Guides, mentioned last month in "Newcomer SWL". Conversely, reading the scale to record in a log book the frequency of a particular station being received may be extremely difficult.

Some receivers have only one short-wave range which can be selected by the **wave-change switch** and these are often fitted with a scale which details several short-wave bands along its length. It may be clearly marked in megahertz but lack any other serious attempt at calibration, except for a few meaningless dots or large coloured "blocks". Because the stations appear very close together along such a scale, a **slow motion** dial drive may be fitted to the set in an attempt to ease the tuning problem.

Better receiver designs incorporate several short-wave ranges, each being selected by the wave-change switch. These receivers electrically spread out the one or more short-wave broadcast bands along the length of each short-wave scale—called **bandspread scales**—and usually detail much more acceptable calibration marks. Nevertheless, they are often inaccurate and may well lead to considerable confusion!

So, how may the s.w.l. overcome these problems?

Fortunately, it is possible to use the broadcast stations themselves to calibrate the receiver, for they operate on specific frequencies allocated to them by international agreement. Modern broadcasters use highly accurate and stable frequency generating equipment at the transmitter; consequently, their signals can be relied upon if used to calibrate a receiver. (A few cases exist where this is not so, however, which will become evident later.)

Before these stations can be used to calibrate a receiver it will be necessary to know the exact operating frequencies of the stations concerned at a chosen time of day. This information can be obtained either from their Broadcast Schedules or a station/frequency guide book, e.g. *International Listening Guide*. A word of caution here, for it is essential to ensure that these are up to date, since many broadcasters change their operating frequencies up to four times a year to allow for seasonal changes in the ionosphere. If these aids are not available, it is possible to monitor stations and note the details they may announce about transmission frequencies just before, or on, the hour. It will help to remember, too, that short-wave stations are generally spaced 5kHz apart, e.g. 15·150MHz, 15·155MHz, etc.—but there are exceptions.

It is necessary to install a **logging scale** to the receiver dial if such a scale is not already present. This consists of a linear scale calibrated 0 to 100, marked either for every digit or every two digits along its length. The scale must be drawn up on a paper strip which is exactly the same length as the receiver scales and then attached to the receiver dial by using adhesive. Note that, although this scale must be linear, the actual frequency scales on the receiver dial may well be non linear.

By using this new logging scale and known broadcast station frequencies, a set of reasonably accurate graphs can be drawn up for a receiver fitted with bandspread scales but, in the case of a receiver which has only one s.w. band, a single —less accurate—graph may be prepared.

The method of preparing a typical graph is shown in Fig. 1. Using a sheet of metric graph paper, which consists of 5mm

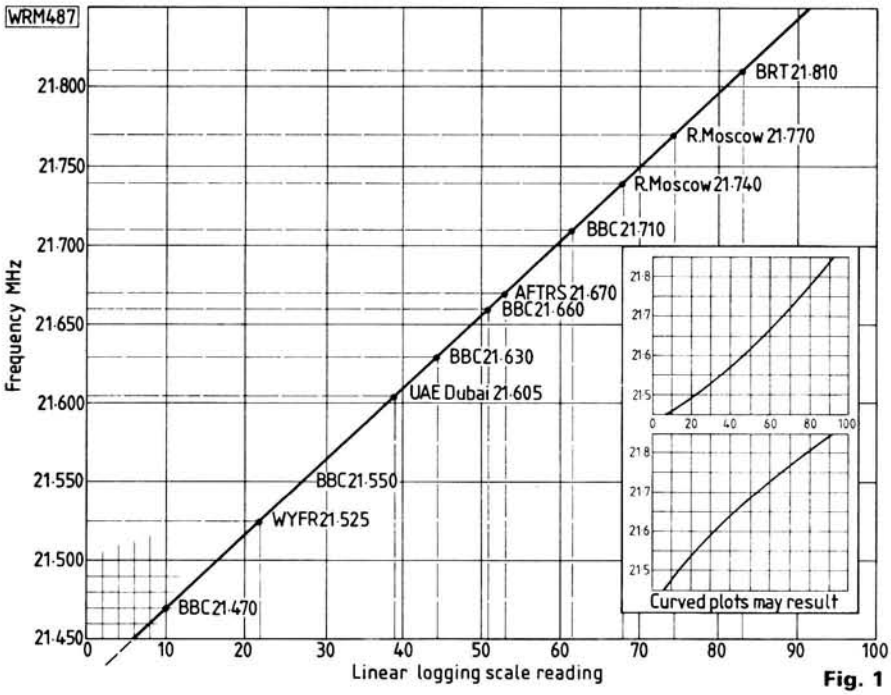


Fig. 1

squares, enter along the horizontal axis a scale incorporating 50 such squares to provide effectively a linear scale 0 to 100, corresponding to the new receiver logging scale. If a receiver with only one s.w. band is being calibrated, mark in along the vertical axis of the graph 1MHz steps at each line forming every other square. If the receiver has bandspread scales, prepare a separate sheet for each band and mark the vertical axis in steps of 100kHz or 50kHz at every fifth square.

Using these axes, plot a number of station frequencies against logging scale readings by marking in crosses and then join them up with a line—this may not be a straight line but curved in shape, depending upon the characteristic of the tuned circuit used in the receiver—see Fig. 1(a)—any crosses which appear out of step with the general shape may be due to off-frequency operation by the station concerned.

If these graphs have been drawn with care it will now be possible to read off the frequency of an unknown station simply by checking its logging scale reading against the graph. Conversely, it will be possible to set the receiver to a particular frequency too, by looking up the required logging scale setting on the graph.

The accuracy of the curves can be checked from time to time and, if necessary, a new graph can be easily drawn up to correct any errors. A similar graph may be prepared for the medium-wave band if desired—note, however, that m.w. stations are not separated by 5kHz but 9kHz in Europe and 10kHz in other areas.

Conditions on 25 and 21MHz

(Note: Frequencies in MHz: Times in UTC = GMT)

There has been no reported reception of signals on the 25MHz (11m) band, which is not altogether surprising since we are at the bottom of the sunspot cycle now—see "On the Air", *PW* March '86.

The 21MHz (13m) band has permitted reception from some areas during daylight in the UK but usually closes by sunset.

Radio Moscow is a regular inhabitant of this band on 21·475 and **Philip Rambaut** of Macclesfield, Cheshire has noted them transmitting to Asia at 1130. UAE Radio Dubai is another regular broadcaster using the band and **Ron Pearce** of Bungay, Suffolk says they have been testing on a new frequency of 21·602 and require reports. His receiver is a new Trio R600 which is coupled to a dipole antenna.

Writing from Malaysia, **Ghazalie Abdullah** of Kuala Lumpur reports that Radio Nederlands is a good signal there at 0830 via their Madagascar relay transmitter on 21·485, which beams to Asia at this time. His well-equipped receiving station, shown in Fig. 3, consists of a Trio R2000 and National Panasonic RF3100 receiver along with ancillary recording equipment. Other consistent signals there are UAE Radio Dubai, 21·700 at 0545 and Radio Prague, Czechoslovakia 21·705 at 0750.

From "down under" **John Ratcliffe** of Southport, Queensland, Australia says "I heard the BBC World Service with a very strong signal for the first time on 13m on December 29 at 0715"—I presume this was from the BBC Masirah Island, Oman relay station on 21·550, which beams to Australia at that time. The BBC Ascension Island relay station on 21·660 was received by **Andy Kennedy** of Leicester at 1115 and a BBC UK based transmitter was logged on 21·710. Tuning around the band, Andy also heard Vatican Radio 21·485 at 1102, transmitting in French; Radio Moscow transmitting to Pakistan 21·475 at 1113 and Radio France International 21·620, beaming to Africa with French at 1111.

A "newcomer" to DXing, **Mat Jusoh** of Selangor, Malaysia, has a Sony ICF 600D receiver. Radio Moscow 21·475; Radio Nederlands via Madagascar 21·485 at 1130; Radio Moscow 21·505 at 1100; Radio Exterior de Espana 21·570, in Spanish, at 1030 and AFRTS on 21·670 via Tinang, Philippines are some of his first DX on this band.

The 17 and 15MHz Bands

Signals from several continents may be received on the 17MHz (16m) band during daylight. By dusk, signals quickly deteriorate and, soon after this, the band closes in the UK.

All India Radio is just one of the interesting signals broadcasting on 17MHz and was noted by **Roy Spencer** of Nuneaton, Warwickshire on 17·875 at 1030—they have a programme called *Focus* at about this time. Roy uses a DX400 receiver in conjunction with four switchable wire antennas about 5m long. He received a News broadcast in English at 1030 from UAE, Radio Dubai, on 17·775, which **Andrew Hill** of Cheslyn Hay, Staffs finds to be an excellent news service but prefers their 17·830 transmission at this time.

Bob Taylor of Edinburgh has been listening to Radio Pakistan on 17·660. They have a dictation-speed news broadcast in English at 1100. Bob says—"I am still amazed at reception from far-away stations using just the whip antenna on my Toshiba RP-F11L receiver". Radio Cairo 17·675 was also noted in his log at 1215.

Although the Radio Nederlands Madagascar transmitter is beamed to Asia at 1130 on 17·575 (and is a good signal, according to Mat Jusoh in Malaysia) Andy Kennedy and Philip Rambaut have been hearing it in the UK. Andy also received Radio Deutsche Welle, Cologne, via their Kigali, Rwanda transmitter on 17·800 at 1230. **Simon Hamer** of New Radnor, Wales logged Radio Australia transmitting to Asia on 17·715—this can be heard on some days in the UK at 0830.

In Malaysia, Ghazaile Abdullah has logged Radio Prague, Czechoslovakia at 0730 on 17·840 with News and Radio Berlin International on 17·880 at 1330: Mat Jusoh heard Radio Moscow on 17·645 at 1100, Radio Cairo on 17·675 at 1215 and the BBC World Service on 17·790.

The Voice of Turkey, 17·885 is noted in the log of **Mustag Ahmed** of Oslo, Norway at 1330. He has been s.w.l.ing for 15 years and uses an Icom R71E receiver plus dipole antenna on 17MHz.

Using a Vega receiver with a 20m inverted "L" antenna, **Jonathan Kempster** of London has been hearing Radio RSA, Johannesburg on 17·780—listen for their programme *Africa Today* at 1400 in English. He also listened to RCI Montreal, Canada 17·820, which beams to Europe at 1537.

Despite the poor conditions, many interesting signals can be received on 15MHz (19m) during the day from several continents.

Stations to look for in the early morning include KYOI Saipan, N. Mariana Islands 15·190 from 0600; Africa No. 1 Gabon 15·200 around 0700; KTWR Agana, Guam 15·115 from 0715; Voice of Nigeria

Fig. 2 ▲

Fig. 3 ▼

15·120 at 0730 and Radio Japan, via their Moyabi, Gabon relay transmitter, 15·400 at 0700—all noted in Andy Kennedy's log.

Later **Margaret Sadler** of Leeds has been listening to Radio Pakistan with a transmission to Europe on 15·605 at 1100. **Leslie Biss** of Knaresborough has recently purchased a Trio R600 receiver, he logged VOIRI Tehran, Iran, transmitting in Farsi on 15·084 at 1140 and The Voice of Turkey, 15·220 at 1200 with a general service for Turks abroad.

Ted Tew of Northallerton, Yorkshire has received a QSL from UAE Radio Dubai —listen on 15·320 for their news in English.

Roy Spencer has been listening to AFRTS from their Greenville, USA transmitter, 15·430 at 1440 and to WYFR on 15·566 at 1600—this station also uses 15·440 at this time. Philip Rambaut has pointed out that although the WYFR studios are in Oakland, California their US based transmitters are at Okeechobee, Florida. Roy has also been hearing VOA via their Tinang, Philippines transmitter on 15·445 at 1703.

Fred Pallant G3RNM of Storrington, Sussex has been monitoring the signal from Africa No. 1 Gabon. He says—"Some days it is possible to listen continuously from mid-day on 15·200, changing to 15·475 at 1700, until about 1830 when the signal fades out. However, on one or two occasions it has reappeared between 2030 and 2100—can anyone explain the reason for this?"

RCI Montreal, Canada broadcast direct to Europe on 15·325 at 1537 but Leslie Biss has been receiving them via relay in Sines, Portugal on 15·315 at this time. Later, **Alan Merritt** of Abingdon has logged them on 15·325 at 1900 but noted that the signal was poor and faded out after five minutes.

Conditions, as late as this, are better towards S. America. **Peter Mills** of Sherborne, Dorset listened to a DX programme at 1850 from RAE Buenos Aires, Argentina on 15·345. Philip Rambaut received Radio Nacional de Amazonia, Brazil on a new frequency of 15·390 at 1800. To his surprise, **Stuart Brooks** of Carluke, Scotland heard Radio Inconfidencia, Brazil on 15·190 as late as 2200!

The transmitter power of HCJB Quito, Ecuador on 15·270 has been increased to 250kW in an effort to improve reception. (The 17·790 transmitter is now 100kW—was 250kW.). My thanks to Leslie Biss for this information, which he obtained from their agents in Yorkshire.

The 13MHz Band

A number of broadcasters are using the 13MHz (22m) band, including Radio Moscow, transmitting to Europe from 0700 on 13·705; Radio Baghdad 13·700, in Arabic to Europe from 0400 until 1000; Radio Bangladesh 13·670 broadcasting at 1600 to the Middle East in Arabic and Bengali; and Radio Prague, Czechoslovakia beaming to Africa on 13·605 with English, Arabic and French.

The 11, 9, 7 and 6MHz Bands

These bands are the main centre of s.w. activity due to the poorer conditions on the higher frequencies. Signals from all continents may be heard at some time during the day or at night.

The happy look on the face of **Graham Powell** of Pontypridd, pictured at his receiver in Fig. 2, is due, no doubt, to being the first to report reception of Radio New Zealand!

Graham says, "While tuning around on December 9 I heard English on 9·600 at 0859 and was expecting the announcer to say 'This is London', when he said 'Radio New Zealand—it's ten o'clock'. I managed to hear the news and a political report before TWR signed on at 0923". He has now received their QSL card—which took only 14 days to arrive—to prove it! I am sure all readers will want to join me in congratulating you, Graham. Two other s.w.l.s have reported hearing Radio New Zealand on 9·600—Peter Mills at 1342 on December 14 and Ron Pearce at 0850 on January 14, 15 and 16. Congratulations to them both!

Andrew Hill enjoys *Media Network*, a programme broadcast every Thursday by Radio Nederlands on 5·955 at 1430. Andrew sent along an interesting map of VOA relay stations, which may be available from the US Embassy, London. Signals from a VOA relay transmitter in Tangier, Morocco 11·760 were received at 1815 by **John Snooks** of Andover, Hants. Radio Sophia, Bulgaria 11·720 at 2305; TWR Monte-Carlo, Monaco 9·495 at 0910; Voice of Turkey 9·560 at 2325 and RAE, Buenos Aries, Argentina 9·690 at 0154 were all received with his National Panasonic RF3100 receiver, using just the whip antenna!

James Sneddon of Motherwell, Scotland has been hearing SRI Berne, Switzerland, who broadcast *Swiss Shortwave Merry-Go-Round* for DXers on Saturdays.

A programme about Culture and Art broadcast by the Voice of Turkey in Ankara 7·215 was listened to by **Derek Thomley** of Birmingham at 2100. Using a DX400 receiver and long wire antenna, Radio Kuwait 11·675 at 2030 and Radio RSA Johannesburg 11·900 at 2100 were also received. **John Parry G4AKX** of Northwich, Cheshire logged HCJB Quito, Ecuador 6·130 at 0900 and News in English from the Voice of Lebanon 6·550 at 1700. Radio Cairo, Egypt 9·805 was heard by **Julian Wood** of Buckie, Scotland at 2216. **John Sadler** of Bishops Stortford, Herts also uses a DX400 receiver but with a whip antenna, he logged Radio Bangladesh on 7·490 at 1815; Radio Afghanistan 5·900 (via USSR) at 1900 and RCI Montreal, Canada 11·945 which beams to Europe at 2000.

A new station—World Harvest Radio, USA—noted by **David King** of Plymouth, Devon beams to Europe at 2000 on 9·770 and no doubt will welcome reports. David also mentioned The Voice of Free China, Taipei, Taiwan, relayed via Okeechobee, Florida—look for this one on 9·852 at 2110.

Radio Beijing, China, which broadcasts to Europe on 6·860 and 7·590 at 1900, was visited by **Douglas Byrne G3KPO** of Ryde IOW, recently. He achieved three lifelong ambitions—to walk on the Great Wall, to see the fabulous city where the emperors lived and actually to broadcast from Radio Beijing—when he talked about the beauties of the Isle of Wight.

The 5, 4, 3 and 2MHz Bands

Hunting ground of the keen DXer, these bands have produced some interesting signals and **Michael Sargeant** of Bolton, Lancs has logged All India Radio on 3·365 and 4·860; Radio Yaounde, Cameroon 4·850; FRCN Kaduna 4·770 and Lagos 4·990 and Radio Garoua, Cameroon 5·010, using an AD370 active antenna with his Panasonic DR49 receiver. All India Radio was also received on 3·365, 3·905, 3·925 and 4·860 by **George Morley** of Redhill, Surrey. Yunnan PBS. Kunming 4·760 and Tanzania 5·050 were also noted in his log.

"Old Timer" **Bill Kelly** of Belfast found Radio RSA on 3·230 at 0315 and Simon Hamer heard it too. His log included Radio Capital, Transkei 3·930; SLBC Sri-Lanka 4·902 and GBC Accra, Ghana 4·915. Another dedicated DXer, **Tim Shirley** of Bristol, mentioned Malawi BC 3·380; ELWA Liberia 4·760 and Radio Botswana, Gaborone 4·820 in his extensive log. Philip Rambaut tuned these bands to find Radio Mali, Bamako 4·783 and 4·835; TWR Manzini, Swaziland 4·775; Sana Yemen AR 4·853 and Radio National, Chad 4·905.

Using a tape recorder, as suggested in "Newcomer SWL", February 1986 *PW*, Derek Thomley identified Burkina Fasso as Ouagadougou on 4·815, Margaret Sadler logged it, too, and added Kalinin, USSR 4·860; ORTB Cotonou, Benin 4·870; ORTS Senegal 4·890; Conakry, Guinea 4·910 and Radio Malaysia, Sarawak 5·005 to her growing DX list!

EDXC—86 Conference

The 20th Annual Conference of the **European DX Council** will be held in Paris, France between 16–19 May 1986.

Station Addresses

Egyptian Broadcasting Corporation: External Services, P.O. Box 566, Cairo, Egypt.

FEBC Radio International: Box One, Valenzuela, Metro Manila, Philippines.

Radio Habana Cuba: Apartado No. 7026, Habana, Cuba.

Did You Know . . . Eric Westman

That Holland was the first country to have regular broadcasts?

During the Trade Fair at Utrecht in the Netherlands, early in 1919, the Philips company of Eindhoven gave demonstrations of wireless telephony. Thereafter, a regular programme of transmissions of speech and music was broadcast every Sunday evening at seven o'clock. These were received with enthusiasm by listeners in Britain and elsewhere in Europe, and were instrumental in creating a demand for broadcasting in this country. So popular in Britain were these "Hague Concerts", as they were known, that British citizens financed them for a time with contributions from the *Daily Mail* newspaper and as the result of an appeal by a British wireless magazine. The broadcasts, from station PCGG, continued until after the newly-formed British Broadcasting Company had commenced operations in Britain.

Telecommunications Engineering Technicians

Openings in Servicing and Maintenance Up to £9,317

Our business is to install and maintain the communications equipment used by the Police and Fire Brigades in England and Wales – some of the latest you will find in operation anywhere.

We have a number of vacancies at our Service Centres in various parts of the country for Telecommunications Engineering Technicians with practical skills in locating and diagnosing faults in a wide range of radio equipment including AM, FM and computer based data transmission systems.

The work provides excellent opportunities for extending your technical expertise, with specialised courses and training to keep you up to date on developments and new equipment. There are also opportunities for day release to gain higher qualifications.

Applicants, male or female, must be qualified to at least City & Guilds Intermediate Telecommunications standard and possess a current driving licence.

Some travelling will normally be involved.

Registered disabled persons can of course apply.

The Home Office is an equal opportunities employer.

Salary will be on a scale £6,810 to £9,317 a year with generous leave allowance and pension scheme. Starting salary may be above the minimum and relocation expenses may be payable for some of the posts.

Good prospects for promotion.

If you are interested in working with us, please write for further details and application forms quoting reference PW/1 to: Miss M Andrews, Home Office, Directorate of Telecommunications, Horseferry House, Dean Ryle Street, London SW1P 2AW.

Home Office

Directorate of Telecommunications

Receivers and Components

SWL & DXING PRODUCTS. SAE details please: D. J. Stanton (Radio), 16 Addison Road, Worcester WR3 8EA.

RADIO CANADA, Peking, Australia, Voice of America. A Vega 206 (6× SW/MW/LW) pulls these and dozens more. £24.95. "Good buy" Practical Wireless. Year's guarantee. Return despatch. CORRIGAN-RADIOWATCH, Building 109, Prestwick Airport, KA9 2RT.

MAXI - Q
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

PRACTICAL WIRELESS KITS

RTTY/morse modem	Jan '86	£35.85
Crystal calibrator	Jan '86	£19.95
Two tone oscillator excl. mic plug	Dec '85	£22.45
Capacitance Meter	Oct. '85	£23.90
DIP Oscillator	Oct. '85	£19.90
Meon 50mHz Transverter	Oct. '85	£49.50 + £1.50 p&p
U.H.F. Prescaler	Sept. '85	£24.95

All kits complete (less batteries) unless specified, including all components, PCB (or Veroi), case & hardware. All components are new/full spec.

P.W. PROJECT COMPONENTS

RA53 Thermistor	£4.95
LM566	£1.25
12V Relay-Meon (RS type)	£2.95
22mHz Crystal-Meon	£7.95
180uH Choke-Meon	£0.49
Coil Formers-Meon per 3	£2.95
Cermet Multiturn Pots ¾"	£0.85
(All R.S. components available)	

Please add 70p postage unless specified. **Do not add VAT.** Cheque or Postal Order to:
C.P.L. ELECTRONICS
8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE.
Tel: 0642-591157
Kits available for other magazine projects, plus components etc. Write or 'phone for Free Price List.

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 freq markers *£12.50*.
FILTERS Crystal, monolithic, mechanical and ceramic for all standard IF's. Special 10.695MHz for big improvement to most CB rigs 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

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. Treasury notes should always be sent registered post. Advertisements, together with remittance should be sent to the Classified Advertisement Dept., Practical Wireless, Enefco House, The Quay, Poole, Dorset.

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.

Receivers and Components Cont.

SCANNERS, BEARCAT 220 £150. Fairmate £80. Rochdale 45424 evenings.

VINTAGE VALVES, SPARES, RECEIVERS for sale. 32 Cefn-y-Bryn, Llandudno, LL30 1NH.

SCANNERS
The interesting stuff is often on when you are not. This simple mod for AOR scanners activates your recorder when station breaks squelch. Instructions and parts etc. **£8.50**
Villiger
26 Gardner Road
Portslade
Sussex
BN4 1PL **0273 412108**

ESR 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.

JAYCEE ELECTRONICS
JOHN GM30PW
20 Woodside Way, Glenrothes, Fife KY7 5DF
Tel: 0592 756962
Open: Tues-Sat 9-5
Quality secondhand equipment in stock. Full range of TRIO goodies. Jaybeam – Microwave Modules – LAR.

Books and Publications

DIAL-SEARCH 4th Edition (1986/87) now available: handy 52 page booklet giving all essentials for listening to European and British broadcasts. Clear listings MW, LW, selection VHF & SW; signature tunes, superb maps. £3.30 including postage; abroad £3.50 or 15 IRCs. WILCOX (PW1), 9 Thurrock Close, Eastbourne BN20 9NF.

For Sale

AMATEUR RADIO EQUIPMENT bought, sold, exchanged. Contact DAVE G3RCQ. Tel. Hornchurch (040-24) 55733 evenings 6-9pm Prestel MBX 402455733 or send S.A.E. for current list: G3RCQ, 65 Cecil Avenue, Hornchurch, Essex RM11.

PANASONIC DR31 LF/MF/HF/FN receiver, digital display, excellent condition. £60. Located Cumbria. (0448) 61052.

Personal

CHRISTIAN SINGLES. – Friendship Contacts. Social Events. Fellowship. Holidays. C.F.F., DT/B89, Edenthorpe, Doncaster.

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. JX16, Tuition House, London, SW19 4DS. Tel. 01-947 7272 (9am-5pm) or use our 24hr Recordacall Service: 01-946 1102 quoting Dept. JX16.

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.

ORDER FORM PLEASE WRITE IN BLOCK CAPITALS
Please insert the advertisement below in the next available issue of Practical Wireless for ..... insertions. I enclose Cheque/P.O. for £ ..... CAT. heading .....
(Cheques and Postal Orders should be made payable to Practical Wireless)

NAME .....

ADDRESS .....

.....

PRACTICAL WIRELESS
Classified Advertisement Department, Enefco House, The Quay, Poole, Dorset.
Rate **40p** per word, minimum 12 words.
Box No. **60p** extra.
PLEASE ADD 15% VAT TO TOTAL

Company registered in England. Registered No. 1980539. Registered Office: Towngate House, 2 Parkstone Road, Poole, Dorset, BH15 2PJ. 4/86

Service Sheets

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

Veteran & Vintage

EARLY WIRELESS SETS FOR SALE. Crystal sets, bakerlite radios. S.A.E. plus 50p for list: 312 Carterhatch Lane, Enfield, Middlesex.

Software

J.E.P. ELECTRONICS

MORSE READER PROGRAMMES Spectrum Dragon VIC 20 Atari 600/800×1 MSX Computers BBC B CBM64 ZX81(16K) Amstrad 464. Sinclair computers require NO interface, others use simple one transistor (BC107) device. Programmes self tracking 8/30 WPM. All connections to existing sockets. Cassette with full instructions and interface circuit (where required) **£6** inc. P&P. Interface built and tested **£2** inc. P&P. **MORSE TRANSCEIVE:** For your 48K Spectrum a full CW transceive Programme. Full type ahead facility, even while receiving. Pre-programmable memories can be called at any time. Lock the sending speed to the received speed, or choose your own. Self tracking 8/30 WPM. On HF bands a suitable filter will improve reception. Programme on cassette with instructions and filter circuit **£8.50** inc. P&P. Ready built filters, see below. **RTTY TRANSCEIVE:** For the 48K Spectrum. Menu driven, 10 programmable memories, split screen, morse ident, 4 Baud rates etc. etc. **No Terminal Unit**, just a filter unit. Cassette with instructions and filter circuit **£8.50** (See below for ready built filters). **FILTER UNITS: RTTY ONLY** Built, tested and fitted with leads (no plugs). **£6. CW ONLY** Built, tested and fitted with leads (no plugs). **£7. RTTY/CW** Switchable, dual purpose filter, supplied boxed and fitted with plugs to fit your Spectrum. **£11.50. RTTY/CW SUPER** Specification as above but with addition of LED circuit for perfect tuning. **£13.50. BASE TERMINAL UNIT** CW-RTTY (170 & 850Hz shifts) **Outputs:**- Audio, TTL, reverse TTL, open collector (normal & reverse) requires 12-15V supply. SAE brings full spec. **£45.** With the exception of the last unit the filters require a nine volt supply. Battery clips are fitted. Battery not supplied. SAE please for full details of any or all of our goods. All goods despatched same day by first class post (overseas add £1.00 for airmail). **J.E.P. Electronics, New Road Complex, Kidderminster, DY10 1AL. Phone (0562) 753893**

Miscellaneous

G2VF D.I.Y. H.F. long and medium wave loop antennas. SAE for details: F. RYLANDS, 39 Parkside Avenue, Millbrook, Southampton.

BURGLAR ALARM EQUIPMENT. Ring Bradford (0274) 308920 for our catalogue or call at our large showrooms opposite Odsal Stadium.

HEATHKIT U.K. Spares and Serviceable Centre. CEDAR ELECTRONICS, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Tel. (0684) 73127.

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.

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, Lancaster LA2 6LT.

CASES, 19" rack and free standing from £12.00. NEWRAD, Wick Ind. Est., New Milton, Hants. Tel. 621195.

QSL CARDS. Gloss or tinted cards. SAE for samples to: TWROG PRESS, Dept PW, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd.

INDEX TO ADVERTISERS

★ BAKER ★

GROUP P.A. DISCO AMPLIFIERS post £2

150 watt Output, 4 input Mixer pre-amp. Illustrated **£99**
150 watt Output, Slave 500 mv. Input 3 Speaker Outputs **£80**
150+150 watt Stereo, 300 watt Mono Slave 500 mv. Inputs **£125**
150 watt P.A. Vocal, 8 inputs. High/Low Mixer Echo Socket **£129**
60 watt Mobile 240v AC and 12v DC. 4-8-16 ohm+100v line **£89**
Reverb Unit for Microphone or Musical Instruments **£35** PP £1.
Electronic Echo Machine for mic/etc **£85. Ditto** Deluxe **£95** PP £1.
30 Watt COMBI, 12in. Speaker, Treble, Bass etc. **£95** PP £5.

FAMOUS LOUDSPEAKERS — FULLY GUARANTEED

Make	Model	Size	Watts	Ohms	Price	Post
AUDAX	WOOFER	5½in.	25	8	**£10.50**	£1
GOODMANS	HIFAX	7½×4¼in	100	8	**£34**	£2
GOODMANS	HB WOOFER	8in.	60	8	**£14**	£1
GOODMANS	"402"	12in.	60	15	**£30**	£2
BAKER	WOOFER	12in.	80	8	**£25**	£2
GOODMANS	DISCO/GROUP	12in.	120	8/15	**£36**	£2
BAKER	DISCO/GROUP	15in.	100	8/16	**£39**	£4
H+H	DISCO/GROUP	15in.	100	4/8/16	**£49**	£4
GOODMANS	HP/BASS	15in.	250	8	**£74**	£4
GOODMANS	HPD/BASS	18in.	230	8	**£87**	£4

COMPACT FULL RANGE SPEAKER SYSTEMS size 24×17×12in
100 watts **£90,** 200 watts **£100,** 400 watts **£150** each. Carr £12.
MID-N-TOP 300 watts add on system complete **£125.** Carr £12.

DISCO CONSOLE Twin Decks, mixer pre amp **£145.** Carr £10.
Ditto Powered 120 watt **£199;** or Complete Disco **£300.** Carr £30.

MAINS TRANSFORMERS — Price Post
250-0-250V 80mA. 6.3V 3.5A. 6.3V 1A. **£7.00** £2
350-0-350V 250mA. 6.3V 6A CT **£12.00** £2
220V 25mA. 6V 1 Amp **£3.00** 220V 45mA. 6V 2 Amp **£4.00** £1
LOW VOLTAGE TAPPED OUTPUTS AVAILABLE
1 amp 6, 8, 10, 12, 16, 18, 20, 24, 30, 36, 40, 48, 60 **£6.00** £2
ditto 2 amp **£10.50** 3 amp **£12.50** 5 amp **£16.00** £2
31-26-0-26-31 volt 6 amp **£14.00** £2
LOW VOLTAGE MAINS TRANSFORMERS £5.50 each post paid
9V, 3A; 12V, 3A; 16V, 2A; 20V, 1A; 30V, 1½A; 30V, 5A+ 17-0-17V, 2A; 35V, 2A; 20-40-60V, 1A; 12-0-12V, 2A; 20-0-20V, 1A.

PANEL METERS 50μA, 100μA, 500μA, 1mA, 5mA, 100mA, 500mA, 1 amp, 2 amp, 5 amp, 25 volt, VU 2¾×2×1¼in. **£5.50** post 50p
MINI MULTI TESTER Volts AC-DC, ohms, milliamps **£8.50**
DELUXE RANGE DOUBLER METER 50K O.P.V. £25.00 PP £1
7 × 5 × 2in Ohms 20meg, volts 0.25, 1000, current 50ua. 10a.

PROJECT CASES. Black Vinyl Covered Steel Top, Ali Base
4 × 2½ × 2¼in. **£2.50;** 6 × 4 × 1½in. **£3.60;** 8 × 5 × 2in. **£4.00;** 11 × 6 × 3in. **£5.50;** 11¾ × 6 × 5in. **£9.00;** 15 × 8 × 4in. **£12.00.**
ALUMINIUM PANELS 18 s.w.g. 12 × 12in. **£1.80;** 14 × 9in. **£1.75;** 6 × 4in. **55p;** 12 × 8in. **£1.30;** 10 × 7in. **96p;** 8 × 6in. **90p;** 14 × 3in. **72p;** 12 × 5in. **90p;** 16 × 10in. **£2.10;** 16 × 6in. **£1.30.**
ALUMINIUM BOXES. MANY OTHER SIZES IN STOCK.
4 × 2½ × 2in. **£1.20;** 3 × 2 × 1in. **£1;** 6 × 4 × 2in. **£1.90;** 8 × 6 × 3 **£3.00;** 12 × 5 × 3in. **£3.60;** 6 × 4 × 3in. **£2.20;** 10 × 7 × **£3.60.**

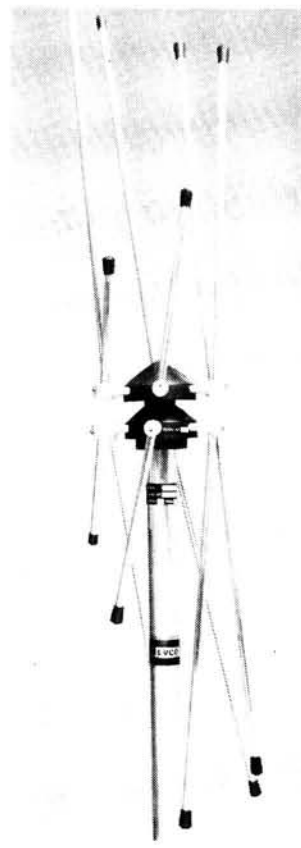
HIGH VOLTAGE ELECTROLYTICS

16/450V	50p	220/400V	£2	32+32/500V	£2
20/500V	75p	8+8/450V	85p	32+32/350V	85p
32/350V	45p	16+16/350V	75p	16+32+32/500V	£2
47/350V	75p	20+20/350V	75p		

GEARED TWIN GANGS 365 + 365 + 25 + 25pf **£2.00.**
REVERSE VERNIER cord drive **90p.** Spindle Extender **£1.50.**
VERNIER DIALS, 0:100, 36mm, **£2.50,** 50mm, **£3.00.**

RADIO COMPONENT SPECIALISTS
Dept 4, 337, WHITEHORSE ROAD, CROYDON
ACCESS **SURREY, U.K. Tel: 01-684 1665** VISA
Post 65p Minimum. Callers Welcome.
Large S.A.E. **Delivery 7 days** Closed Wednesday

REVCO



A BREAKTHROUGH IN WIDE BAND ANTENNA TECHNOLOGY

The new Radac® series from Revco offers a very much improved performance over existing Discone and other type configurations. Produced after concentrated development, wide band performance is available in a very compact form. Primarily designed for omni-directional monitoring applications, these antennas can also be used over the entire band for transmitting purposes. Quality engineered to meet professional, military and amateur applications. Special and higher frequency versions will be available.

MODEL 2045
General coverage monitor.
100-480 MHz. with option 25-100 MHZ.

MODEL 2046
Amateur Bands TX Version.
430-147-145-70-50-28 MHz

PRICE: £58 + carriage + V.A.T.
Total £69.90

REVCO ELECTRONICS LTD.,
Poundwell Street,
Modbury, S. Devon PL21 0RQ.
Tel: 0548 830665
Telex: 8954665 VBSTLX G REL

Also from:
Garex Electronics, Lowe Electronics, A.R.E.

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)

ESSEX

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

2 Stanley Road
Herne Bay, Kent
CT6 5SH
Tel: 0227 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 or 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

INTRUDER ALARM UNITS light activated comprises light detector with photo diode & scr. Control unit mains operated with int 6v Nic Cad battery & charger, test buzzer, test & reset swts, mains ind. as sks for two I/Ps and one O/P to operate 12v two tone siren supplied. Were intended to be operated/activated by flash cube but will work from torch or sim, new unused with leads, £19.50. **ROTARY INV** aircraft type I/P 18v DC O/P 230v AC at 180 watts 50c/s sine wave approx 18 amps I/P for full load, new, £45. **METERS** 240 Deg 1 Ma, scale 0 to 8×100 3¼" sq, £12.50, also DC 0/10 amps 2½" dia, £4.50, DC 0/25 amps proj mt 3½", £8.50, DC 100 Ua scale 0/100 3×2¼", £5.50, all new. **DIODES** stud type 200 PIV 20 amps, 4 for £4.50. **VARIACS** for 240v, O/P var 0 to 270 at 8 amps or 2Kw max for internal mounting, £35. **HAND GENERATORS** Army type provide O/P for charging 12v batteries est 3 amps with O/P ind tree clamp, handles, carrying bag, cable, new, unused, £45. **ULTRA L.B. Rts.** 70/90 Mc/old type, solid state, dash mt, 4 chan AM, size 12×7×4½, est 3 watts 12v ext, soiled cases, most have mikes, £18. **AUDIO OSC.** Advanced gen purp osc 15c/s to 50Kc sine wave var o/p into 5 or 600 ohm mains tested, £33. **MOTOR** 6/24v DC with int gearbox 60 RPM at 24v size 2½×1½×1½", £4.50. **TAPE RECORDERS** 2 chan 3 speed ¼ track with mon spk in wood carrying case for 240v with headset with boom mike, tape circ & inst, £29, or Rec only £19. **ARMY RECT. 7** 240v AC or 12v DC I/P gives 80-0-80v DC at 30Ma, will also give 240v AC at approx 40 watts from 12v DC I/P, in wood case with lid, £10.50. **ROTARY SWTS** 2p 10 way ceramic, 2 for £2.50. **PYE PF.1 Rx.** nom 450Mc/s FM req 9v batt with circ, £6.50. **C.R.T.** DG-7-32 gen purpose 2¾" dia tube green trace with connec, £14. **TAPE REC.** Fi.Cord miniature battery operated reel to reel, 2 speed ½ track ¼" tape, req two supplies of 7/12v DC supplied with tape, mike, carrying case, inst etc, £65. **PHOTO TEST UNIT** Reflec Densitom, contains two lens units with adjustable light source mains trans etc, £25. **CONDS** block paper 8uf 1500v size 5×4×5", two for £10 also 4uf 1500v at £3.50ea. **BRIDGES** Services type CT492 general purpose CRL bridge meter indication, battery operated, £85. **VOLTAGES REGULATORS** Claude Lyons mains voltage stab nom 220v out at 30 amps, adjustable motor, variac type with transis control unit, tested, £85. **TAPE RECORDERS** Philips type Pro.12 reel to reel 3¾/7½" two chan int mon amp, 7" spools, mains operated, modern professional recorder in good cond tested, £135. **For callers** Army lead acid batteries 12v 75 A/Hr, £18 new or £11.50 S/Hand.

Above prices inc. 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.
Phone: (0742) 444278.

VALVES

*SPECIAL QUALITY

Prices are as at going to press but may fluctuate. Please phone for firm quotation

1A3	1.40	6AH6	1.15	6C6	1.20	6J6W	2.80	9D6	2.90	20D1	0.80
1L4	0.80	6AK5	0.65	6CH6	8.20	6JE6C	5.90	11E2	19.50	20E1	1.30
1R5	0.80	6AK8	0.60	6CL6	2.75	6JS6C	6.40	12A6	1.00	20P1	0.65
1S4	0.65	6AL5	0.60	6CW4	8.50	6K7	1.45	12AT6	0.70	25L6GT	1.60
1S5	0.65	6ALSW	0.85	6CX8B	4.60	6KD8	5.50	12AT7	0.85	25Z4G	0.75
1T4	0.65	6AM5	4.20	6CY5	1.15	6KD6	6.50	12AU7	0.60	35W4	0.80
1U4	0.80	6AM6	1.50	6D6	1.50	6L6M	4.60	12AUB	0.95	85A2	1.40/2.55*
1X2B	1.40	6AN8A	2.50	6F6	1.60	6L6GC	3.70	12AX7	0.75	807	1.60/2.40*
2X2A	2.50	6AQ4	4.40	6F6GB	1.10	6L6GT	1.95	12BA6	0.90	812A	44.80
3A4	0.70	6AQ5	1.30	6F7	2.80	6L18	0.70	12BE6	1.25	813	28.50/68.50*
3AT2	3.40	6AQ5W	2.20	6F8G	0.85	6LD20	0.70	12BH7	3.45	829B	24.00
3B28	12.00	6AS6	1.15	6F12	1.50	6LD6	5.90	12E1	18.95	832A	8.90
	19.50*	6AS7G	4.99	6F14	1.15	6Q7G	1.30	12J5GT	0.55	866A	5.05
3D6	0.60	6AT6	0.90	6F15	1.30	6SA7	1.80	12K7GT	0.70	866E	9.80
3E29	19.00	6AU6	1.25	6F17	3.20	6SG7	1.80	12K8GT	0.80	931A	19.80
3S4	0.70	6AV6	1.25	6F23	0.75	6SJ7	1.80	12Q7GT	0.60	954	1.20
4B32	18.25	6AX4GT	1.30	6F24	1.75	6SK7	1.40	12SC7	0.65	955	1.20
5R4GY	2.20	6AX5GT	1.30	6F33	10.50	6SL7GT	0.85	12SH7	0.65	956	1.20
5U4G	1.40	6BA6	0.70/1.20†	6FH8	17.80	6SN7GT	1.00	12SJ7	0.70	5763	5.75
5V4G	0.75	6B48	3.45	6GA8	1.55	6SQ7	0.95	12SQ7	0.45	6060	1.55
5Y3GT	0.95	6BE6	0.65/120*	6GH8A	1.95	6SR7	4.60	12S7GT	0.85	6080	7.30
5Z3	2.80	6BG6G	1.60	6H6	1.60	6V6G	1.50	12Y4	0.70	6201	5.20
5Z4G	1.25	6BJ6	1.30	6J10	5.85	6V6GT	1.30	13D3	2.80	6146	10.35
5Z4GT	1.45	6BQ7A	0.85	6J4	1.35	6X4	1.50	13D5	0.90	6146B	10.35
6/30L2	0.90	6BR7	2.00	6J4WA	2.00	6X5GT	0.65	19AQ5	0.85	8068	12.50
6AB7	0.70	6BW6	6.20	6J5	2.30	6Y6G	0.90	19G3	11.50	9001	0.95
6AC7	1.15	6BW7	1.80	6J5GT	0.90	6Z4	0.70	9D6	10.25	9002	0.95
6AG5	0.60	6C4	0.70	6J6	0.85	724	1.50	19H5	39.55	9003	0.95

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. Minimum 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' level subjects			☐

ICS

Name _____

Address _____ P. Code _____

International Correspondence Schools Dept EES46, 312/314 High St., Sutton, Surrey SM1 1PR. Tel: 01-643 9568 or 041-221 2926 (24hrs).

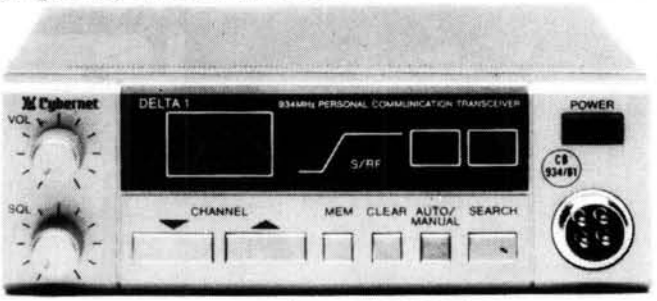
Published on the first Thursday of each month by PW Publishing Limited, Westover House, West Quay Road, Poole, Dorset BH15 1JG. Printed in England by Benham & Co Limited, Colchester, Essex. Distributed by COMAG, Tavistock Road, West Drayton, Middlesex UB7 7QE, telephone West Drayton 444055, Telex 8813787. Sole Agents for Australia and New Zealand – Gordon and Gotch (Asia) Ltd.; South Africa – Central News Agency Ltd. Subscriptions INLAND £13 and OVERSEAS (by surface mail) £15, payable to PRACTICAL WIRELESS, Subscription Department, Oakfield House, 35 Perrymount Road, Haywards Heath, West Sussex RH16 3DH. 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 advertising, literary or pictorial matter whatsoever.

934 MHz PERSONAL RADIO

The Nevada Range

Join the growing number of people discovering this exciting radio band.

934 MHz offers 2 way high quality communications from 10 - 250 miles (according to location/weather conditions).



THE CYBERNET DELTA 1 934 MHz TRANSCEIVER
Has been engineered specifically for the UK market using latest "state of the art" technology.

- Sensitive RX (0.25 μV for 12 db SINAD).
- 16 memories available.
- Auto/Manual scan and search facility.
- External 'S' meter socket.

£355
+£5 SPECIAL DELIVERY

POWER SPLITTER
Enables the co-phasing of any two similar 934 MHz antennas to give an additional 3 DB gain.
£24.50

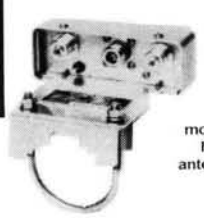
HRA 934 L IN-LINE GaAs FET PRE-AMP

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. 20 DB gain.
£125

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.

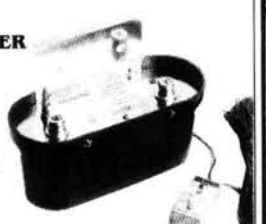
£89.95

REMOTE ANTENNA SWITCH



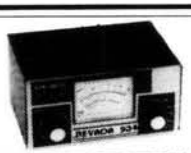
High quality weatherproof masthead mounting switch. For switching 2 antennas with one cable feed.
£59.95

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 received range of many sets.

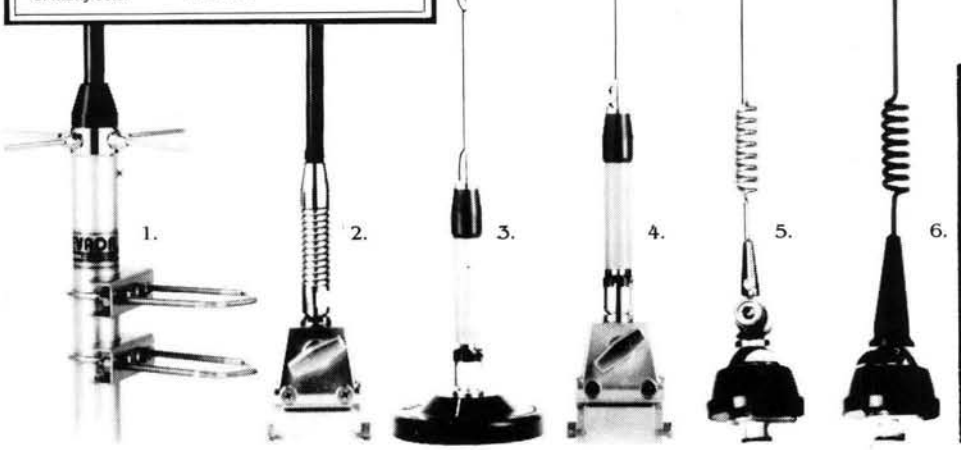


£139.95

HAS-2
Remote DC switch for mast head antenna switch
£6.95



WR 900 SWR/POWER METER
A low cost unit measuring power to 100 watts in three ranges.
£49.50



ANTENNAS
Manufactured to the highest possible specification.

1. **PA7-E BASE COLNEAR** — Gain 7.14 dBi stacked 5/8 array. **£66**
2. **P714-RE** — High gain gutter mount, mobile antenna. **£44**
3. **P7-ME** — High gain mobile magnetic mount antenna. **£44**
4. **P7-E** — High gain gutter mount mobile antenna. **£44**
5. **G900A** — Low profile, bolt thru mobile antenna. **£25**
6. **G900R** — Low profile bolt thru mobile antenna in black. **£25**
7. **Tc 12L MKII 12 ELEMENT BEAM** — A new aluminium version of our succesful 12 element loop quad. Gain: 18dBi. **£49**

NEVADA 934 *Professional Series*

ASK YOUR DEALER FOR MORE INFORMATION OR CONTACT US DIRECT.

Telecomms, 189 London Road, Portsmouth PO2 9AE. Tel: 0705 662145 Telex: 869107 TELCOM G

Nevada 934 MHz Catalogue with full details and specifications of the complete range is available from Telecomms £1.00.

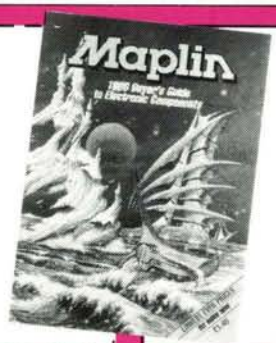
Lowest possible prices?
Top quality components?
Fast reliable service?
Large range?

Maplin . . . . . We've got it taped.

Pick up a copy of our new 1986 catalogue from any branch of W.H. Smith for just £1.45.
Or post this coupon now, to receive your copy by post for just £1.45 + 40p p & p. If you live outside the U.K. send £2.50 or 11 International Reply Coupons. I enclose £1.85.

Name .....
Address .....
.....
.....

PW 4/86



MAPLIN ELECTRONIC SUPPLIES LTD.
Mail Order: P.O. Box 3, Rayleigh, Essex SS6 8LR.
Telephone: Southend (0702) 552911

SHOPS
- BIRMINGHAM Lynton Square, Perry Barr, Tel: 021-356 7292.
- LONDON 159-161 King Street, Hammersmith, W6. Telephone: 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. Telephone: 0702-554000

Shops closed all day Monday.