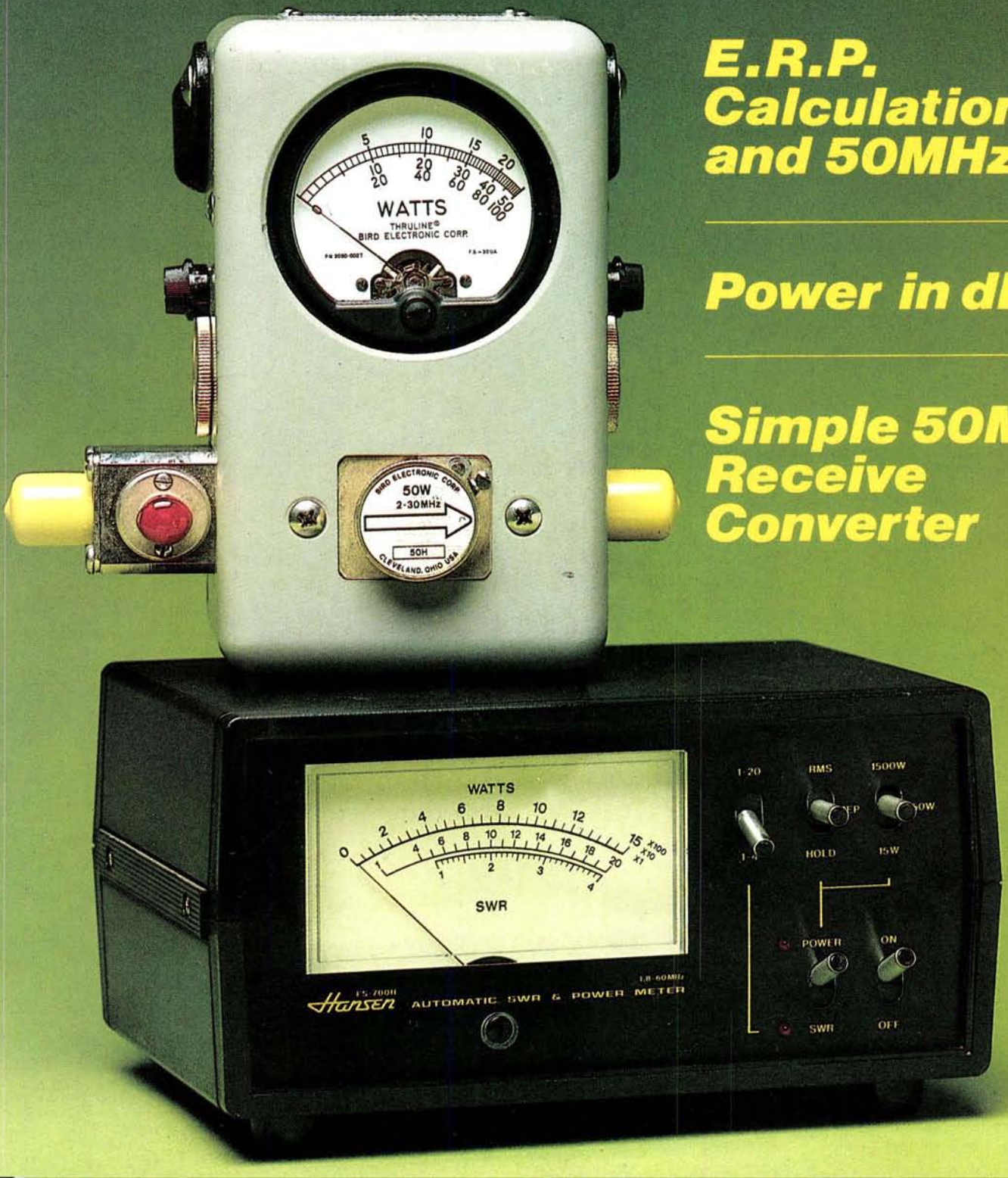
SEPTEMBER 1986 £1·10

Practical Wireless

The Radio Magazine



E.R.P. Calculations and 50MHz

Power in dBW

Simple 50MHz Receive Converter

Reg Ward & Co. Ltd.

1 Western Parade, West Street, Axminster, Devon, EX13 5NY.
Telephone: Axminster (0297) 34918

Yaesu

FT1	HF Transceiver	P.O.A.	(—)
FT980	HF Transceiver	1759.00	(—)
SP980	Speaker	86.09	(2.00)
FT757GX	HF Transceiver	879.00	(—)
FC757	Auto A.T.U.	318.00	(2.00)
FP757HD	Heavy Duty PSU	199.00	(2.00)
FP757GX	Switched Mode PSU	199.00	(2.00)
FT290	2m M/Mode Port/Transceiver	369.00	(—)
FT290	With Mutek front end fitted	399.00	(—)
FT690	6M M/M Portable Transceiver	289.00	(—)
FL2010	Linear Amplifier	79.00	(1.00)
MMB11	Mobile Bracket	33.00	(1.00)
NC11	Charger	10.00	(1.00)
CSC1	Carrying Case	6.50	(1.00)
YHA15	2m Helical	7.50	(1.00)
YHA44D	70cm ½wave	10.95	(1.00)
YM49	Speaker Mike	19.00	(1.00)
MMB15	Mobile Bracket	14.55	(1.00)
FT203R	NEW 2m H/Held/C/W FNB3	225.00	(—)
FT209R	NEW 2m H/Held/C/W FNB3	265.00	(—)
FT703R	70cm H/Held	255.00	(—)
FT709R	70cm H/Held	285.00	(—)
FT270R	2m 25W F.M.	359.00	(—)
FT270RH	2m 45W F.M.	399.00	(—)
FT2700R	2m/70cm/25W/25W	499.00	(—)
FRG 9600	60-905MHz Scanning RX	465.00	(—)
MMB10	Mobile Bracket	8.50	(1.00)
NC9C	Charger	9.60	(1.00)
PA3	Car Adaptor/Charger	18.00	(1.00)
FNB2	Spare Battery Pack	25.00	(1.00)
YM24A	Speaker Mike	27.00	(1.00)
FT726R	2m Base Station	899.00	(—)
430/726	70cm Module for above	255.00	(2.50)
FRG8800	HF Receiver	575.00	(—)
FRV8800	Convertor 118-175 for above	90.00	(1.50)
FRT7700RX	A.T.U.	53.50	(1.50)
MH1B8	Hand 600 8pin mic	17.50	(1.00)
MD1B8	Desk 600 8pin mic	75.00	(1.00)
MF1A3B	Boom mobile mic	23.00	(1.00)
YH77	Lightweight phones	17.50	(1.00)
YH55	Padded phones	17.50	(1.00)
YH1	L/weight Mobile H/set-Boom mic	17.00	(1.00)
SB1	PTT Switch Box 208/708	18.50	(1.00)
SB2	PTT Switch Box 290/790	16.00	(1.00)
SB10	PTT Switch Box 270/2700	18.50	(1.00)
QTR24D	World Time Clock	39.00	(1.00)
FF501DX	Low Pass Filter	33.00	(1.00)

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	249.00	(2.00)
HL 35V	2m, 3W in, 30W out	76.00	(2.00)
HL 20U	70cms, 3W in, 20W out	122.50	(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	36.50	(1.50)
SP122	1.8-60MHz PWR/SWR/PEP	85.00	(1.50)
SP220	1.8-200MHz PWR/SWR/PEP	59.99	(1.50)
SP225	1.8-200MHz PWR/SWR/PEP	109.95	(1.50)
SP420	140-525MHz PWR/SWR/PEP	71.00	(1.50)
SP425	140-525MHz PWR/SWR/PEP	109.95	(1.50)
SP825		165.00	(1.50)

TOYO

T430	144/432 120 W	52.50	(1.00)
T435	144/432 200 W	58.00	(1.50)

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

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	149.50	(4.00)
PS30	Systems p.s.u. 25A	343.85	(—)
SM6	Base microphone for 751/745	39.10	(1.00)
IC505	50MHz multi-mode portable	489.00	(—)
IC290D	2m 25w M/Mode	519.00	(—)
IC271E	2m 25w M/Mode Base Stn.	779.00	(—)
IC271H	100W version of above	979.00	(—)
IC27E	25W FM mobile	399.00	(—)
IC47E	25w 70cm FM mobile	595.00	(—)
ICBU1	B/U Supply for 25/45/290	31.05	(1.00)
ICR71	General Coverage Receiver	789.00	(—)
IC02E	2m H/Held	299.00	(—)
IC2E	2m H/Held	199.00	(—)
ML1	2m 10w Linear	79.35	(2.00)
IC4E	70cm H/Held	285.00	(—)
IC04E	70cm handheld	299.00	(—)
BC35	Base Charger	67.85	(1.00)
HM9	Speaker mic	20.70	(1.00)
LC3	Carry Case	6.90	(1.00)
ICBP3	Std Battery Pack	28.75	(1.00)
BP5	High Power Battery Pack	58.65	(1.00)
CP1	Car Charging Lead	6.90	(1.00)
DC1	12v Adaptor	17.25	(1.00)
R7000	VHF/UHF Scanning Receiver	899.00	(—)
IC3200	2M/70cm Mobile Transceiver	529.00	(—)

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	435.00	(2.50)

Mutek Products

SLNA 50	50MHz Switched preamp	49.50	(1.50)
SLNA 144s	144MHz Low noise switched preamp	41.95	(1.50)
SLNA 145sb	Preamp intended for 290	31.90	(1.50)
GLNA 432e	70cm Mast head preamp	159.90	(2.50)
RPCB 144ub	Front end FT221/225	84.90	(1.50)
RPCB 251ub	Front end IC251/211	89.90	(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	94.90	(1.50)
TVHF 230c	2M-FM Transverter	299.90	(5.00)
LBPF 144v	Bandpass Filter	24.90	(1.50)
LBPF 432u	Bandpass Filter	24.90	(1.50)
TVVF 50c	6M Transverter	209.90	(2.50)
GLNA 433e	70cm Pre-amp	89.90	(2.50)
TVVF 144a	2M Transverter	249.90	(2.50)

Datong Products

PC1	Gen. Cov. Con.	137.40	(1.50)
VLF	Very low frequency conv.	34.90	(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	36.00	(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 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

HK703	Up down keyer	29.35	(1.50)
HK704	Up down keyer	19.95	(1.50)
HK706	Up down keyer	19.35	(1.50)
HK707	Up down keyer	18.25	(1.50)
HK710	Up down keyer	39.95	(2.00)
HK802	Up down solid brass	86.30	(2.00)
HK803	Up down solid brass	82.65	(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	89.00	(2.50)
KP200	Memory 4096 Multi Channel	179.00	(2.50)

Trio

TS940S	9 Band TX General Cov RX	1795.00	
TS930S	9 Band TX General Cov RX	1395.00	(—)
TS440	NEW 9 Band TX General Cov RX	950.00	(—)
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	395.00	(—)
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)
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	998.00	(5.00)
TS670	6, 10, 15, 40M 10W M/M Transceiver	774.13	(5.00)
TR9300	6M M/M Transceiver	590.49	(5.00)
TR751	NEW 2M 25W Multimode	544.00	(—)

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)

SMC

RU120406	4 amp Power Supply	14.95	(2.35)

Aerial Rotators

KR250	Light Duty	69.00	(2.50)
FU200	Light Duty	59.00	(2.00)
AR40	5 core Medium Duty	115.00	(2.00)
KR400	Med/H Duty	119.00	(2.50)
KR500	6 core Elevation	139.95	(2.50)
KR400RC	6 core Medium Duty	147.95	(2.50)
KR600RC	8 core Heavy Duty	199.00	(2.50)
HAM1V	8 core Heavier Duty	379.00	(4.00)
T2X	8 core Very Heavy Duty	P.O.A.	(—)
KR5400	Elevation/Azimuth	239.95	(2.50)
KR5600	Elevation/Azimuth	349.00	(3.00)

Switches

SMCS 2U	2N 50239	11.95	(1.00)
SMCS 2N	2 way 'n' Skts	19.49	(1.00)
Welz	2 way SO239	26.50	(1.00)
Welz	2 way 'n' Skts	46.50	(1.00)
Drae	3 way SO239	15.40	(1.00)
Drae	3 way 'n' Skts	19.90	(1.00)
Kenpro KP21	N2 way Switch	24.15	(1.00)

Miscellaneous

DRAE	Wavemeter	27.50	(1.00)
T30	30W Dummy load	8.50	(1.00)
T100	100W Dummy load	38.00	(1.00)
T200	200W Dummy load	56.00	(1.50)
CT20A	20W Dummy Load PL259	14.25	(1.00)
CT20N	20W Dummy Load N. Plugs	22.50	(1.00)
CT530	300W Dummy Load	82.00	(2.00)
DRAE	2m Pre-set A.T.U.	14.50	(1.50)

TOKYO HI-POWER

HC200	10-80 HF Tuner	115.00	(2.00)
HC400	10-160 HF Tuner	199.00	(3.00)

CAP CO.
AERIAL TUNERS

SPC300	1kW PEP	188.00	(3.00)
SPC3000	3kW PEP	275.00	(4.00)

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Practical Wireless
The Radio Magazine

SEPTEMBER 1986 VOL 62 NO. 9 ISSUE 954

WE'RE CHANGING!

Our Publication Date

Starting with our next issue, we shall publish on the **Second Thursday of each month**—that's a week later than before.

Regular Features

NEXT MONTH

28MHz—our Most Versatile Band

Watertight Connections

Kit Construction—Boxing it Up

On sale September 11

THIS MONTH

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PLEASE NOTE OUR NEW ADDRESS
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telephone 0222 464154.

In London,
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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 a source of good advice on the South Coast, 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.

AR2002 receiver.

Frequency range of the AR2002 is from 25 to 550 and from 800 to 1300 MHz. Modes of operation are wide band FM, narrow band FM and AM. The receiver has 20 memories, memory scan and a search mode which checks frequencies between user designated limits.

The receiver has a push button keypad for easy frequency entry and operation.

A front panel knob allows the listener to quickly step up or down in either 5, 12.5 or 25 kHz steps from the frequency initially chosen.

The AR2002 has a front panel LED bar "S" meter.

There is a front panel 3.5 mm jack socket for headphone use.

A socket for the optional RS232 interface (RC PACK) is provided on the rear panel. The RC PACK consists of an 8 bit CPU with its own ROM and RAM and with your own computer acting as a dumb terminal many additional operating facilities become available. Of course, if you want to write your own programs using the RC PACK as an interface then "the sky's the limit".

AR2002 ..... **£435.00 inc VAT,** carriage £7.00
RC PACK ..... **£221.00 inc VAT,** carriage £7.00

data equipment.

CD600 . . . . . RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as morse tutor ..... **£188.19 inc VAT,** carriage £7.00

CD670 . . . . . A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matric display, variable RTTY shift, normal/reverse mode switch, outputs for TV, monitor and printer and can also be used as morse tutor ..... **£286.73 inc VAT,** carriage £7.00

CD660 . . . . . Similar to the CD670 but without the built-in display ..... **£231.79 inc VAT,** carriage £7.00

DAIWA meters.

CN410M . . . 3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors ..... **£53.28 inc VAT,** carriage £1.50

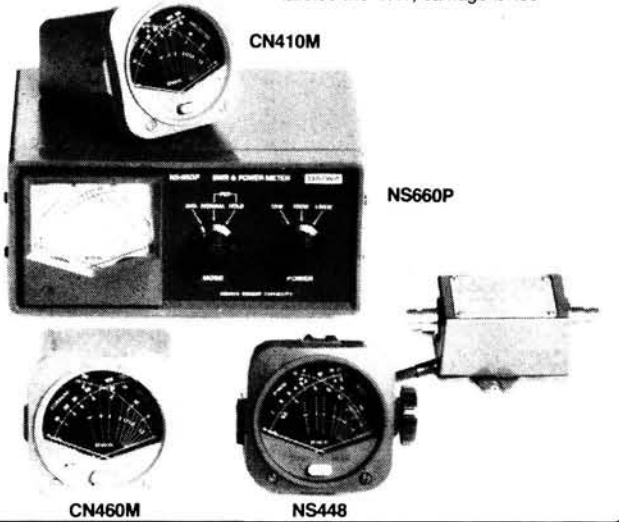
CN460M . . . 140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors ..... **£57.73 inc VAT,** carriage £1.50

NS448 with remote head . . . 900 to 1300 MHz, forward 5/20 W, reflected 1.6/6.6 W, N type connections ..... **£75.00 inc VAT,** carriage £2.50

NS660P with switchable meter reading (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors ..... **£99.50 inc VAT,** carriage £2.50

U66V remote head, 140/525 MHz, max 300 W, N type connectors ..... **£48.00 inc VAT,** carriage £1.50

SC20 extension cable for U66V, approx 20 metres long **£25.85 inc VAT,** carriage £1.50



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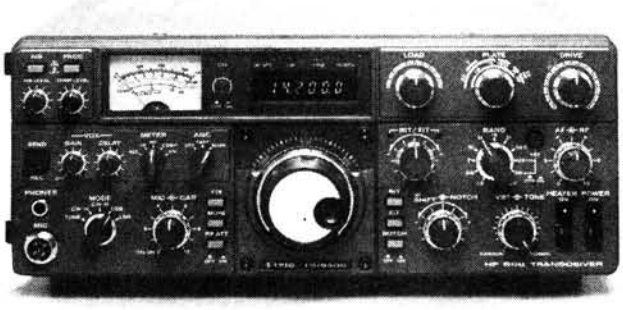
the TRIO TS830S hf transceiver



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

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

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

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

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

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

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

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

To cope with pulse type noise (such as ignition), the transceiver has a noise blanker.

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

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

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

TS830S HF transceiver . . . £898.00 inc VAT, carriage £7.00.

and the TS530SP hf transceiver.

The TRIO TS530SP HF transceiver is similar to the TS830S in that it also uses a pair of 6146B valves in its PA stage. The transceiver has been designed for the amateur who has no need for the additional facilities that are part of the TS830S but who still requires a high level of performance from his equipment.

The TRIO TS530SP covers the amateur bands from 160 through to 10 metres. Modes of operation are USB, LSB and CW.

Operating from 240 volts AC the transceiver has its own internal power supply.

IF shift is built into the TS530SP to allow the IF passband to be moved around the received sign and away from interfering signals and sideband splatter. Even greater selectivity is achieved when an optional YK88SN (1.8 kHz), YK88C (500 Hz) or YK88CN (270 Hz) filter is installed.

A tunable notch filter is built into the audio circuit of the TS530SP.

The speech processor in the TS530SP combines an audio compression amplifier with a change of ALC time constant for extra audio punch and increased average SSB output.

To cope with pulse type noise (such as ignition), the transceiver has a noise blanker.

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

TS530SP HF transceiver . . . £779.79 inc VAT, carriage £7.00.

for those who prefer a valve P.A.

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This new 2 metre band transceiver is just 140mm (W) x 50mm (H) x 133mm (D) and will fit nearly anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low power and is supplied complete with an internal loudspeaker.

The large front panel LCD readout is designed for wide angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operation.

The front layout is very simple, all the controls are easy to select making mobile operation safe. The IC-28E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM-15 microphone provided. Also available is the IC-28H with the same features but with a 45 watt output power.

Options include IC-PS45 13.8v 8A power supply, SP8 and SP10 external speakers, HS15 flexible mobile microphone and PTT switchbox.

→» Rx Range 138-174 MHz.«←

IC-290D/490E Mobiles

These SSB, CW, FM transceivers are ideal for mobile or base station operation. The IC-290D for 2 metres produces 25 watts/5 watts low power. The IC-490E for 70 centimetres produces 10 watts/1 watt low power. Both transceivers have a range of operating features, these include 5 memory channels, dual V.F.O.'s and a priority channel to automatically check your most used frequency. Squelch on FM and SSB to allow silent scanning whilst searching for signals, slow or fast AGC for SSB and CW and a noise blanker to suppress pulse type QRM. Sidetone is provided on CW.

Memory and full or programmable band scan with internal switches to stop on busy or empty channels. Programmable offsets are included for odd frequency splits.

Options include: IC-PS45 13.8v 8A power supply, IC-BU1 memory back up battery unit, IC-SP8 and SP10 mobile speakers.

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If you have a BBC Micro (Model B) or Commodore 64 or 128, the ICOM control system can control up to four (or more) ICOM radios in the range IC-751, 735, R71, R7000, 271, 471 and 1271 (and 745 with modification). The help menu shows the available functions

	H = HELP		
F0	Frequency	↔	Frequency Steps
F1	Select Mode	↑ V	Up/Down (arrows)
F2	Freq/Memory Scan	M	Memory Channel
F3	Mode Scan	,.	Memory Up/Down
F4	VFO → Memory	/	VFO/Memory
F5	Memory Write	B	Bargraph Select
F6	Memory Clear	@	Occupancy On/Off
F7	Set 'SIG' Level	:	Scan Stop Off/On
F8	Memory File Read	S	Change Set
F9	Memory File Write	DEL	Speech (If fitted)
		Q	Quit

IC-735, The Compact HF Radio

The new ICOM IC-735 is ideal for mobile portable or base station operation. It has a general coverage receiver from 0.1MHz to 30MHz and transmits on all amateur bands from 160m to 10m. SSB, CW, AM and FM modes are included as standard. RTTY and Amtor are also possible. The IC-735 has a built-in receiver attenuator, pre-amp, noise blanker and RIT to enhance receiver performance. A 105dB dynamic range with pass band tuning and a sharp I.F. notch filter for superior reception. The twin VFO's and 12 memories can store mode and frequency. The HM12 scanning mic is supplied. Scanning functions include programme scan, memory scan and frequency scan.
The IC-735 is one of the first H.F. transceivers to use a liquid crystal display which is easily visible under difficult conditions. Controls that require rare adjustment are placed behind the front panel hatch cover but are immediately accessible. Computer remote control is possible via the RS-232 jack. Output power can be adjusted from 10 to 100 watts with 100% duty cycle. A new line of accessories are available, including the AT150 electronic automatic antenna tuner and the PS55 AC power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories. See the IC-735 at your authorised ICOM dealer or contact Thanet Electronics Limited.

ICOM

IC-1271E, 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.

Available soon–The IC·12E 1·2GHz FM handportable.

IC·R71E, General coverage receiver.

The ICOM IC-R71E 100KHz to 30MHz general coverage receiver features keyboard frequency entry and infra-red remote controller (optional) with 32 programmable memory channels, SSB, AM, RTTY, CW and optional FM. Twin VFO's scanning, selectable AGC, noise blanker, pass band tuning and a deep notch filter. With a direct entry keyboard frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency is altered without changing the main tuning control.
Options include FM, voice synthesizer, RC-11 infra-red controller, CK70 DC adaptor for 12 volt operation, mobile mounting bracket, CW filters and a high stability crystal filter.

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IC-3200E Dual-band

If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.

The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is easy to read in bright sunlight. 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan. Try this exciting set from ICOM the IC-3200E, when only the best will do.

Options include IC-PS45 AC power supply, HS15 mobile boom mic, SP10 external speaker, UT23 speech synthesizer and AH32 dual-band mobile antenna.

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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.

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., Barclaycard and Access facility, 24 hour answerphone service.

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.

Alyntronics, Newcastle, 091-761002.
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.
Eastern Communications, Norwich, 0603 667189.
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.
South Midlands Comms. & branches, 0703 867333.
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.

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TRIO KENWOOD TR2550

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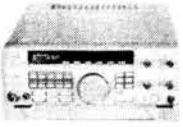
TRIO KENWOOD
TS440
HF INC AUTO ATU



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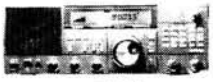

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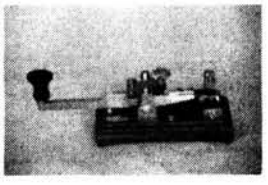

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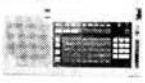

SONY ICF 7600D

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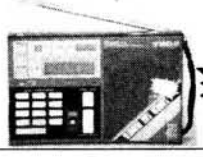
162kHz-29995MHz
MEMORIES, FM, AM, SSB.



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108-136MHz
150KHz-2194KHz

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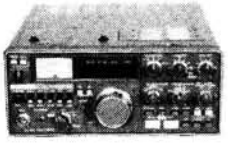

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Professional electronic circuitry with very wide dynamic range. Meets professional demands both in electronics and mechanical ruggedness. 120 cm long glass fibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems. £110. See Review in August Issue p.15

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50MHz to 1300MHz
Gain 17dB Typical

TECHNICAL SPECIFICATIONS FOR ARA 500

Gain	17dB Typical (14-17dB)
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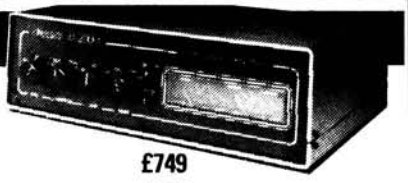
Operation is possible up to 1300MHz with gain of 10dB

Noise 4-6dB

Intercept Point 3rd Order: +18dbm at Input

LINEARS



D200	2 MTR 500W SSB	£749
D200S	2 MTR 750W SSB	£879
D70	70 CMS 550W SSB	£899

PRE-AMPS – NEW MODELS

MODEL	FREQ.	NOISE	GAIN	POWER	PRICE
EVV1296S	1.25-1.3GHz	0.7-0.9	16-19dB	100W	£149
EVV1296C	1.25-1.3GHz	0.9-1.2	16-18dB	100W	£129
EVV1296	1.25-1.3GHz	1.9-2.1	14-17dB	100W	£110
EVV700	430-440MHz	0.5-0.9	15-18dB	500W PEP	£99
EVV2000FB	144-146	0.6-0.9	16-18dB	1000KW PEP	£99
EVV200FB	144-146	0.6-0.9	16-18dB	700W PEP	£89
EVV2000GAAS	144-146	0.6-0.8	16-18dB	1KW PEP	£99
EVV200GAAS	144-146	0.6-1	16-18dB	700W PEP	£89
EV2GAAS	144-146	0.6-0.9	15-18dB	100W PEP	£66
VV INTERFACE FOR ABOVE PRE-AMPS					£23

RECEIVE PRE-AMPS

MODEL	FREQUENCY	NOISE	GAIN	PRICE
EWPA 560	50-600-1GHz		16.5dB-1dB	£69
IP3 order	+18dBM			
ERPA 1296	1.25-1.30	0.8	17-18dB	£77
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Novice Licence

Sir: In your February 1986 issue, R. C. Barrett GM6GJZ issued a challenge to anyone to demonstrate the value of having a novice licence. I accept his challenge. I quote his opening statement: "I feel I must question the need for a novice licence in this country. Another licence level would surely be counter-productive to the present system."

To GM6GJZ and anyone else who shares his opinion, I put the questions: How do you arrive at this conclusion, what research have you done and where are the facts to support your statement? I suggest that the research and the facts are non-existent, and the supposition mere prejudice! As a former novice amateur (VK4VOK) and now a full call (class A) amateur VK4FOX, I would like to bring a new dimension to this debate for the benefit of your readers—namely some FACTS!

This year the NAOCP (Australian Novice Licence) celebrates its tenth anniversary. It came about as a direct result of the 27MHz CB boom in 1976, which introduced thousands of new people to the wonders of 2-way radio communication. Some astute members of the Wireless Institute of Australia realised that out there in the CB jungle was a huge untapped resource of potential radio amateurs. The WIA decided to entice some of these newcomers and it came up with an approach that was both novel and inspired. With the full support of the Department of Communications (DOC), a bridging licence was formulated, to be known as the Novice Amateur Licence. As in the higher classes, the syllabus would consist of: (a) Regulations, (b) Morse Code and (c) Theory.

There were no concessions made with Regulations—all licence classes sit the same paper. The minimum standard for Morse was set at 5 w.p.m. The Novice Theory, while easier than the standard set for the higher classes, is still quite comprehensive, and is harder than the American Novice paper. The Australian Novice was rewarded with c.w. (10 watts) and 'phone (30 watts p.e.p.) in the following h.f. sub-bands:
3·525–3·625MHz;
21·125–21·200MHz and
28·100–28·600MHz. Also, our Novice Licence does not expire after 12 months.

This new class of licence was initially given a cool reception in some quarters, but not any more. Now, a decade later, the following facts emerge. The total of Australian amateurs has more than doubled. We now have a higher percentage of amateurs in our population than the UK has. The fear that our Amateur organisations would become top-heavy with Novices has been proved a myth. On current figures, less than 10 per cent of our amateurs are Novices, proving that most are very keen to upgrade given the right encouragement and opportunity.

The introduction of our Novice licence, in effect, created another licence class. Our Limited (class B) amateurs could upgrade to the new Combined (Limited plus Novice) licence by passing the 5 w.p.m. Novice Morse test. This new class provides the class Bs with the Novices' privileges on h.f. and the incentive for them to get off their butts and at least have a go at the Morse. The system must work, because the Limited amateur is numerically the smallest group in Australia. By the way, three of our classes can converse on the same h.f. bands, and three of our classes can do the same on v.h.f. and higher. Only Novices and Limiteds are isolated. 73's to all.

Tony Taylor VK4FOX
Innisfail, Queensland

Two-tone Tests

Sir: The two-tone generator described in the December 1985 issue of *PW* is an excellent piece of gear, a "must" for all those interested in the performance of their s.s.b. rigs. However, I would like to warn that reliance upon a power meter reading X2, or the behaviour of the p.a. d.c. input current isn't good enough. If the transmitter is driven to such an extent that the peaks of the output waveform become flattened (assuming the p.a.s don't blow up first!) the 2:1 relationship between p.e.p. and average power will no longer hold. The average power will tend to increase whilst the peak envelope remains at saturation point—the condition known as "flat-topping".

This results in distortion, but more importantly, a considerable increase in harmonic generation. It follows, therefore, that this condition can only be monitored accurately with an oscilloscope, so connected that the output waveform can be observed. One of the big advantages of a two-tone input over a single tone, is that the beat between the tones produces a low-frequency envelope pattern, capable of resolution on a slow timebase 'scope, irrespective of the carrier (suppressed) frequency, making recognition of "flat-topping" instant.

Alan B. Pigeon G6CBP
Worcester
(Formerly of
PO/BT Radio Service)

AMTOR Working

Sir: Having been "off air" for quite a while, I was looking forward to getting the antenna back up. I mainly used c.w. RTTY and AMTOR, and also enjoy s.w.l.ing on these modes, too.

Since going back on air there has been some disappointment, but only with a few stations I should add.

There is nothing worse than listening to an AMTOR contact, waiting for the callsigns when the over is finished "+?". No callsigns, it's very frustrating as some QSOs make you wait a very long time before that information is given.

Whilst looking through an old issue of *Datacomm* (the BARTG magazine) I saw an AMTOR Courtesy Code, and here are a few of the points.

Call CQ in Mode B (FEC) on the calling frequency when that frequency is clear, QSY as soon as contact is made.

If you QSY in Mode A (ARQ), disable your p.t.t. line or cut transmitter output while moving to avoid spraying your path with QRM.

Do not use a programmed CQ call on Mode B—type it slowly by hand. Chances are that a programmed CQ call contains no "Idle" characters. Remember a distant station can only lock onto idle characters.

Do not attempt to break into a Mode A QSO already in progress.

Listen carefully before starting to call. You'll hear at least one of the other stations if they're already using the frequency—so unlike RTTY/s.s.b. simplex you can't claim you didn't hear.

Start and finish each transmission with identification.

If you drift apart during Mode A QSO, adjust as follows:

with r.i.t. if you are the Master

with main tuning if you are the Slave.

Remember that nobody else can break in when you are in Mode A QSO—and there might be someone waiting patiently outside. It could be helpful to revert to Standby at intervals during a long rag-chew QSO to allow waiting stations to identify.

Don't use a linear in Mode A. You defeat one of AMTOR's main advantages—the ability to send perfect copy QRP.

H. B. Smithson
Birmingham

The DTI and RSGB

Sir: Your July *Comment* raises some interesting points. The standard answer from Potters Bar will be that the Society does not lack ideas but has to decide priorities. It has become increasingly obvious that the current priorities are not to the liking of members. As far as the relationship between the RSGB and the DTI is concerned, members have become accustomed to the RSGB claiming the credit for all improvements in the licence, whilst saying "We were not consulted" when anything goes wrong. The most recent example of this was on December 20 last, when Class B licences were amended by a *Gazette* notice to allow unrestricted use of Morse. Note that there is no longer any statutory requirement to identify on 'phone because the terms of operation are not governed by DTI Press Releases. In late March, RSGB HQ did not know that the *Gazette* notice had been published, or if they did they were unaware of its contents. Members look to their national society for accurate information and guidance on such matters but often do not get it. This situation has been the cause of much discontent and must not be allowed to continue.

For many years the late Roy Stevens G2BVN was RSGB Telecommunications Liaison Officer who provided the vital link with the Home Office as it then was. He enjoyed a close working relationship with Don Baptiste of the Home Office, who gave the amateur cause much needed credibility and support at WARC 1979. The outcome of this work was broadly favourable to the amateur movement, and the 10, 18 and 24MHz bands are amongst the gains. A proposal for an amateur allocation at 50MHz in Region 1 was defeated by only a narrow margin. There is no doubt that the amateurs of the world owe an enormous debt to G2BVN for his efforts over many years, even when his health was failing him.

After his untimely demise, the Society abolished the post of Telecommunications Liaison Officer and gave the job of negotiating with the DTI to the General Manager on a policy decided by the Licensing Advisory Committee. Since then we have seen a number of fiascos which seem to stem from a lack of effective communications between the parties concerned. The problem is almost certainly related to the General Manger being grossly overworked and thus unable to devote the time to do the task effectively. With the current situation surrounding the RIS we need a Society which has effective links with the DTI, and there is thus a strong case for a full time Telecommunications Liaison Officer on the HQ staff.

More staff means more money and this can only come from the members in the form of increased subscriptions or by increased sales of publications. If the RSGB is to flourish it must have sufficient funds to do the work the members want it to do. Membership fees have historically lagged behind inflation and as a result the Society's finances have seldom been on a sound footing. The time has come to grasp the nettle of asking members to pay more for a better service.

Many amateurs are prepared to spend hundreds and indeed thousands of pounds on their equipment and then complain about the cost of subscriptions. They have quite simply got their priorities wrong. What is almost as unfortunate is that the vast majority of members are prepared to sit back and do nothing except winge to each other on the local repeater about what is wrong, rather than trying to do something positive to change things. A penny a day on the membership fee would produce an extra revenue of about £130 000 per annum, which would put the Society finances on a much sounder base. The extra revenue would pay for extra staff and also build up the much depleted reserves. I am sure that many members think it would be worth it.

P. L. Crosland G6JNS
Worcester

There have been rumblings already about the recently announced increase in RSGB subscription rate to £18.50. Would members be prepared to pay even higher subs for an improved service? Let's hear your views.
Regarding the Gazette *notice of 20 December 1985, apart from containing several typographical errors, this*

▶ 19

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", Enefco House, The Quay, Poole, Dorset BH15 1PP,** 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, KITS AND PCB'S

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 our new **PCB SERVICE**. For details see p29.

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 it is required.

Send your orders to **Post Sales Department, "Practical Wireless', Enefco House, The Quay, Poole, Dorset BH15 1PP.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to Practical Wireless. Access, Mastercard, Eurocard and Visa accepted.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £15 overseas, from **"Practical Wireless" Subscription Department Competition House, Farndon Road, Market Harborough, Leicestershire LE16 9NR. Tel: (0858) 34567.** Airmail rates for overseas subscriptions can be quoted on request.

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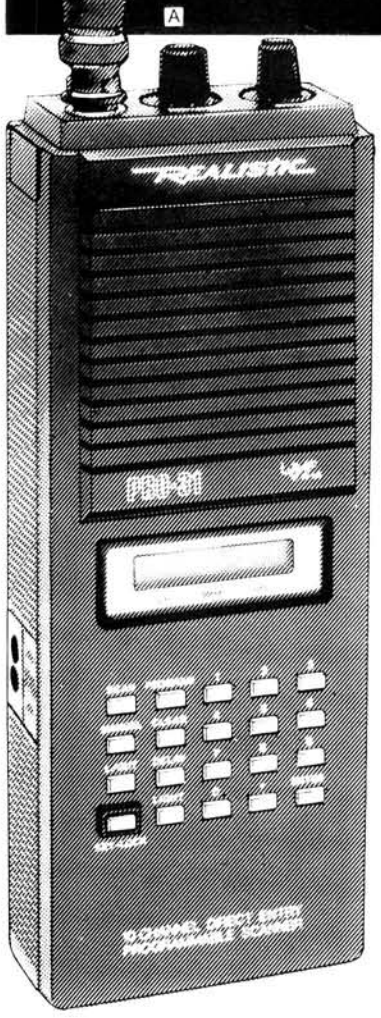

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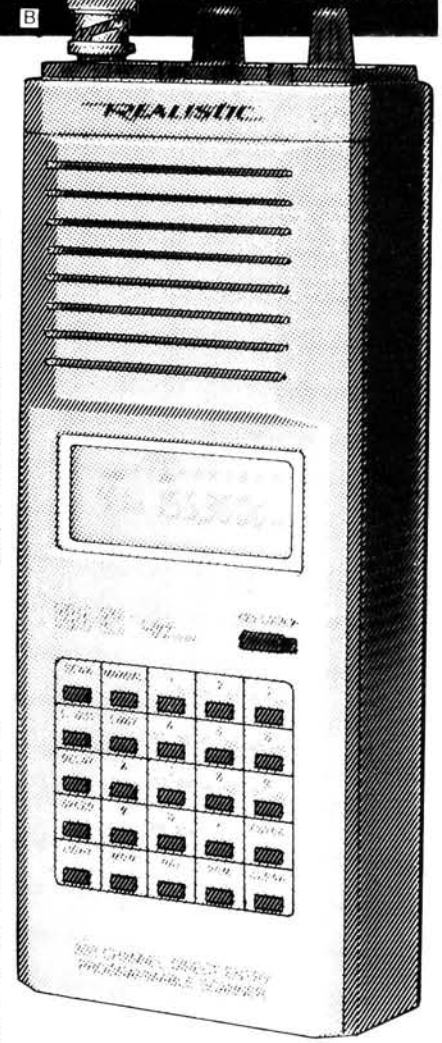

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really left the question of Morse for Class Bs very much unresolved. Although, amongst other things, it amended Clause 2(b) of Licence B (presumably it meant Clause 1.(2)(b), as there isn't a Clause 2(b)!) to say that licensees could use all authorised modes (including Morse), the notice did not cancel or amend Footnote A to the Schedule. That Footnote says that Class B licensees may not use Morse except when using another amateur's station under his supervision.

So, which has precedence; the amended Clause or the Footnote? The recent DTI Press Release said that the Gazette *notice "had the effect of removing Footnote A to the Licence", but as Peter Crosland rightly points out, Amateur Licence changes are made by means of* Gazette *notices or by any other means laid down in Licence Clause 12, and not by Press Releases.—Ed.*

The DTI and RSGB II

Sir: I thoroughly agree with the *PW Comment* in the July issue. My own experience of the problems may be of interest.

In February, I wrote to the RSGB enclosing two separate letters I had received from the DTI. One of these stated I could have my equipment checked for £21, but a later one stated that they could not do this, and suggested that I get one of the complainants to contact them. This they will not do, which leaves me somewhat in limbo, especially when the local Planner has threatened dismantling of my mast. In my letter to the RSGB I asked for advice/assistance on these matters. After three weeks I wrote again, urgently requesting an early response. I am still awaiting a reply.

The information on this matter of radio and TV interference via *Radio Communication* is far from reassuring. The problem according to the Society "is very complex and will take many months to formulate a strategy", etc. I fail to see the complexity they are referring to. Problems of TVI/RFI require a simple arbitration procedure. There is no other way, but the Society seems to be relying on the day when Government legislation covering the manufacture of domestic equipment will remedy the situation.

It appears obvious that swift and positive action by the RSGB should be aimed at reintroducing the arbitration procedure, instead of the go-slow, cautious and necessarily protracted way the Society has embarked upon. As things stand at present, members beset with interference problems will derive little comfort from the somewhat vague policy and lack of assistance from their Society.

J. M. Robson GM3CFS
Thurso, Caithness

Our Hobby

Sir: May I compliment you on your most sensible and well-reasoned *Comment* in the July issue. There is nothing wrong with Amateur Radio as such: the trouble is some of the people in it!

There are a small number of "agitators", as you term them, who write letters of carping criticism to all the magazines. Most of these people try to imply that their views form the majority opinion, whereas I feel confident that all fair-minded responsible members of our hobby think as you do.

(I say, steady on!—Ed.)

Nothing in this life is perfect, and it is so easy to find something to attack verbally. What we never get from our vociferous ones are any concrete suggestions on how to remedy any alleged shortcomings, plus of course any indications of past experience in an executive capacity which might inspire confidence in their organising ability. In their absence, it is probably sufficient to remember the old adage about empty vessels making the most noise.

E. G. Allen G3DRN
London SW20

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.

Kit Construction

Sir: As a newcomer to amateur radio, I was interested in your July article "Kit Construction—It's Easy" since, like many others, I've come to the conclusion that the only way to afford the necessary equipment for my hobby is to make it myself after acquiring the necessary know-how.

Whilst not wishing to appear critical of someone who is obviously well skilled (the author, I note, built the kit during a photographic session *and* it worked first time!), or of Messrs Howes' excellent kits, I nevertheless found the article misleading to the novice insofar as it made the construction of a container for the finished equipment seem almost a cosmetic afterthought. For my part, I find the box or similar structure to hold the components not mounted on the p.c.b. is absolutely essential—otherwise what holds the variable resistors and capacitors, switch and sockets? Surely the author doesn't leave the lot in one glorious cat's cradle on the bench, inviting shorts, dust and extreme difficulty of twiddling knobs on unmounted parts.

If any of your readers have any tips to offer regarding simple ways of securing and containing such components, I'm sure they would be welcome by others as well as me. Surely I'm not alone in finding the necessary devising, marking-out, drilling and filing of boxes to be a tedious process taking far longer than the construction of the kit itself—and requiring more tools than the article suggests. Any ideas please?

Alan Jones
St Margarets Bay
Kent

Looking back at that particular article, I think that Mr Jones has a point, as we rather ignored the question of what needs to be done to stop all the controls floating around and turn the project into a usable unit. If you're dealing with something like a pre-amplifier, which simply has input, output and power connections, the box you put it in is important only from the point of view of screening and of keeping dust, metallic objects and prying fingers out—there are no controls, etc., to worry about. With a receiver, having tuning and gain controls, the box has a more vital role unless, as with the old valved sets, you adopt the baseboard and front panel approach or something like it.

Doing the necessary "metal-bashing", or "plastics-bashing" as it more often is nowadays, can certainly be a very time-consuming business, especially if you're limited to the kitchen table and a hand-held electric drill, plus a rat-tail file.

Look out for a special feature in our October issue on housing your kits and projects.—Ed.

Mobile Rallies

August 10: Flight Refuelling ARS, in conjunction with Bournemouth RAIBC, are holding Hamfest '86 at the Flight Refuelling Sports and Social Club Ground, Merley, Wimborne, Dorset.

Among this year's attractions are a flying demo by radio-controlled helicopters, craft fair, steam train rides and a creche. Of course if you are interested in radio there are things for you too! There will be Morse testing on site, booking in advance through RSGB, bring and buy, radio traders, satellite TV and 934MHz CB.

Car parking for this event is free and there are direction signs and talk-in on S22.

More details from ***Ashley Hulme G0CDY, 71 Victoria Gardens, Ferndown, Dorset. Tel: 0202 872503.***

August 24: Preston ARS are holding their 19th Mobile Rally at Lancaster University. The university entrance is on the A6 and they say there is ample free car parking on site. If you are not sure of directions, leave the M6 at junction 33 and proceed north on the A6 for 2 miles.

The rally opens at 11am, with disabled visitors in wheelchairs being admitted earlier. The entrance is 50p by programme with a prize draw.

The usual trade stands, bring and buy and RSGB stand and bookstall will be there, as well as a licensed bar and cafeteria.

More details from: ***Godfrey Lancefield G3DWQ on Preston 53810.***

August 24: The 1986 BARTG Rally will take place at Sandown Park Racecourse. It is open 1030 until 1700 with all the usual attractions for the amateur. Further details from: ***Peter Nicol G8VXY, BARTG Rally Manager, 38 Mitten Avenue, Rubery, Rednal, Birmingham. Tel: 021-453 2676.***

August 24: Galashiels and District ARS have an Open Day at the Rugby Club, Netherdale, Galashiels. There will be trade stands, bring and buy, catering as well as all the usual activities. For more details contact: ***John Campbell GM0AMB, 21 Hareshaw Bank, Tweedbank, Galashiels on 0896 55569.***

September 13: The Scottish Amateur Radio Convention is being organised by Glenrothes and District Amateur Radio Club and will be held at the Lomond Centre, Glenrothes, Fife.

Doors open to the disabled at 10.30 and to the general public at 11.00. Mr. Alan Devereux GM8VJV, Chairman of the Scottish Tourist Board, will officially open the rally.

Further details from: ***Ken Riddoch GM3ZSP on 0334 53336.***

September 21: The Dunstable Downs Radio Club are holding the 3rd National Amateur Radio Car Boot Sale at the Shuttleworth Collection. There are over 100 stalls selling both new and secondhand equipment and parts. For the rest of the family there is the famous aircraft and motor museum located at the Old Warden Aerodrome, near Biggleswade.

Admission is 50p and parking is free. For more details please contact:

Phil Morris G6EES on 0582 607623.

Special Event Stations

GB2TVF: After the success of last year the Towersey Village Festival Amateur Radio Group will be setting up a special event station at this year's festival. They might even be able to use the club callsign G1TVF too—if it's issued in time.

Hopefully the bands in use will be 3·5, 14 and 144MHz with other h.f. bands and 430MHz being used if there is space for the antennas.

The festival is on between August 22 and 25—4 full nights, 3 full days says the brochure. The funds raised go to local and national charities and the special event station is being sponsored for each contact they make.

More details from ***Andrew Woods, 13 Elm Trees, Long Crendon, Bucks. Tel: 0844 208635.***

The Wessex Amateur Wireless Club will be running a station between August 15–17, using the callsign GB1PRA. It commemorates the Purbeck Rally and Autojumble that will be held at the village of Ridge.

The route to the event will be AA signposted. The station will be operating on 144MHz during daylight hours.

For further information contact: ***John G6SDQ on Verwood 822125.***

On August 9, Birmingham based Eddystone Radio Ltd will be holding an Open Day at its factory for members of staff and their families.

A feature of the Open Day will be an amateur radio station operating on the h.f., v.h.f., u.h.f. and microwave bands using the company callsign G6SL.

GB2MLF will be active from the Mersea Island Museum for the Mersea Island Lions' Festival on August 25 from 1000 to 1700. They will be operating on the h.f. bands as well as 144MHz.

The centre of Mersea will be closed to traffic and stalls, sideshows will be set up with a brass band on The Green.

Parking in adjacent side streets and car parks is available.

Unapproved Cordless Telephones

At present there is nothing to prevent the manufacture, importation, sale or possession of unapproved cordless telephones.

Powerful cordless telephones designed to operate on 49MHz have been recently outlawed in the USA. As a result there has been an influx of this equipment into the UK.

The powerful cordless telephones operate on unauthorised frequencies and cause considerable interference to authorised radio users, domestic television, air traffic control and other legal radio systems. The use of this equipment can give engineers working on the lines a considerable electric shock. It is intended that 49MHz will shortly be allocated to pagers used in such places as hospitals.

A new Order restricting the manufacture, importation, sale and possession of all unapproved cordless telephones has been drawn up and is expected to become law in the autumn. The proposed Order will also restrict the use of cordless telephones transmitting between 471 and 853MHz. It will add a marking and labelling requirement to those at present in force.

Radio Controlled Models Get New Frequencies

It has been agreed that frequencies at 40MHz will be made available for the use of radio control surface models operating on f.m. and p.c.m. There is a distinction between surface and aeronautical models and for the latter further channels are to be released at 35MHz to add to an existing allocation for aeronautical modelling.

The main band for surface model control at present in the UK is 27MHz. Although this will continue to remain available for modellers, the introduction of a European specification for CB on 26·96 to 27·40MHz f.m. only has sharpened the search for new additional frequencies for model control. The release of the new allocation takes account of the arrival of the new European CB service and the proposed sharing of the spectrum that was formerly allocated for model control in the u.h.f. band.

On-site paging is also getting new spectrum allocations to take account of the new European specification for CB.

Salisbury 144MHz Contest

The rules have not changed from last year for this contest, so it must have been well received!

Briefly they are: August 17 from 0900–1500GMT. A maximum power of 250W e.r.p. and s.s.b. and c.w. only (no transmission over 144·295MHz). The exchange must consist of callsign, RST and serial number and county. The scoring is one point for each contact, 10 points for each new county or country and 10 points for contacting G3FKP/P. All entries must include a log, details of station and an s.a.e. before September 17.

You should send all details to G4RLF.

Amateur Morse Test

The DTI have announced that a pass in the Radio Amateur Morse Test will be regarded as valid for life.

Previously, where a break of over 12 months had occurred in licensed operation, or where a licence had not been obtained within 12 months of having passed a Morse Test, a further test was required.

This brings it in line with the Radio Amateurs Examination.

SMC Have Moved

South Midlands Communications have moved to new premises near Southampton. Having gained the reputation of one of Europe's largest and most comprehensive suppliers of radio communication equipment the company found itself short of space for storage and development of new products.

Their new address is: ***South Midlands Communications, SM House, School Close, Chandlers Ford Industrial Estate, Chandlers Ford, Hampshire SO5 3BY. Tel: 04215 55111, Telex: 477351 SMCOMM G, FAX: 04215 63507 SMC FX.***

RAE Courses

Birmingham: Fox Hollies Leisure Centre, Acocks Green, Birmingham. There is a new RAE and Morse course starting at this venue. The RAE course is on Mondays, 1915Z to 2045Z and the Morse course is on Thursdays 1915Z to 2045Z. More details from: ***Keith Frettsome on 021-778 1311 during school hours or 021-743 5104 evenings and weekends.***

Cambridge: Coleridge Institute, Radegund Road, Cambridge. This college will be running a Morse course this autumn. The enrolment date is September 15 and the course starts September 22.

Fareham: Fareham Adult Education Centre, Wickham Road. The course starts 26 September 1986 on Friday evenings and runs for 27 weeks. A shorter course, for the December '86 exam, will commence on Monday 15 September for 11 weeks. For more details contact: ***A. S. Chester on Fareham 280709 or the course tutor G3CCB on Fareham 288139.***

Guildford: Guildford College of Technology, Stoke Park. The course starts 15 September 1986 on Monday evenings, excluding college holidays, until May 1987. Enrolment is on September 8 and 9, 1400–1600 and 1800–2300. For further details please contact the course tutor: ***B. E. Purse G1RNV on 0483 31251 during college hours.***

Leamington Spa: Mid Warwickshire College of Further Education, Warwick New Road. Enrolment for the C&G RAE is on September 1 & 2. The course starts on Thursday, September 11 for 30 weeks. For further details please contact: ***C. A. Smith on 0926 311711 during college hours.***

Paddington: Paddington College, 25 Paddington Green, London W2. This course differs somewhat from the usual C&G, it covers the syllabus for the RAE and allows the students to carry out practical experiments into the electronic theory covered. As the course is extended, attendance is required twice a week during term time. Enrolment is September 8–10, between 1pm and 4pm and 6pm and 8pm. The course tutors are David Peace G4KKM and David Hunt G6MFR. For further information contact: ***Paddington College 01-402 6221 or David Peace on 01-892 7585.***

Stretford: North Trafford College of Further Education, Talbot Road, Stretford, Manchester M32 0XH. The course enrolment is September 3–5. The courses running will be Theory—Monday or Thursday evenings, or Wednesday afternoon; Morse Code—Tuesday evening or Wednesday morning; Advanced Morse Code—Monday evening. More details from:

J. T. Beaumont on 061-872 3731.

G4WAC Active

The Wythall Radio Club will be active with G4WAC throughout the forthcoming months to promote and support the "Worked All Midlands Clubs Award". They will be on-air every Tuesday evening from 8pm onwards.

Tuesdays are their regular club night and visitors are most welcome, and an RAE course is held every Tuesday from 7.30 to 9pm.

The club venue is Wythall CC, Silver Street, Wythall, South Birmingham.

For further details contact: ***Terry G1MEE on 0546 824705.***

Martial Arts

Would anyone who is either a licensed amateur or short wave listener and who is actively involved in the Martial Arts like to help start an association called ARMA (Amateur Radio/Martial Arts). You should send a short letter detailing your interest in both hobbies, marked ARMA, to either: ***G4RKV or G4NAO both QTHR.***

Screen Europe

This is a bi-monthly newsletter meant to cover a broad range of TV interests for both the informed layman and enthusiast alike.

Subscription will be £4 per annum, but the first issue is free on receipt of an s.a.e.

One item of interest I found in my copy of *Screen Europe* were some information sheets available.

TVDX (A beginners Guide)—£2·50.

Band I Antennas for TVDX—£1·50.

Band III Antennas for TVDX—£1·50.

UHF Antennas for TVDX—£1·50.

Sporadic-E Reception—£1·00.

Tropospheric Reception—£1·00.

Meteor Scatter, F2, TE Reception—£1·00.

Multi-Standard Televisions—£2·00.

French TV—£2·50.

Photographing and Videoing TVDX—£1·50.

There is also one video available—European TV including Middle East TV. This video comprises actual TVDX received in East Sussex and gives you an indication of what you can expect to receive. The video includes examples of test cards, logos and programme extracts. Nearly all East and West European countries are represented on the tape—£9·50.

All prices include postage.

For more details contact: ***Tim Anderson, 2 Burry Road, St Leonards on Sea, East Sussex.***

Can You Help?

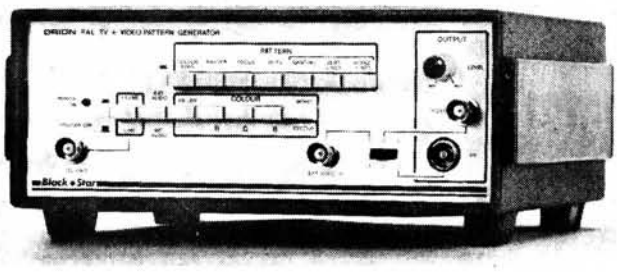
"Somewhere in this country is a company who specialises in the slitting of video tape to a required size—in my case that would be to cut $\frac{1}{2}$in wide tape to a $\frac{1}{4}$in width for use on my Akai VT-700 VTR.

"I would of course prefer to buy $\frac{1}{4}$in wide video tape 'as is', but this commodity appears to be as rare as dodo eggs—possibly like my machine!

"Any help will be greatly appreciated."

If you can help, write to: ***Mr H. N. Kirk G3JDK, 54 Allendale Road, Rotherham, Yorkshire S65 3BY.***

Colour Pattern Generator



A low-cost, rugged, mains operated bench instrument, the Black Star Orion TV and Video Pattern Generator will find a home on many an engineer's test bench.

Features include separate r.f. and composite video outputs with level control, tuneable r.f. carrier, internal or external sound modulation, switchable sound carriers (5·5, 6·0, 6·5MHz) and either positive or negative video modulation. Frame and line sync pulses are provided on the front panel for triggering an oscilloscope.

The unit covers both v.h.f. and u.h.f. channels and is compatible with PAL B, D, G, H, I and K systems and gives a full range of colour/monochrome test patterns including colour bars, greyscale, focus, purity, dots and gratings.

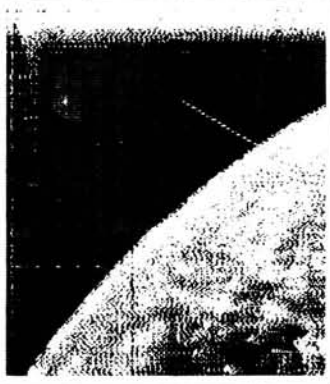
Rear panel outputs give RGB and sync signals with switchable signal levels and sync conditioning to ensure compatibility with the majority of video and computer monitors.

Further details from ***Black Star Ltd., 4 Stephenson Road, St. Ives, Huntingdon, Cambs. PE17 4WJ. Tel: (0480) 62440.***

Software

Neill Taylor G4HLX, has produced another program for the Spectrum computer. Like his program for decoding telemetry and weekly news bulletin (SUDD), the new one does not require special interfaces or extra hardware.

Called SPIX, the program decodes and displays UoSAT–1 c.c.d. images. The full resolution is transmitted as a 256 x 256 pixel display, each with a 16 level grey scale which is represented on the picture as a 4x4 dot matrix for each pixel. The limitations on the picture shown here are due to the limitations of the Aplhacom printer used.



SPIX costs £4.50 including postage direct from ***G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND.***

End of the ACE

The Jupiter ACE home computer—you remember, the one that tried to use FORTH instead of BASIC as its only language—is being discontinued by Boldfield Computing.

However, it is not going out whimpering. Boldfield rescued the ACE from the financial trouble of its original designers way back in 1983 and it has since, they say, proved to be very popular.

However, Boldfield are now moving away from the home-computer market and so they are offering ACE stocks at very low prices. A complete ACE starter set is now £25 plus VAT, for instance.

As well as spare parts and components the manufacturing and design rights are also up for sale.

If you fancy your own computer company, or just want some ACE software at knock-down prices then contact ***Boldfield Computing, FREEPOST, Cambridge CB1 1BR. Tel: (0223) 61175.***

Yaesu Back-Packs

Major advances in microprocessor and semiconductor technology have enabled engineers at Yaesu to design the FT-70 self-contained portable h.f. transceivers with an all-up weight of just 5·8kg—including the NiCads.

These "back-pack" rigs have been designed to provide reliable, convenient, medium range communications under rugged field conditions and are obviously aimed at the military user as well as the amateur, marine and commercial fields.

The frequency synthesised solid-state circuitry gives a multi-mode transmitter operating between 2 and 30MHz at 10W r.f. output (5W a.m.) and reception down to 500kHz.

The use of a die-cast anodised aluminium front panel with a combined battery pack makes for a highly portable and virtually weatherproof station.

Flexible operation under a wide range of propagation conditions is assured by the provision of s.s.b., semi break-in c.w. and a.m. modes all switchable from the front panel along with high/low power selection, and the all-mode squelch. A noise blanker, multi-function meter and receiver offset control are also on the panel.

The rigs can also be powered from any external 12V d.c. 4A power source and the NiCads can be re-charged from the mains using the optional extra quick-charger.

Optional extras also include a whip antenna to plug into the front panel socket, a portable tripod whip antenna with its own carrying case, 11-channel pre-settable a.t.u. and a full-range manual a.t.u. for piggy-back mounting on the transceiver. A telephone handset and a back-pack carrying case are also available as extra.

For further details of the FT-70 range contact

Amcomm/ARE,
373 Uxbridge Road,
Acton, London W3 9RN.
Tel: 01-992 5765.

Soldering Station

Most forms of electronics call for a high degree of engineering skill regardless of whether it is amateur or professional.

To cater for the hobby end of the market Oryx have produced their DPU45 Soldering Station offering high technology at a competitive price.

Presented in an attractive two-tone grey metal case complete with iron stand and tip cleaning sponge. The temperature at which the iron is set can be seen at a glance on the digital readout simply by depressing a button.

All the control electronics is contained in the case, and temperature sensing is by a platinum thick film sensor in the iron itself. A thick film heating element is also used offering ultra-stable temperature control and long life. The electronics have been designed to eliminate switching spikes by using a zero crossing detector system and temperature over-shoots have been avoided by the use of proportional control techniques.

The station is normally priced at £112 but for *PW* readers it is available direct from ***Greenwood Electronics, Portman Road, Reading RG3 1NE. Tel: (0734) 595843*** for £84 incl. VAT and postage (Access or Visa acceptable).

Electron RTTY

Are you a frustrated Electron equipped radio amateur wondering why nobody ever seems to provide much in the way of radio based software for your computer?

Well, now you are in luck. G6LAW can supply you with a kit to provide the Acorn Electron with 8 input/output lines.

Based on the 6522 VIA, it is compatible with the BBC-B user port connector and now enables the Electron to be used for RTTY transceive operation.

To go with the port G3WHO has translated his BBC RTTY program for the Electron.

The kit costs £25.00, (£29.95 ready built) inc. post and packing. For further details contact ***Chris Rudge G6LAW, 5 Teal Close, Fareham, Hants PO16 8HG.***

Price List

I have been sent a list of components and services that can be supplied by ***Baxol Tele Exports Ltd., Newbawn, Rathdrum, Co. Wicklow, Eire. Tel: 0404 6521.***

As well as a range of semiconductors, they can supply 144MHz crystals, trimmers, p.c.b. mounted transformers, kits by Wood & Douglas and Velleman and, of course resistors, capacitors, etc.

They also service and repair all makes of masthead amplifiers and can supply the Polytron range of amplifiers, combiners, converters and filters. Any size of p.c.b.—up to A4—can be manufactured to order on glass fibre laminate. Ask for Tina EI9FW or Deiter EI5FF.

144MHz PA

Geoff Brown, GJ4ICD is producing a 144MHz 3CX800A 25W in/1kW out p.a. with p.s.u., fan, relays, etc., in kit form or built.

Details from ***Geoff Brown, Belmont Road, St. Helier, Jersey, C.I. Tel: 0534 26788.***

Low-cost Scope

The Altai OST5M is a 5MHz single-beam portable oscilloscope aimed at the low-cost end of the market.

Fitted with a 3in screen, it should have many applications in schools, factories, laboratories and with service engineers.

Price is £145.75 plus VAT. Postage adds £6.

For full technical details on the OST5M, and other test gear, contact ***Semiconductor Supplies International Ltd., Dawson House, 128/130 Carshalton Road, Sutton, Surrey SM1 4RS Tel: 01-643 1126.***

Dummy Load

The newly released Nevada Professional Series Dummy Load covers the frequency range 0 to 3GHz with a power handling capability of 15W.

Designed originally with the 934MHz personal radio and cellular radio markets in mind, this unit has many other applications as a result of its 3GHz capability.

The price is £29.95 incl. VAT and further details are available from ***Telecomms, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0705) 698113.***

Electrical Safety– The Shocking Truth Part 2

Roger Alban GW3SPA BSc(Hon) C.Eng MIEE, continues giving some tips on making it safer in your shack

Miniature Circuit Breakers

The disconnection time can be reduced if an electro-mechanical protection device is used instead of a fuse. The electro-mechanical device is called a Miniature Circuit Breaker (m.c.b.). The m.c.b. consists of a length of thermo metal, a solenoid and a trip bar mechanism, as shown in Fig. 2.1. When the overload current just exceeds the rating of the m.c.b., the current flowing through a length of thermo-metal will begin to deflect it in response to the heat generated. The thermo-metal will begin to move against the trip bar, releasing the trip mechanism. If the overload current is high, due to a short circuit condition, the current flowing through the m.c.b. will also pass through a solenoid which will pull-in a hinged action plunger, forcibly separating the contacts and simultaneously releasing the trip mechanism. In both situations of overload, the moving contact moves away from the fixed contact, and an arc will be established between the contacts. The arc will run along the arc runner to the arc chamber where it will be split up between the plates and extinguished. The low inertia and consequent high speed of the moving contact has a limiting effect on the flow of fault current. The rapid development of the arc together with its associated extinction in the arc chamber gives a typical operating time of 3·5 to 5ms, as shown in Fig. 2.2. The rapid speed at which the contacts are parted prevents the fault current from reaching its peak value. The high speed current limiting action of the m.c.b. ensures that the energy let through and any subsequent damage is minimised. The characteristics of a typical m.c.b. showing the two operating conditions is shown in Fig. 2.3.

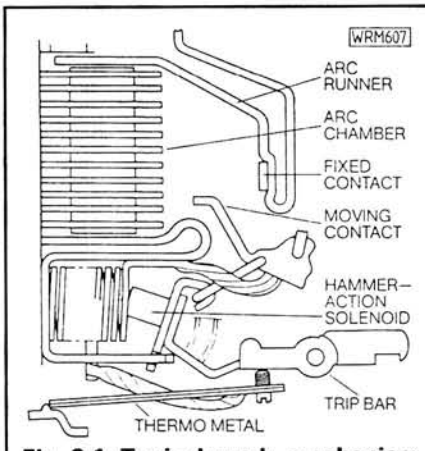


Fig. 2.1: Typical m.c.b. mechanism

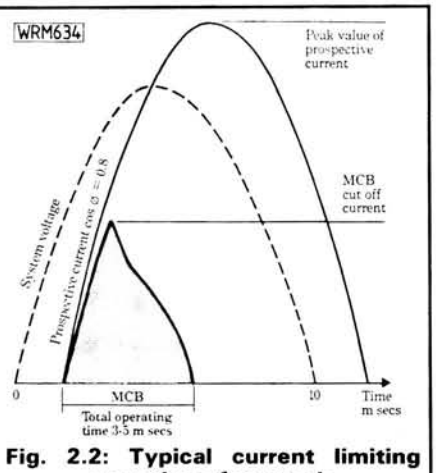


Fig. 2.2: Typical current limiting operation of an m.c.b.

Installing MCBs

To meet the requirements of the IEE Wiring Regulations, 1 January 1983 amendment, the m.c.b. must operate within 100ms. To cater for the different environments that an m.c.b. may encounter, different operating characteristics have been devised to meet the majority of different situations. For example, it would be unwise to install an m.c.b. with a sensitive characteristic in a circuit which is likely to experience heavy switching surges. The different classifications of m.c.bs are:

Type 1: Those having a magnetic operation over the range 2·7 to 4 times the rated current.

Type 2: Those having their band of magnetic operation over the range 4 to 7 times the rated current.

Type 3: Those having their magnetic operation between 7 and 10 times the rated current.

These values are such that in each case the current flowing ensures that the m.c.b. will trip within 100ms. Typical characteristics of the Crabtree Type 1 and Type 2 m.c.bs are shown in Fig. 2.4. The Type 1 characteristic is best suited for use on loads with little or no switching surges, as occurs in domestic application and the amateur radio shack! In addition, a Type 1 m.c.b., when compared with the characteristic of fuses, will give indirect shock risk protection for high values of loop impedance. The Type 2 characteristic is best suited for general commercial/industrial applications combining maximum usage with closest protection. Although this type of m.c.b. gives a similar degree of indirect shock risk protection to that given by certain fuses, the closer protection it affords on smaller overloads combined with the slower operation on heavier faults enables it to offer better protection with less likelihood of nuisance tripping.

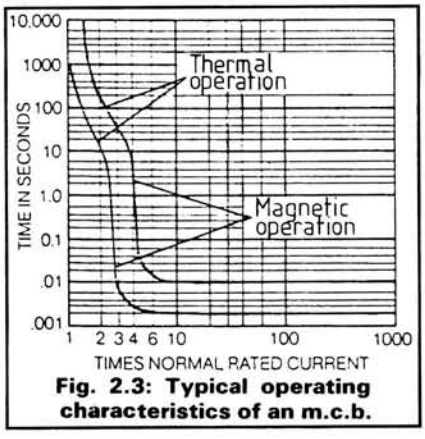


Fig. 2.3: Typical operating characteristics of an m.c.b.

The IEE regulations requires that the m.c.b., which is an over-current protective device, should be capable of making and breaking any over-current up to and including the prospective short circuit current at the point where the device is installed. The short circuit test requirements embodied in the relevant British Standard for m.c.b.s form a very searching trial of the circuit breaker's ability to clear short circuit faults safely and also to be reclosed safely against any existing faults. The trip-free mechanism will be designed to ensure that the breaker will, on experiencing the over-current again, open and therefore safely isolate the fault again.

Typical Installation

In a typical installation there will inevitably be other devices between the m.c.b. and the source of supply, due to the methods of breaking down the supply for the purposes of distribution. These other protective devices may be larger m.c.b.s or fuses of either

the re-wirable or cartridge type. In the typical domestic situation, the ring-main circuit will be protected by a fuse or m.c.b. at the point of distribution.

When designing a distribution system it will be necessary to consider the problems of ensuring effective discrimination between all the protective devices. Ideally, the protective devices in an installation should be so graded that, when a fault occurs, only the protective device nearest the fault should operate. The other devices should remain intact and should continue supplying the other healthy circuits.

Back-up Protection

In the situation where the prospective short circuit current might exceed the breaking capacity of the m.c.b., back-up protection will be required. Crabtree Starbreaker and MK Sentry m.c.b.s are capable of making and breaking over-currents of up to 6000A. If the prospective short circuit current is greater than 6000A, then the m.c.b. will require back-up protection by a suitable fuse. At the maximum fault level, the fuse may operate first. In most cases, it will be the m.c.b. which operates before the fuse and disconnects the circuit. When the Supply Authority cut-out contains a 60A fuse to BS1361, the cut-off current and the operating time of the fuse are sufficiently low that the Crabtree Starbreaker and MK Sentry m.c.b.s will be fully protected. In practice it is usually advisable to aim at the back-up fuse taking over at a fault current level not exceeding 70 per cent of the m.c.b.'s breaking capacity. However, the value of the back-up fuse must not be too low such as to lose discrimination between the two protective devices.

Power Distribution

Before embarking on the design of a power distribution system for the shack it is wise to establish first of all the size of the Supply Authority fuse. If this information is not readily available, then it is sensible to base the installation design on the premise of a 100A fuse being used. The existing domestic electrical installation is likely to have a main distribution consumer unit containing a number of fuses or m.c.b.s which distribute the domestic supply between the lighting and power circuits. If there is no spare position for an m.c.b. or a fuse, then the consumer unit will need to be changed for a larger unit. This sort of work must be carried out by a technically competent person, and reconnection of the supply made by the Electricity Board.

The total electrical energy demand likely to be required for the radio shack should not exceed 10kW, unless you are planning some DX activity which is outside the terms and conditions of your amateur licence! For supply demands below 10kW, the electrical feed to the radio shack can be provided by a cable containing a conductor size of 6mm². Probably the most popular type of cable used in domestic and some commercial wiring is known as 6mm² twin and earth which is protected by a grey pvc sheath. The current carrying capacity of this cable is 40A if the cable is enclosed and unable to freely dissipate heat losses. If the cable is clipped directly to the surface of walls and is not enclosed at any point along its length, the current capacity of the cable is increased to 46A. The cable can be terminated in the main consumer unit by either a fuse or m.c.b. The value of the m.c.b. should be such that it will protect the feed cable, supply the required load and operate if a short circuit condition should occur on the load side of the m.c.b. without any other protective device operating on the supply side of the m.c.b. The 6mm² cable will be adequately protected by the 30A m.c.b.

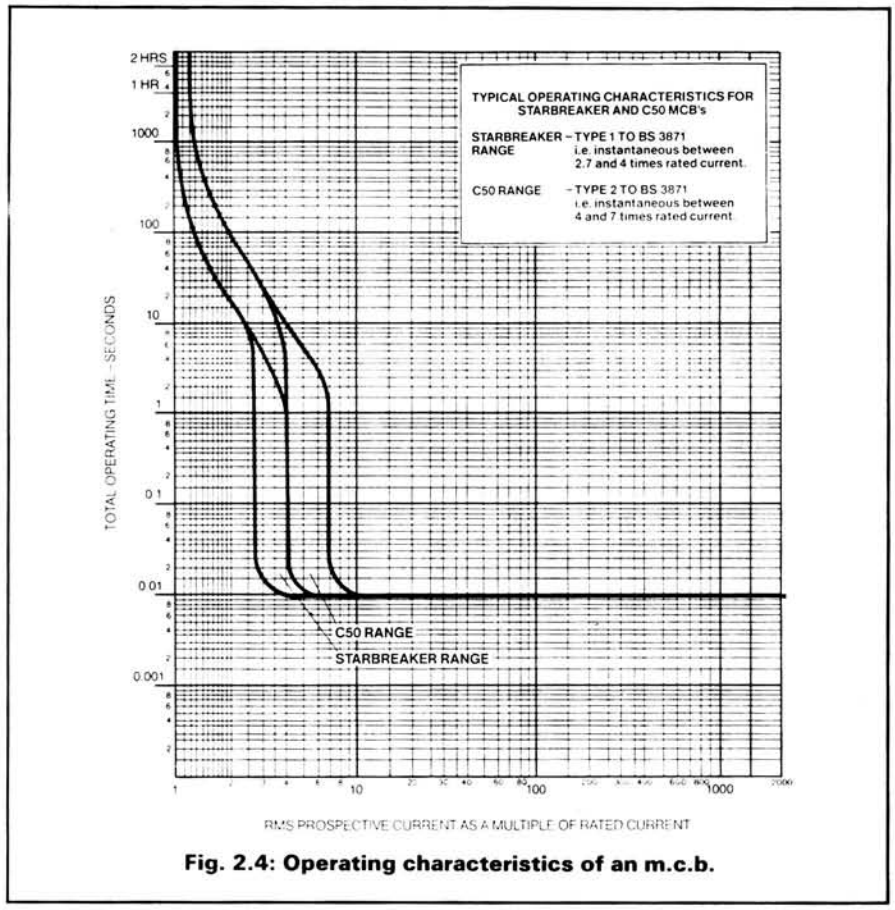


Fig. 2.4: Operating characteristics of an m.c.b.

Manual Isolation of the Supply

The shack end of the supply cable needs to be connected to some device which will quickly disconnect the supply manually in an emergency. From the previous discussion on electrical safety, it is important that the rescuer in an emergency can disconnect the supply easily and quickly inside the radio shack. It is recommended that an isolating switch should be positioned within easy reach by the entrance to the radio shack together with a number of emergency stop buttons which should be strategically placed around the shack. These should disconnect the power supply to the radio shack, excluding lighting, if any one of the stop buttons is pressed. The stop button can be connected to a contactor which will have its contacts normally open when the contactor coil is not energised. The author's preference is a system using an r.c.c.b. which contains an additional shunt coil, this will cause the r.c.c.b. to trip externally. Unfortunately, to date a suitable r.c.c.b. with a separate shunt coil has not been found. The author is not in favour of artificially tripping the r.c.c.b. by placing either the live or neutral wire to earth via a resistor when the thump switch is operated.

Crabtree manufacture a triple-pole and neutral m.c.b. which includes a shunt trip mechanism. The shunt trip must be connected such that the coil is de-energised once the m.c.b. has operated. The shunt trip coil is suitable for use on the normal mains supply. The Crabtree m.c.b. with the shunt coil are available in a range with different current ratings varying from 0·75A up to 60A. In this application a 20A m.c.b. will be suitable, and would also protect the power distribution within the radio shack. The catalogue number for the Crabtree C50 triple-pole m.c.b. is 64/20. The m.c.b. can be housed within a standard Crabtree surface mounted enclosure.

An alternative method is to use a double-pole m.c.b. containing a shunt trip for external tripping. Dorman Smith Switchgear Ltd. manufacture a range of m.c.b.s known as the Loadmaster range of miniature circuit

breakers. Shunt trips are available for single-pole, double-pole and triple-pole breakers. These protective devices are specially assembled in the factory and must be specified on ordering by adding the suffix ST to the appropriate Loadmaster catalogue number. The 20A, double-pole breaker catalogue number is LM2P20ST. The circuit breaker can be housed in a surface mounted box supplied by that company. The special m.c.b. needs to be located close to the entrance of the radio shack, and within easy reach. It may also be advisable to fix a suitable notice above the isolating switch appropriately labelled. The notice should advise visitors to the shack the location of the supply isolating switch. The various thump switches can be located in appropriate positions underneath the benches, but in view of the operator. Try and avoid locations where the knees are likely to come into contact with these thump switches and accidentally isolate the supply. This sort of situation often leads to the switches being tampered with to prevent accidental isolation, and so they don't operate in an emergency when required. The type of thump switch required will depend upon the type of isolating device you choose to use. A wide range of thump switches can be purchased over-the-counter direct from your local electrical wholesale dealer. The output from the m.c.b. with the shunt coil should be fed directly into the radio shack consumer unit which will contain the r.c.c.b.

Shack RCCB

Both MK and Crabtree manufacture consumer units which can incorporate an r.c.c.b. protective device. In the MK Sentry consumer unit, the r.c.c.b. occupies the space normally occupied by two m.c.b. modules. The r.c.c.b. can be supplied in a range of different current ratings from as little as 10mA up to 300mA earth leakage trip currents. The consumer unit will accept the Sentry m.c.b. which is supplied in a range of different single-pole overload tripping currents ranging from 5A to 30A.

Crabtree also manufacture a Starbreaker consumer unit which will house an r.c.c.b. which occupies the room taken by three m.c.b.s. The r.c.c.b. can be supplied in a range of

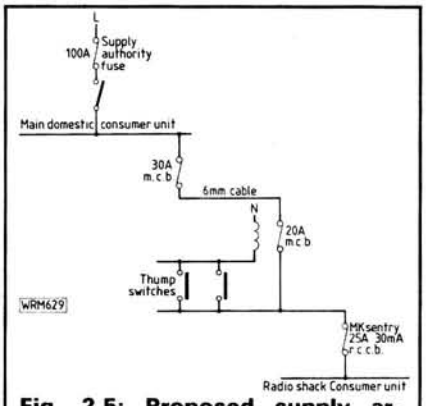


Fig. 2.5: Proposed supply arrangements feeding the radio shack

earth leakage trip currents varying from 10mA up to 300mA. The individual m.c.b.s are manufactured with a range of overload currents varying from 6A up to 40A. To increase the level of safety within the radio shack it would be advisable that the lowest value of r.c.c.b. should be used. However, this may prove counter-productive with an increase in nuisance tripping because of high values of leakage current to earth that may occur as a result of old mains transformers usually associated with pre-war and war-time manufacturer communications equipment such as the HRO and AR88 receivers.

If you think that this is likely to create a problem within your radio shack, the solution could be to fit a 30mA r.c.c.b. in place of the 10mA r.c.c.b. As discussed earlier, a 30mA r.c.c.b. will provide a high degree of protection against electrocution in an accidental radio shack hazard situation. The current flowing through a human body could vary between 30mA and 250mA, depending on the resistance of the human body and the voltage across it. To be within Zone 2 of the IEC curves shown in Fig. 1.4, it is necessary for the r.c.c.b. to operate within 50ms at 240mA, and 150ms at 80mA. Both these conditions are satisfied by a 30mA r.c.c.b. If 10mA r.c.c.b. is used instead, further protection against the likelihood of ventricular fibrillation will be provided.

However, to protect against the effects of electric shock it would not be wise to use an r.c.c.b. rated higher than 30mA. The two different manufactured r.c.c.b.s also act as the main switch for the consumer unit and have been designed with a mechanism to trip when a specified value of overcurrent is detected in a similar manner to an m.c.b.

The Crabtree Starbreaker 3-module r.c.c.b.s are rated from 32A up to 80A, and the MK Sentry r.c.c.b. units are rated between 16A and 80A. For the power distribution system that is being designed for the radio shack, the author would suggest from practical experience that a 30mA r.c.c.b. should be used. However, if the 20A m.c.b. with the shunt trip coil which has been installed on the load side of the consumer unit is not to trip before the r.c.c.b. has detected the overload current, then a 16A, 10mA Sentry r.c.c.b. (No. 6316) should be used. Alternatively, if you are content with the m.c.b. with the shunt coil tripping before the r.c.c.b. switch, then a Sentry 25A, 30mA r.c.c.b. (No. 5725), or a Crabtree 40A, 30mA Starbreaker r.c.c.b. can be used. It is wise to remember that the shunt coil m.c.b. has been provided to act as an isolating switch and also to respond to the command of the various thump switches to isolate the supply to the radio shack in the case of an emergency. The circuit diagram of the proposed radio shack power feed is shown in Fig. 2.5.

Power Distribution

The size of the shack consumer unit will depend on the system of power distribution you adopt for the radio shack. It is wise to consider what equipment needs to be connected to the power distribution system. The last thing you will want is not to have sufficient power sockets and be continuously swapping around plugs to connect pieces of equipment to the supply. Another consideration is the possibility of segregating the supply to various pieces of electrical equipment. For example, the amateur radio equipment can be fed from a different part of the supply to that for the test equipment. This will help to split up the electrical load, and permit you to use lower values of m.c.b.s which in turn will improve the protection against overcurrent.

Part 3 will conclude this series on safety

BATC Convention Report

The 1986 British Amateur Television Club Convention took place on Sunday, May 4, at the Post House Hotel at Crick, close to junction 18 on the M1. As in previous years, this venue proved popular, with visitors from all over England and Wales plus at least one contingent from north of the border. Colin Redwood G6MXL reports on the day's events.

In order to cope with the ever-increasing number of visitors and traders, a large marquee was erected in the hotel grounds. It was used to accommodate some of the many traders and to permit a larger room to be used for the lectures. Every aspect of the amateur television scene was represented, including narrow-band, slow-scan and fast-scan, with both transmitting and receiving gear. My apologies to any exhibitors that I missed; there was so much to see!

The increasing interest in 1·3GHz f.m. TV was very evident judging by the many pieces of equipment for the band on display by the various traders. One, DC to Light, had distributed over 90 leaflets and sold most of their stock within 15 minutes of the convention opening. They also have what the author believes to be the first commercially available 10GHz TV transmitter for the UK amateur market. Comex were selling a range of modules intended for use with satellite TV reception, but which are also suitable for f.m. operation on other bands. Wood and Douglas were showing their new 1·3GHz transmitter, which unlike the previous model operates directly at the output frequency and does not employ a tripler. The Solent Scientific stand was busy with many enquiries about their popular range of 1·3GHz gear.

By shopping around the traders, it would have been possible to buy a complete FSTV station for 430MHz or 1·3GHz. For the SSTV enthusiast Drae were showing their transmitter and receiver, together with their popular power supplies.

In addition to the various trade stands, there were displays by repeater groups, slow-scan television enthusiasts and the Narrow-band Television Association. The Remote Imaging Group had a fine display of members' activities. The Worthing Group were selling ATV software, 1·3GHz colinear antenna kits and a host of other goodies to help support their repeater. The quality of the colour slow-scan was most impressive. One exhibitor was displaying a well-known test card using both fast and slow-scan techniques. It wasn't until the viewer got to a nearly normal viewing distance that this became apparent.

No BATC Convention would be complete without the outside broadcast enthusiasts. As well as various ex-broadcast vehicles, this year it was possible to see how small a modern unit could be. A small electronic news gathering (e.n.g.) vehicle from Independent Television News was present —its pneumatic antenna masts seemed to be the envy of most visitors!

Throughout the day, the BATC stand was kept busy with membership applications, enquiries, and the sale of various books and printed circuit boards for club projects. Back issues of *CQ-TV* (the club's quarterly journal) have almost sold out, so the club has produced a *Best of CQ-TV* book, which is crammed full of the most popular articles from the past five or six years.

As well as the various trade stands, etc., there were a series of lectures. These provided a welcome chance to sit down and be enlightened in various aspects of the hobby. Two of the three lecture sessions concentrated on 1·3GHz TV, the first of these dealing with f.m. repeaters. Representatives from 9 of the current 11 TV repeater groups were present. Many groups were concerned at the inordinately long time it seems to be taking to get licences issued for repeaters. Discussions also covered possible techniques for linking TV repeaters.

In the second lecture, Andy Emmerson G8PTH gave a brief resumé of equipment and techniques for 1·3GHz operation before showing a video of some activity on that band from our continental cousins. Particularly impressive were the superb graphics used. The final lecture dealt with the various uses for micro-computers in an ATV station. Proceedings were rounded off by the Biennial General Meeting.

If you are interested in joining the BATC, please send a large (241 × 165mm) s.a.e. for full details to: The Membership Secretary, "Grenehurst," Pinewood Road, High Wycombe HP12 4DD. **PW**

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Kit Construction– It's Easy

With a new amateur band allocation, a 50MHz pre-amplifier seemed just the thing to go with the 50MHz transverter. Elaine Richards G4LFM looks at the Wood & Douglas 50MHz r.f. switched pre-amplifier, the 6PA4/S.

The Wood & Douglas 50MHz pre-amp is a modified version of the tried and tested 144PA4/S switched 144MHz pre-amp. If no supply is connected, r.f. signals can pass in either direction through the circuit with minimal attenuation. When the supply is connected, the pre-amplifier is automatically switched into circuit in receive mode. Switching is achieved by *pin* diodes which are turned off as soon as a significant power level from the transmitter is sensed at the output. The circuit has a "hang-time" of about 100ms to prevent switching occurring in the middle of an s.s.b. transmission, according to the instructions. This seems to be sufficient as no problems were noticed during actual QSOs.

Components

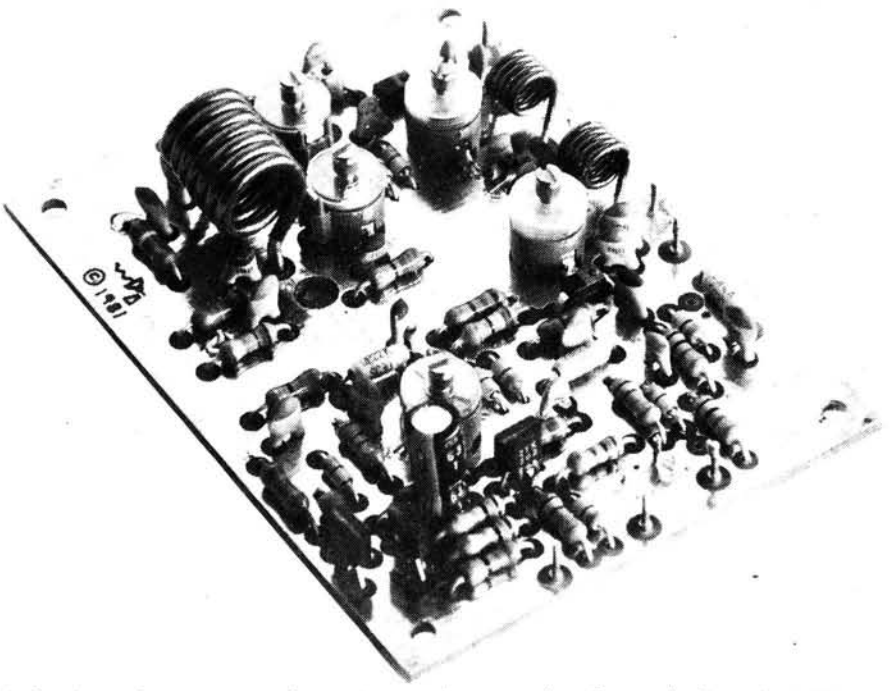
The kit arrived safely and neatly packaged. The p.c.b. is double-sided, tinned and made from very good quality glass fibre. All the holes on the p.c.b. were drilled to the correct size for each component, saving me the job of filing out the holes for larger components—a job I really dislike.

The ceramic plate capacitors were particularly good as they were of a very high quality. Instead of the ceramic coating ending up half-way down the leads making them very difficult and messy to fit, they were finished cleanly leaving the leads easy to solder. They were all a perfect fit in the p.c.b.—avoiding a common failing with many kits. Plenty of constructors have been faced with the ceramic plate that splits in half during construction because the hole spacing is wrong, and it's always the value you haven't got in the junk box!

All the coils were ready wound and stripped, which again is a welcome change. The leads only needed dressing to fit the p.c.b.

Instructions

The component placement drawing is a little small and uses the "old-style" symbols rather than the "blocks" normally used, so it could be rather confusing to a newcomer. The construction notes are on a different side of the instructions to the p.c.b. component placement drawing, so the best thing to do in these circumstances is to photocopy the overlay for easy reference.



The capacitor mounting details were a bit confusing as the instructions said don't solder the earth connection on top of the p.c.b., while the mechanical drawings gave you the option.

Also capacitors C31 and 32 were not on the p.c.b. layout and were not mentioned in the text. Fortunately the circuit diagram showed their function and they were fitted on the back of C5 and C8—as can be seen from the photograph.

The instructions supplied with the kit were easy to follow, although I wouldn't necessarily recommend it as a "first" kit because the trimmer capacitors need to be soldered to both sides of the board and this can be a little tricky if you haven't had much practice. Once these trimmers have been soldered to the board the rest of the components follow in the usual order. If you forget to solder to the ground plane side where specified it is very difficult to remedy this later as the hot iron often damages adjacent components.

The p.c.b. component placement drawing did show a screen in the r.f. amplifier, but no mention was made of this in the text. I suspect that this screen is only required on the 144MHz version as the kit I built suffered no stability problems.

Testing

The instructions for testing the kit were quite straightforward, and no problems were encountered. Nothing more complicated than a 50Ω power meter or v.s.w.r. meter is necessary to set up the kit, although other pieces of test equipment are useful. When it comes to adjusting the signal to noise ratio, obviously, as the instructions point out, a SINAD meter is very useful here, but they do say that tuning for maximum signal strength will be almost as good.

There are included also a few methods of building an attenuator if the gain of your pre-amp is too great. The specification states a 17dB gain overall.

A useful tip to check the gain of your pre-amp is as follows:

(1) Connect the pre-amp to a 50MHz receiver or transceiver.

(2) Connect a signal generator to the pre-amp input and adjust the output level of the signal generator for a reading of S9 on the receiver. Note the setting of the output control of the signal generator.

Practical Wireless

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PCB SERVICE

Printed circuit boards for recent *PW* constructional projects are now available from the PW PCB SERVICE. The boards are fabricated in 1·5mm glass-fibre, and are fully drilled and roller tinned. All prices include VAT and postage and packing for UK orders. Add £2.00 per order for despatch to overseas addresses.

Orders and remittances should be sent to: **PCB Service, Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP. Cheques should be crossed and made payable to Practical Wireless.**

When ordering, please state the Project Title and Issue Month as well as the Order Code. Please print your name and address clearly in block capitals, and do not send any other correspondence with your order. You may phone your order using Access.

Please allow 28 days for delivery. Always check the latest issue of *PW* for the current details of price and availability. Note that we can only supply the p.c.b.s listed in the most recent issue.

PROJECT TITLE *(Issue)*	ORDER CODE	PRICE
PW Marchwood *(Jul. 83)*	WR161	£3.32
Bug Key with Memory *(Oct. 84)*	WR189/WR192	£10.35
PW Teme—TX *(Nov. 84)*	WR196	£4.83
PW Teme—VFO/Doubler *(Dec. 84)*	WA001	£3.76
PW Teme—RX *(Jan. 85)*	WA002	£5.46
PW Triambic Keyer *(Feb. 85)*	WAD280*	£4.26
FRG-7 BFO Mod *(Feb. 85)*	WAD249	£4.00
PW Colne *(Apr. 85)*	A004	£4.14
	A005	£4.08
PW Colne *(May 85)*	WR198	£5.01
PW Colne *(Jun 85)*	WR197	£4.97
Battery Charge Control *(Jun. 85)*	WAD302	£3.94
Crystal Tester *(Jul. 85)*	WR200	£3.43
Add-on BFO *(Aug. 85)*	WR201	£3.42
UHF Prescaler *(Sep. 85)*	WR202	£4.76
PW Meon 50MHz Transverter *(Oct. 85)*	WR199	£8.28
Capacitance Meter *(Oct. 85)*	WR203	£3.74
WQ MW Loop *(Nov. 85)*	WR204	£3.45
RTTY/Morse Modem *(Jan. 86)*	WR205	£6.73
	WR206	£3.78
Crystal Calibrator *(Jan. 86)*	WR207	£2.90
Simple Audio Oscillator *(Mar. 86)*	WR209	£5.50
RF Speech Processor *(Mar. 86)*	WR208	£5.21
PW Meon Filter *(Apr. 86)*	WR211	£4.04
PW Arun Parametric Filter *(May 86)*	WR210	£9.87
FRG-7 CIO Mod *(Jun. 86)*	WR213	£3.61
Simple 50MHz Converter	WR215	£4.68

(3) Switch the pre-amp out of circuit and re-adjust the signal generator output for an S9 reading.

(4) The difference between this new output setting and the previous one represents the gain of the pre-amp and can be read from the generator output control.

If your signal generator doesn't cover the required frequency range all is not lost, as you can use the harmonics produced by the signal generator to cover frequencies higher than its basic range.

For example, 50MHz can be covered by using the 5th harmonic of a 10MHz signal generator. A little rough and ready perhaps, but it does work. The kit built showed a gain of 20dB using this method.

Switching

The trans/receive switching is very versatile and can be r.f., voltage or ground switched according to the information given with the kit. The unit can also be powered via the coaxial output lead allowing for complete remote operation.

For our "on air" testing, the trans/receive switching was achieved by using the T- terminal to the p.t.t. line in the transceiver. By using this hard wired switching the 100ms hang time is avoided (a tip for any AMTOR buffs amongst you).

Finishing

The unit needs to be well boxed, ideally a die-cast aluminium box or similar, as per normal practice with v.h.f. pre-amps. I will go into the various methods of boxing your kit or home-brew projects next month, hopefully giving a few ideas of how to make your own work look most professional.

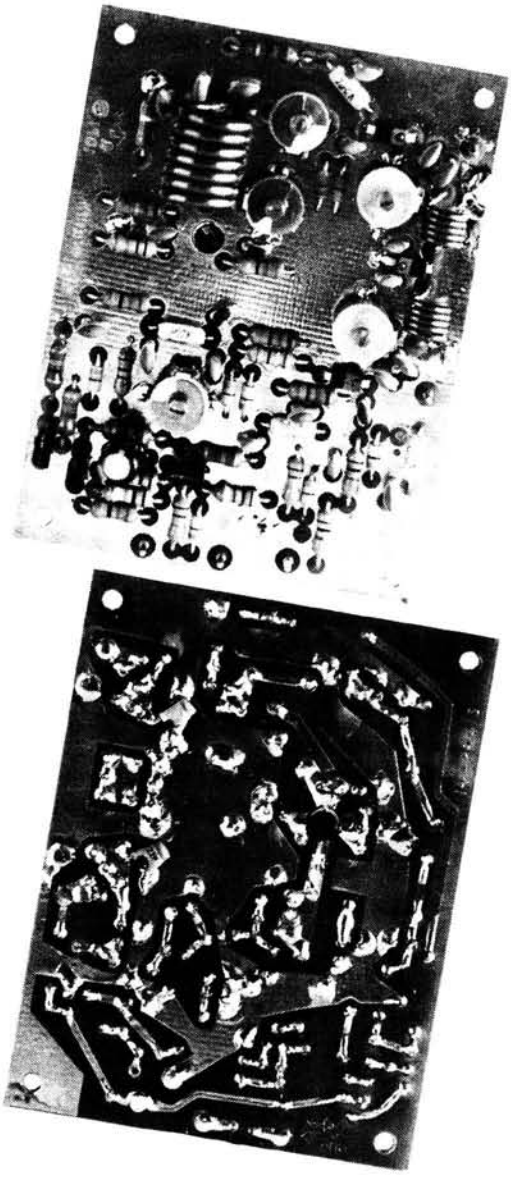
On Air Testing

The pre-amp was tested "on air" eventually, the biggest problem was finding a signal on the band. It's not the best v.h.f. site in the world here, near to sea level and surrounded by plenty of high ground—a nearby water meadow makes it a good h.f. site though! In the end I nearly had to revert to the age-old trick of telephoning a fellow amateur to get a signal on the band. But I did hear a signal or two on Sunday, not all DX but at least they proved the system worked well. Reports in all directions were more than satisfactory.

Cold Feet

As with all Wood & Douglas kits, if you receive the kit and feel that you would rather have an assembled and tested version then you can send it back with the balance and a completed kit will be dispatched. Or if it fails to work they will repair the kit on a charge basis explained in the instructions.

The 6PA4/S kit costs £19.50 including post and packing, a completed and tested version costs £31.20 inclusive. They are available from **Wood & Douglas, Unit 13, Youngs Industrial Estate, Aldermaston, Berkshire RG7 4PQ.** Many thanks for the review kit.



SWAP SPOT

Have Heathkit Laboratory Oscilloscope model IO-12 with leads, Scopex 456 6MHz 'scope—solid state but not working, Codar PR30 r.f. pre-selector, Drae 3-way antenna switch v.h.f. All in very good condition. Would exchange for w.h.y. S. Deacon G6HVS, 25 Moseley Road, Bebington, Wirral, Cheshire. Tel: 051-334 6859. *B463*

Have Heathkit separates, SB-301 and SB-401 h.f. transceiver, 6 bands 3·5—30MHz. Would exchange for 144MHz multimode, airband receiver, 0/100MHz frequency counter, signal generator etc. Geoffrey Marshall, 4 Wellpark Walk, Manchester 10. Tel: 061-682 1243. *B471*

Have IBM C16 home computer, new. Would exchange for TV camera or w.h.y? Tel: 06667 7820. *B474*

Have Yaesu FT-290R plus muTek and NiCads etc. Would exchange for Argonaut or HW8 or general coverage receiver, w.h.y? Tel: Dalgety Bay 822206 (evenings). *B477*

Have two guitars, one electric, one twelve string, plus Canon cine camera and projectors, plus Texas TI99/A computer. Would exchange for FT-480R, FT-290R, TR-7800, TR-9000 or w.h.y? Ian, "The Dormouse", 5 Sunset Walk, Bush Estate, Eccles-on-Sea, Norfolk NR12 0SX. *B479*

Have TVDX colour receiver/monitor, 6in Sony KV6000BE, v.h.f. 1/3, PAL B?GH?I, 5·5/6MHz sound with a.c. p.s.u. and battery/charger, v.g.c. including 1 year guarantee. Would exchange for general coverage receiver as Trio R2000, Yaesu FRG-8800. Tel: 0241 72273. *B485*

Have Murphy A122M 5 valve superhet covering long, medium and short wavebands in excellent condition, beautiful wooden cabinet. Would exchange for Hacker receiver in similar condition. Tel: Reading 883799. *B505*

Have Ross 16 × 50 binoculars, excellent condition. These are high class English made glasses. Would exchange for communications receiver or scanner. Tel: Ottershaw 4248 after 7.30pm. *B506*

Have Storno 900 direct dial system 4 car telephone. Would exchange for u.h.f. or v.h.f. mobile rig or h.f. linear. G4VNG. Tel: 0733 231639. *B519*

Have Vic-20 computer plus joystick and games. Would exchange for any good scanner. Rod. Tel: Longstratton 30685 (Norfolk). *B520*

Have f.m. a.m. signal generator, Hewlett Packard 202H, 54–216MHz, absolutely mint condition, recently serviced with comprehensive service manual. Would exchange for FRG-7 or similar general coverage receiver. Must be in mint condition. John. Tel: 0224 40242 ext 5485 (office hours). *B530*

Have Akai VP7100 portable VTR with spare battery pack and charger plus Panasonic colour camera WV3000E. Would exchange for best transceiver offered. Vic Driver. Tel: Woodhall Spa 53576. *B568*

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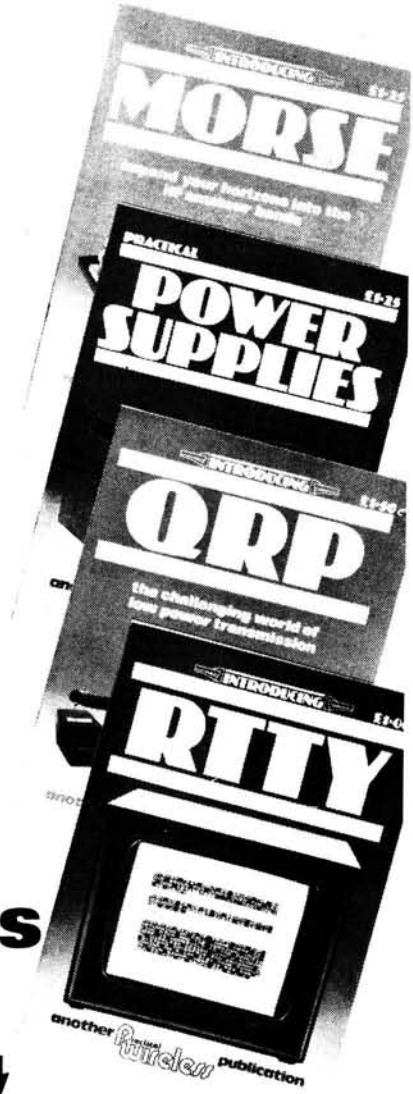

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EDXC Conference 1986

Simon Spanswick, Assistant Secretary-General of the European DX Council and a DX enthusiast since his school days, reports on the proceedings of the 20th EDXC Conference.

Paris was the place to be between May 16 and 19, for the French capital was the venue for the 1986 European DX Council Conference. More than 180 delegates travelled from 20 countries, representing East and West Europe and from further afield, Korea, North America, Taiwan and Australia. The conference was notable for the number of anniversaries celebrated during its course. Apart from seeing the 20th annual EDXC Conference, 1986 marked the 40th anniversary of the first publication of the *World Radio TV Handbook*, whilst during the conference, May 17 was World Telecommunication Day, which commemorates the founding in 1865 of the International Telecommunication Union.

The conference, which was most efficiently organised by the French DX club, Amitie Radio, started on Friday afternoon with a presentation by Telediffusion de France (TDF) about France's plans to inaugurate a Direct Broadcasting by Satellite (DBS) service using the new TDF1 and TDF2 satellites. This new service, which may also include a satellite version of Radio France Internationale, will use the French-pioneered D2 MAC/Packet television system which, it is said, has a better picture quality than either PAL or SECAM (the French TV system) and will accommodate the development of large-screen viewers.

Welcome

On Saturday morning, the main working session of the conference got under way, with Roland F. Paget, President of Amitie Radio, and the Council's Secretary-General, Michael Murray, welcoming the assembled masses to the event.

The morning's presentations started most dramatically with an audio-visual display given by Jonathan Marks of Radio Netherlands' English Service. Entitled *A Bit of Chaos*, this looked at some of the challenges facing international broadcasting at the present time, with the overcrowding on the bands and the increasing popularity of satellite and cable services. The presentation examined some of the possibilities for short wave radio in the future, with less expensive and more sophisticated computer technology coming on stream. One such development may be the "credit-card schedule", where receivers would have the capability of reading s.w. schedules stored on magnetic strips which might be produced by stations. The presenter also looked at the results of the EDXC Computer Survey which was held during last winter, and to which more than 1200 replies were received.

These showed that, at present, few home computers are being used to their full potential in connection with short wave radio—most are employed simply for the keeping of listening logs and for use as word processors when writing to clubs and stations. Only a very small proportion of micro-computers are presently being used in conjunction with receivers for computerised control and memory functions. Finally, the lecture looked at the new computer system developed in The Netherlands for short wave radio listeners. Known as INFODUTCH (INFOrmation of Direct Use To Computer Hobbyists) it provides a service to listeners having a home computer and a telephone line with modem to access the Radio Netherlands computer and obtain information including a regularly updated Propagation Report, tests on receivers and other DX-related news.

Following on from this high-speed audio-visual extravaganza, the conference welcomed Mr K. Munekata to the lectern. Mr Munekata is the Manager of the Engineering Section of the General Audio Division at the Sony Corporation in Tokyo, and he looked at "Sony and the Future". The presentation examined the development of transistorised short wave receivers from the early 1960s through to today's high-tech, state-of-the-art equipment, such as the ICF7600D and the ICF2001D. The system of ECSS (synchronised detection) as fitted to the 2001D was explained in some detail and Mr Munekata went on to say that this was just the first in a long line of potential enhancements to short wave receivers which are currently being researched by Sony. With communications technology changing at such an astonishing pace, and with micro-chips becoming less expensive and yet capable of performing more and more complex tasks, the short wave receiver of the future may be vastly superior to today's sets, and proportionally less expensive.

Conference was then honoured to receive Herr Werner Wolter, an Executive Director of the International Telecommunication Union in Geneva. After a brief multi-lingual introduction, Herr Wolter explained to delegates the significance of World Telecommunication Day, and related some of the history of the Union, originally known as the International Telegraph Union.

The BBC External Services exhibit with Dennis Thompson loading the BBC Micro-computer

All photos courtesy Radio Amitie

East meets West: representatives from the Korean Broadcasting System meet listeners from the UK and Spain

Herr Wolter went on to explain some of the ITU's role in international broadcasting, and in particular about the World Administrative Radio Conference for the h.f. bands (WARC–HFBC), the final session of which is due to be held in Geneva between January and March 1987. The short wave bands are becoming more and more crowded, he observed, and are subject to escalating amounts of jamming which combine to make the administration of the h.f. spectrum increasingly difficult.

The present system is also perhaps rather unfair, as each member state is entitled to the same number of votes in WARC sessions—namely one. How, therefore, can one rationalise the needs of countries such as the USA with those of third-world nations such as Burundi who also want an international h.f. service? Much work is thus needed to improve the system and to ensure the fair distribution of the precious h.f. resource. Herr Wolter commented on the importance of organisations such as the European DX Council in representing the "end-user" of the short wave "product", and welcomed the opportunity presented by the Council's annual conference to promulgate the valued co-operation between the ITU and EDXC.

Following a break for coffee, Dennis Thompson, Head of Transmission Planning Unit at the BBC External Services, took the floor to talk about WARC–HFBC, with the theme "**W**e **A**ll have **R**adio **C**hannels—**H**ow About **F**inding us **B**etter **C**hannels?". He explained some of the problems facing WARC–HFBC in 1987, and in particular the enormous strain that is being put on the whole h.f. administration with the present unprecedented increase in requirements by member states for h.f. channels.

An example used to demonstrate this problem was the increase in requirements for channels to be used by 500kW transmitters on 9MHz (31m). Here the number of requirements has increased from around 600 in the second half of 1985 to more than 2000 in the first half of 1986. Clearly such an enormous leap is extremely difficult to accommodate and this is just one of the many problems facing WARC–HFBC when it convenes. Jamming is, of course, another dilemma for WARC for which there is no easy solution. However, Dennis Thompson observed, there is more spectrum space becoming available between 3 and 30MHz as fixed services take advantage of new technology and move from h.f. to satellite, thereby releasing frequencies for international broadcasting.

Receiver Technology

In the field of new technology, the EDXC Conference was treated to a new wonder, the Japan Radio Company's NRD-525 receiver. Roger Ellis, the UK representative for the company, gave a presentation which looked at the new receiver and its development from the 515, noting its highlights and innovations, and describing the electronics which make it such a desirable piece of equipment for s.w.l.s and DXers *(See* PW *June 1986 for a preview of this receiver—Ed.)*

The final presentation of the morning session came from Kjell Ström, the European representative from the Yaesu-Musen Company, who talked about their computer-aided tuning system (CAT). This is a means of controlling a receiver or transceiver by a home computer, but does not differ greatly from other uses of a computer. Instead, perhaps, of sending information to a printer, the computer can send instructions to a receiver and it will do whatever one wants it to do. Benefits of this system are many: it could be especially useful to people who have difficulty in handling a receiver, such as the handicapped. People confined to a bed could have a small keyboard on their bed and control the receiver from that. Alternatively, s.w.l.s could keep transmitting schedules on data files in the computer and use this information for programmed listening or recording, or for automatically trying different frequencies which may be on air at the time. The limits for the application of this system are really only those of the computer programmer's imagination.

In the afternoon, the conference exhibition, known as the EDXC Forum, opened its doors. Here the clubs and radio stations represented at the conference had the opportunity to display information, schedules, bulletins and other goods, as well as to give away stickers, badges and other "freebies". Among the more popular exhibits was a computer-controlled JRC NRD-525, whilst on the BBC External Services stand, a BBC Master Series computer was in action with demonstrations of BBC TV computer graphics, a World Service frequency information chart program, and a spectacular propagation program. Using the latter, one could enter a BBC transmitter site, a target area, plus the time and date, and the computer would calculate which frequencies would propagate to the target, and how reliable in percentage terms of days of the period such frequencies would be. This program is a scaled-down verson of the Propagation Program actually used by the Transmission Planning Unit to evaluate paths and frequencies.

Kjell Ström addressing the Conference whilst Michael Murray looks on

Working Groups

On Sunday morning, most delegates formed into three Working Groups which discussed Computers in DXing, Medium Wave DXing and, for French linguists, a French DX group. Discussions within each group were wide-ranging and the exchange of ideas proved useful for all involved.

After lunch, delegates assembled for the first Broadcasters' Forum to be held at an EDXC Conference. Representatives from Radio France International, Swiss Radio, Radio Netherlands, ORF-Vienna, Radio Sweden, the Voice of America, Radio Berlin and Radio Australia were able to respond to questions from the delegates, and topics ranged from whether there is a future for h.f. broadcasting with satellite broadcasting coming on stream (to which the answer was a most definite "yes"), to the importance of listener response and criticism. The Forum proved to be highly successful and will doubtless become a regular feature of EDXC Conferences.

Later in the afternoon delegates were able to participate in technical visits and sightseeing tours, and in the evening the Conference Banquet was held. Presentations were made to several DX personalities at the banquet, including Anker Peterson, a founder of the DX Council; Jens Frost, Editor-in-Chief of *World Radio TV Handbook,* and Jonathan Marks, Producer of *Media Network* on Radio Netherlands.

The concluding session of the conference was held on Monday morning, with presentations by Mike Burden of the MW DX Group, Radio Mediterranean and the Voice of Free China, a varied end to one of the most successful EDXC Conferences to date, which was found to be a very enjoyable and worthwhile event by all of the 180 or so delegates.

And for the future? Helsinki between 5th and 8th June 1987 for the 21st European DX Council Conference. **PW**

PAST GEMS

Practical Wireless
October 1, 1932

"Narrowcasting"

They have a way of doing things in America that seldom occurs to people on this side (just as well, perhaps). The other day, for instance, it was the occasion of the opening of the new 50kW WGY transmitter at the Schenectady Station of the General Electric Co. of New York, and a huge crowd of people were present at the ceremony. Even the Government co-operated in the affair, and loaned the United States Navy airship, the *Los Angeles*, to participate in a stunt piece of transmission through the transmitter. The airship from aloft shot a beam of light on to a mirror some half a mile away, and a programme was sent over the beam that was easily followed by the audience below. This method of "narrowcasting", as they call it, was that originated by Mr. John Bellamy Taylor, this gentleman having sent the human voice over a beam of light on many occasions. In this case the transmission was particularly successful, as the programme was picked up by a sister airship, the *Akron*, many miles away over the Pacific. The beam of light is modulated by the voice, and the photo-electric tube in the receiver responds to the modulated light, affecting the electrical impulses in the amplifier, from whence it is fed to the transmitter. As a freak transmission, I suppose the system serves its purpose, but I am afraid I cannot see much future for it commercially, at any rate, particularly as a good pea-soup fog would put the whole thing out of action, I should think.

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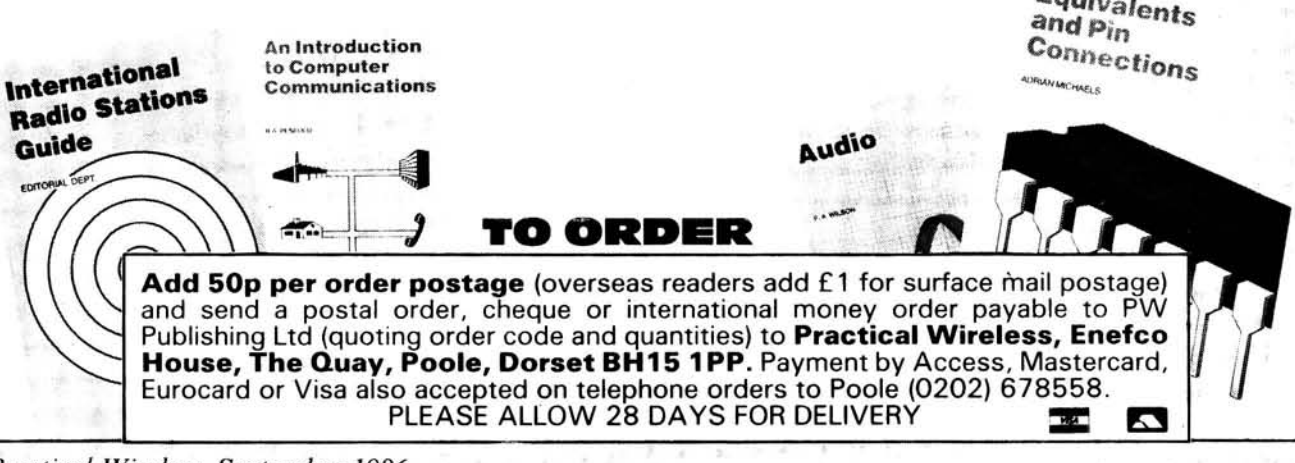

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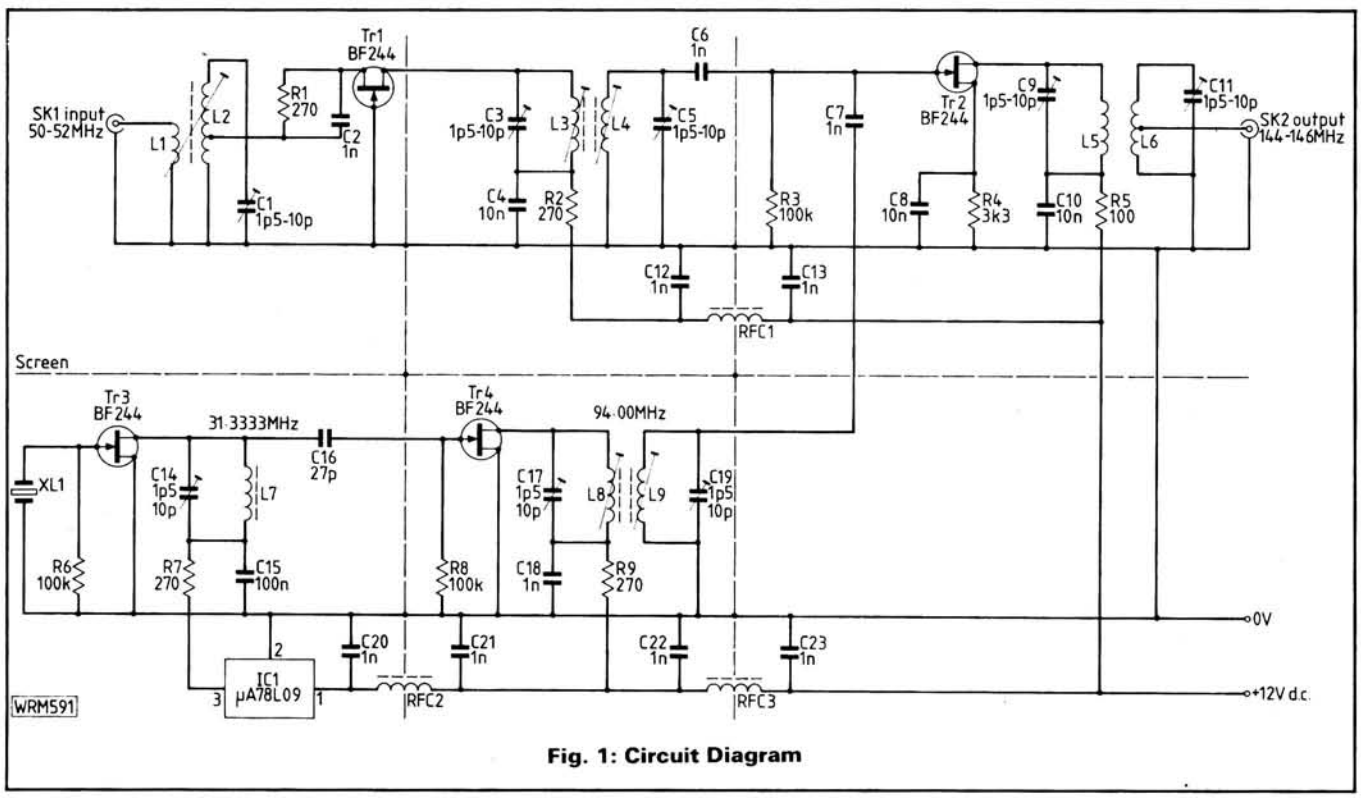

Fig. 1: Circuit Diagram

This project is just right for all those who are interested in 50MHz (6m) but not convinced that it's worth spending lots of cash and time on putting a signal on the band yet. The design uses home-wound coils and easily obtained discrete components.

Circuit Description

The circuit shown in Fig. 1 consists of four stages all using BF244 j.f.e.t.s. The first stage, formed by Tr1 in common-gate mode, is an r.f. amplifier tuned to the 50MHz band. Its source is coupled to SK1 by L1/L2, and its drain is coupled to the mixer stage formed by Tr2 via L3, C3/L4, C5 which is a bandpass filter. Transistor Tr2 is used as a single-ended mixer, the local oscillator (l.o.) injected signal is fed in on the gate, together with the received signal. The drain of Tr2 is coupled to another bandpass filter L5, C9/L6, C11 tuned to the 144MHz (2m) band. The output of the converter is connected to a tap on L6. The l.o. input to the mixer is derived from a 31·3333MHz crystal in an overtone oscillator formed by Tr3. The tuned drain circuit of Tr3 is capacitively coupled to the gate of Tr4 which is configured as a frequency doubler. The mixer injection frequency of 94MHz (3 × 31·3333) is capacitively coupled from L9 to Tr2. The supply rail for Tr3 is regulated by IC1 to improve frequency stability. All supply lines between stages are well decoupled by individual pi-filters made from two 1nF capacitors and a 1mH r.f. choke, in order to reduce spurious interaction between stages.

Construction

Prepare the p.c.b. to take the coil formers and trimming capacitors. These components will need larger or specially shaped holes to accommodate their legs and bodies. These alterations, if needed, are best made with a needle file and 1·5mm twist drill. After this operation mount all the components in order of profile height. All vertical coil formers are fixed to the p.c.b. with rapid setting epoxy resin. Horizontal coils L5 and L6 are self-supporting, L8 and L9 have formers to take iron dust adjusting cores. All coil winding data is given in Table 1. The *PW* prototype used epoxy resin to secure the windings to the formers. Coils L1–L5 and L7 were wound after the formers had been fully set in the p.c.b. The remaining coils were wound on a mandrel, e.g. a twist drill of the correct size. Lastly the inter-stage screening partitions need to be cut from the tin salvaged from a soup can, any tin-coated steel of similar gauge will do. Cut three pieces 25 × 60mm and two pieces 25 × 40mm, lightly clean the surface of the tin to enable easy soldering. Next cut ten lengths of 19s.w.g. tinned copper wire. Solder these into the p.c.b. at the points marked X on Fig. 3. These points are staggered across the board so that the partition will locate between them. The screening plates can now be soldered to the wire supports, after making the cut-outs to clear the r.f.c.s, of course.

Alignment

For the alignment of the converter you will need a g.d.o. (*PW* October 1985), a local 50MHz signal and an analogue multi-meter with an a.c. current range. First, turn all trimming capacitors to their mid position, then turn all ferrite cores to about 2mm from the top of their formers. Set the g.d.o. to around 50MHz, loosely couple it to L1/2, and tune the core for maximum dip. Then damp the circuit of L4 and C5 with a 100kΩ resistor, this will enable you to obtain a dip while tuning L3. Next use the previous

SHOPPING LIST

Resistors

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100Ω	1	R5
270Ω	4	R1,2,7,9
3·3kΩ	1	R4
100kΩ	3	R3,6,8

Capacitors

Miniature ceramic

27pF	1	C16
1nF	10	C2,6,7,12, 13,18 C20–23
10nF	3	C4,8,10
100nF	1	C15

Miniature trimmers

1·5–10pF	4	C1,3,5,14

Sub-miniature trimmers

1·5–10pF	4	C9,11,17,19

Semiconductors

Transistors

BF244	4	Tr1–4

Integrated circuits

78L09 (1)	1	IC1

Miscellaneous

RFC 1mH(3); Metallic box 50x150x80mm; p.c.b.; Coaxial connectors(2); XL1 31·3333MHz (3rd overtone HC-18/U crystal(2); 5·23mm dia Neosid (52–002–60) type formers(6)(3); Cores dia to suit, F29 material(6)(3); 750mm 18s.w.g tinned copper wire; 750mm 21s.w.g. enamelled copper wire; 750mm 25s.w.g. enamelled copper wire; Tinned steel plate 33s.w.g.

(1) Cricklewood Electronics Ltd, 40 Cricklewood Broadway, London NW2 3ET.
(2) Golledge Electronics, Merriot, Somerset TA16 5NS.
(3) CPL Electronics, 8 Southdean Close, Hemlington, Middlesbrough, Cleveland TS8 9HE.

TABLE 1: COIL WINDING DATA

Coil No	Turns	Wire-s.w.g.	Coil Form Dia (mm)	Iron-core	Remarks
L1	4	enam/25	5mm	yes	Close wound on top of cold end L2
L2	14	enam/25	5mm	yes	Tapped at 5 turns from cold end
L3	14	enam/25	5mm	yes	
L4	14	enam/25	5mm	yes	
L5	6	bare/18	6mm	no	Air core rigid spaced 1mm
L6	6	bare/18	6mm	no	As L5, tapped 2 turns at cold end
L7	15	enam/25	5mm	yes	
L8	7	enam/21	5mm	yes	Spaced 1mm
L9	7	enam/21	5mm	yes	Spaced 1mm

procedure in reverse to tune L4, and remove the damping—you have now tuned all the 50MHz coils.

Next tune the g.d.o. to 31MHz and set the sensitivity control to the point where the meter needle just comes to rest at zero. Then check the wiring and the p.c.b. for faults, if all is well then power up the converter. Loosely couple the g.d.o. to L7. This should cause a small meter deflection. If not try tuning L7 until one is obtained. After this remove the power from the p.c.b. and align L8 and 9 the same way as L3 and L4 but with the g.d.o. tuned to 94MHz. This leaves L5/C9 and L6/C11 to align, the procedure will be the same as all the other double-tuned networks, except you have only capacitors C9 and C11 to adjust and the g.d.o. must be set to 144MHz. At this stage, if all has gone to plan, the converter should be capable of receiving a large local signal on 50MHz. This can either be from a nearby radio amateur with 50MHz transmit capability or from a signal generator. Both need only produce a carrier wave signal.

Final Adjustment

Before you attempt to hone the performance of your converter to perfection, it is best to mount it in a shielded enclosure, as this will generally undo all previous efforts at obtaining more gain. This is also a convenient place and time to mount any coaxial connectors you wish to add.

There are two options as to how wide you set the bandwidth of your converter. If you intend to monitor the entire 50MHz allocation for the other IARU Regions, you will need to set your signal source for 54MHz instead of 50·5MHz which is the upper band limit in the UK.

Connect the converter to a 144MHz receiver, select f.m. mode and apply power. Then connect a 50MHz c.w. signal to the input of the converter, and adjust the receiver for maximum signal strength. Next connect your multimeter, set to the 10mA a.c. range, across the speaker terminals of your receiver. Adjust the 50MHz signal level until it produces smooth audio

Table 2—50MHz Beacons

Frequency	Callsign	Location
50·005	H44HIR	Solomon Is
50·005	ZS2SIX	Cape Province
50·005	ZS5VHF	Cape Province
50·006	GB3RMK	Inverness
50·010	ZS1STB	Still Bay
50·010	ZS6STB	Vereeniging
50·015	SZ2DH	Athens
50·020	GB3SIX	Wales
50·025	ZS6SIX	Kempton Park
50·025	6Y5RC	Jamaica
50·030	ZS6PW	
50·035	ZB2VHF	Gibraltar
50·039	FY7THF	French Guiana
50·041	WA8KGG	NE Ohio
50·045	OX3VHF	Svalbard I.
50·050	GB3NHQ	Hertfordshire
50·055	ZS6DN	
50·060	ZS6DN/B	Pretoria
50·062	PY2AA	San Paulo
50·062	W3VD	Laurel, MD
50·075	VS6HK	Hongkong
50·080	TI2NA	San Jose
50·080	ZS5VHF	Durban
50·088	VE1SIX	New Brunswick
50·098	ZS6LN	Transvaal
50·099	KH6EQ	Pearl Harbour
50·110	ZS6LN	
50·110	ZS6SS	
50·499	5B4CY	Cyprus
50·945	ZS1SIX	Cape Province
52·200	VK8VF	Darwin
52·300	VK6RTV	Perth
52·320	VK6RTT	Carnarvon
52·330	VK3RGG	Geelong
52·350	VK6RTU	Kalgoorlie
52·500	ZL2VHM	Palmerston
52·510	ZL2MHF	Mt Climie

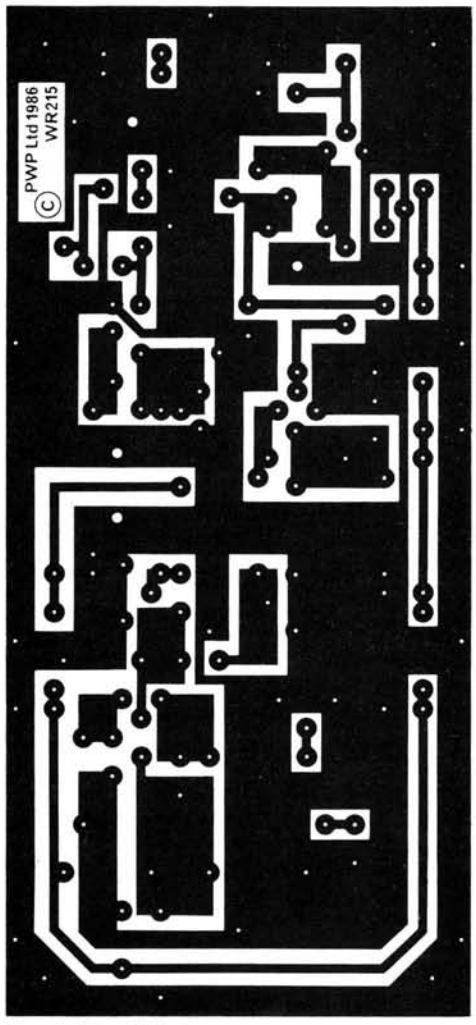


Fig. 2: Track Pattern

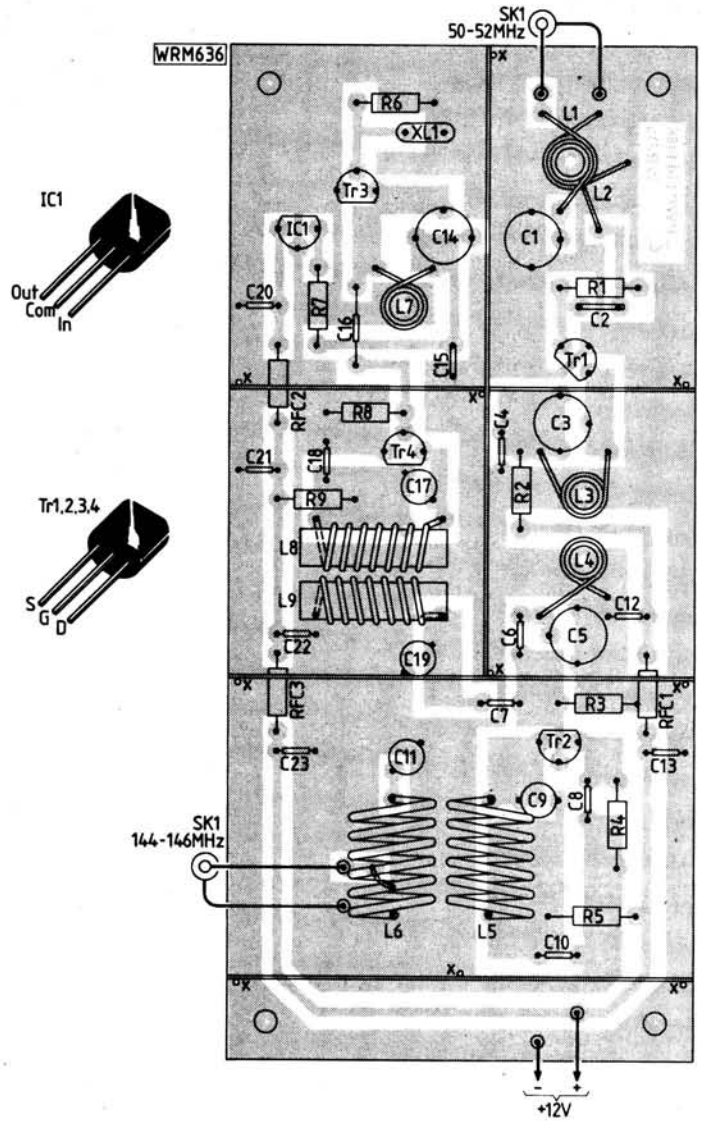
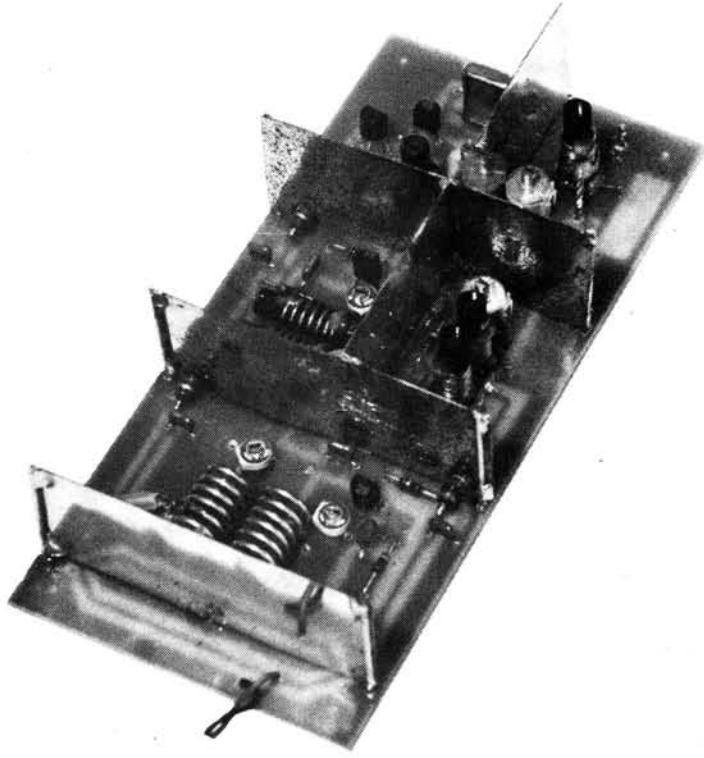


Fig. 3: Component Layout



The PW prototype of the 50MHz Converter

noise, turn the volume control down on the receiver to obtain a half-scale reading on the meter, and adjust C9 and C3 for minimum meter reading. Next adjust your signal source to 50·5MHz or 54MHz and re-adjust the receiver accordingly, then tune C11 and C5 for minimum meter reading. Lastly tune C1 for minimum meter reading. This procedure may seem a little strange at first, but if carried out correctly it will give the best signal to noise ratio with the equipment available.

The capacitors and r.f.c.s for this project were obtained from Cirkit, Park Lane, Broxbourne, Herts EN10 7NQ, and complete kits or various combinations of components are available from CPL Electronics. ***PW***

E.R.P. Calculations and 50MHz Part 1

Now that the 50MHz band has been in use for a little while, F. C. Judd G2BCX explains how to calculate your e.r.p.

First, it is suggested that all who intend operating on the recently allocated 50MHz band (including those already using it) should, if they haven't done so, write to the DTI for the *Radio Amateur Information Sheet No. 2* on the Amateur Service Allocation in the 50MHz band (6m). This is available free of charge from the Department of Trade and Industry, Radio Regulatory Division, Amateur Radio Section, Waterloo Bridge House, Waterloo Road, London SE1 8UA. This information sheet contains details of various regulations and restrictions which, if abused, could result in use of the band being withdrawn completely. Sad to relate some operators are already escalating this possibility by using high gain beam antennas and linear r.f. amplifiers with up to 100 watts output and, therefore, generating an e.r.p. ten times or more in excess of that allowed!

Effective Radiated Power (e.r.p.) stems from the r.f. power produced by the transmitter multiplied by the direct ratio "power gain" of the antenna and not its gain in dB relative to either a dipole (dBd) or an isotropic radiator (dBi). To minimise the possibility of interference to Band I television in other European countries, the DTI quote the maximum allowed power for 50MHz as e.r.p. That is the r.f. power actually radiated from the antenna and not the power delivered to the antenna by the transmitter.

For example, if 4·5 watts of r.f. from a transmitter is applied to an antenna having 7dBd gain (direct ratio power gain 5) the e.r.p. (power in the direction of the main lobe of the antenna as in Fig. 1.1) would be 4·5 × 5, or 22·5 watts which is an e.r.p. of just a little under 14dBW.

Two e.r.p. ratings are given for the 50MHz band, one being termed "carrier" at 14dBW and the other "p.e.p." at 20dBW. Carrier refers to a steady state unmodulated signal, or f.m. where the carrier remains at constant amplitude, whilst p.e.p. relates to single sideband. With c.w. the steady state carrier is interrupted by keying.

Mean Power and dBW

Power ratings in dBW are relative to 1 watt = 0dB. Decibels have no meaning in themselves but are a convenient way of expressing the ratio of one power level in watts to another power level in watts (some may regard it as inconvenient). If power is quoted as 14dBW, this does not mean 14 times 1 watts. Expressed in decibels, 14 represents a "power ratio" of 25·12 to 1, derived from 10^{xy}, where xy = dBW/10. So for this example:

$10^{1\cdot4}$ = 25·12 watts

Similarly, 20dBW represents a power ratio of 100 to 1 but otherwise indicates a transmitter power output of 100 watts. Most radio amateurs fully understand this interpretation, but some do not.

Because the allowed transmission power for the 50MHz band is given as e.r.p. at so many dBW, some confusion may arise. With a suitable r.f. power meter one can measure the mean unmodulated r.f. power from a transmitter and, if so inclined, convert it to dBW. The information sheet referred to earlier does not mention how one arrives at the required e.r.p. However, it would be virtually impossible to "measure" it, for reasons too complex to deal with here, so what is the alternative, calculation or pure guesswork? The obvious, though not perfectly accurate method, is to calculate the e.r.p. As already indicated, two major parameters are required, namely antenna gain and transmitter r.f. power.

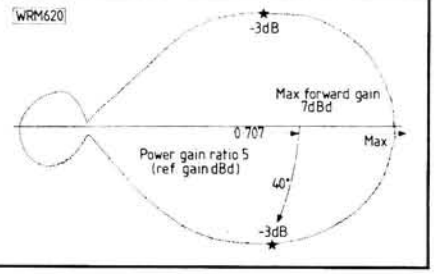


Fig. 1.1: Typical polar pattern from small beam antenna. The "half power" or -3dB points (marked with a *) are referenced to 0·707 of maximum. The total beam-width is 80° which gives the antenna a maximum forward gain of 7dBd or a power gain ratio of 5—see text and Table 2

What the Power Meters Read

Normal r.f. power meters, often combined with a facility for verifying v.s.w.r., are generally calibrated to read "mean power" and not so-called r.m.s. power as sometimes incorrectly intimated. The same applies to "built-in" power meters in transceivers some of which only "indicate" that r.f. power output is present but do not cater for the measurement of this. The readout and calibration (if any) of such meters applies only to a specific "load" resistance typically 50Ω.

With s.s.b. transmission, r.f. power occurs only when there is an audio input, for example, during "voice" modulation. With s.s.b. the peak envelope power (p.e.p.) generated by an audio tone modulation for example, can be no greater than the r.f. power that the transmitter is capable of producing which, in turn, is limited by the power supply capability, heat sinking for the p.a. transistors etc. A reasonable approximation of p.e.p. can be obtained by using a "peak reading power meter", preferably with a peak

Table 1

Power dBW	Power watts
1	1·3
2	1·6
3	2
4	2·5
5	3·2
6	4
7	5
8	6·3
9	7·9
10	10
11	12·6
12	15·8
13	20
14	25·1
15	31·6
16	39·8
17	50·1
18	63·1
19	79·4
20	100

Note: dBW relative to 0dB = 1 watt. Table may be used in reverse, i.e. Power in watts to dBW.

Transmitter r.f. power dBW to mean power in watts

"hold" feature and modulating the s.s.b. transmitter with a sustained "voice" sound or whistle. With 100 per cent amplitude modulation, including s.s.b., the p.e.p. will be 4 times the mean carrier power. Note: not all transmitters with basic a.m. facility will modulate to 100 per cent and some may be limited to around 50 to 60 per cent.

It should also be noted that most transceivers/transmitters for 50MHz have a means of controlling the r.f. power output. This control should be kept in mind when relating e.r.p. to antenna gain. There are transceivers available with a maximum r.f. power output that would produce an e.r.p. well in excess of that allowed, even using only a dipole antenna of unity (0dB) gain.

Power dBW to Mean Power

The information required to establish e.r.p. from the two parameters mentioned can be produced graphically or as tables. It was thought that tables might prove easier to use. First then we need conversion from dBW to mean r.f. power in so many watts. Table 1 shows dBW in steps of 1 to 20, covering more than the requirements for the 50MHz band.

To convert any power level to dBW the equation is:

$$10 \log_{10} \frac{\text{Power}}{1}$$

For example:

$$10 \log_{10} \frac{90}{1}$$

$$= 19{\cdot}54\text{dBW}$$

Table 2

Antenna Gain dBd	Power Gain Ratio
1	1·3
1·5	1·4
2	1·6
2·5	1·8
3	2
3·5	2·2
4	2·5
4·5	2·8
5	3·2
5·5	3·5
6	4
7	5
7·5	5·6
8	6·3
8·5	7·1
9	7·9
9·5	8·9
10	10
10·5	11·2
11	12·6
11·5	14·1
12	15·8

Note: Gain dBd relative to dipole at 0dB. If antenna gain is given as dBi (gain over isotropic radiator) then subtract 2·15 to obtain gain dBd.

Antenna gain dBd to antenna power gain ratio

Antenna Power Ratio Gain

The next table, Table 2, provides the second required parameter, namely "Antenna Gain" derived from maximum forward gain in dBd (gain relative to a dipole) or dBi (gain relative to the hypothetical isotropic radiator).

As far as e.r.p. is concerned, we can ignore side and/or rear lobes as they do not contribute to the forward gain of the antenna. For the time being we will assume no losses due to the antenna feed cable and other factors. Antenna gain (power ratio) can be found from Table 2 which covers from 1 to 12dBd in steps of 0·5dB with equivalent power ratios.

Remember that all antennas for the 50MHz band must be horizontally polarised and the height above ground must not exceed 20m (approximately 65 feet).

The band covers only 50 to 50·5MHz, although most transceivers at present on the market cover a frequency range of 50 to 54MHz.

If the maximum forward gain of the antenna is not known, it can be determined from the beam-width (in degrees) of the main lobe at the −3dB (half-power) points, as per Table 3. Those who wish to obtain antenna gain (dBd), from a beam-width other than those in the Table may use the following equation:

$$10 \log_{10} \frac{32027}{\text{Beam-width degrees}^2}$$

For example:

For a beam-width of 62° =

$$10 \log_{10} \frac{32027}{62^2}$$

$$= 9{\cdot}2\text{dBd}$$

Effective Radiated Power

We can now establish the two required parameters: transmitter power in watts, from Table 1, and the direct ratio power gain of the antenna for a given gain in dBd (or dBi) from Table 2. The e.r.p. can be derived from:

transmitter power in watts × antenna direct ratio power gain.

For example:

From Table 1 the transmitter power is 11dBW or 12·6 watts, and from Table 2 the antenna gain is 7dBd, so the direct ratio power gain is 5. The e.r.p. will be:

$12{\cdot}6 \times 5$

$= 63$ watts or 17·9dBW

For the moment we still assume no other power loss in the system although probable losses will be taken into account later.

An e.r.p. of 17·9dBW as before exceeds the DTI rating for carrier rating (c.w./f.m.) but for s.s.b. the p.e.p. (modulation) rating would be less than the specified 20dBW (e.r.p.). A reduction or power from the transmitter to 9·8 watts would be necessary to comply with an e.r.p. of 14dBW.

Please remember that the figures in all the tables and in examples have been "rounded" by the computer. It is unlikely that the DTI would expect one to adjust transmitter r.f. power output to a figure so precise as 9·8 watts as in the previous example. It is equally unlikely that anyone could do so anyway as even the best measuring instruments have a tolerance too great for 100 per cent accuracy.

E.R.P./Antenna Power Gain Ratio

Next are two Tables that may be found useful. These are for an e.r.p. of either 20dBW (100 watts) or 14dBW

Table 3

Beamwidth °−3dB	Forward Max Gain dBd
45	12
50	11·1
55	10·2
60	9·5
65	8·8
70	8·2
75	7·6
80	7
85	6·5
90	6
95	5·5
100	5·1
105	4·6
110	4·2
115	3·8
120	3·5
125	3·1
130	2·8

Note: Antenna gain dBd ± 1dB. Preferably allow −1dB.

Antenna maximum forward gain from beamwidth (°) at −3dB

Table 4

Power Gain Ratio	Power at Antenna*
1	100
2	50
3	33·3
4	25
5	20
6	16·7
7	14·3
8	12·5
9	11·1
10	10
11	9·1
12	8·3
13	7·7
14	7·1
15	6·7
16	6·3

With power gain ratio at 1, antenna = dipole and e.r.p. will be 20dBW (100 watts). See also Table 2. *Remember feed cable and other losses.

Power required at antenna to maintain an e.r.p. of 20dBW (100 watts), with antenna power gain ratio of 1 to 16

(25·12 watts) for given values of antenna power gain ratio. Note that the power values given are those at the antenna feed point and not from the transmitter r.f. output stage. The power values are also "mean", as indicated by an ordinary r.f. power meter. Remember also to take feed cable and other known or estimated losses into account when adjusting transmitter power to provide the requisite power at the antenna.

Feed Cable and Other Losses

So far we have not taken antenna feed cable loss into account which at 50MHz could be quite considerable, depending on the cable quality and its length. Then there is insulation loss in the antenna itself, power loss due to the proximity of other conductors, loss due to feed cable/antenna mismatch and to plug and socket connections at the transmitter and/or antenna.

There can be no common factor to account for such losses because there are too many variables. One can only estimate lost power, except possibly that due to the inherent loss in the antenna feed cable. The "overall" loss could amount to as much as 6dB

which, relative to 1 watt, is almost 4 watts! It does not require a mathematical genius (or a pint of a certain dark alcoholic beverage) to realise that if a transmitter is rated for a continuous r.f. power output of 10 watts for example, then only 6 watts, or nearly 8dBW, would be radiated.

Thanks

My thanks are due to Thanet Electronics Ltd. for the loan of an Icom IC-551 50MHz transceiver, Reg Ward & Co. Ltd. for the loan of a Welz p.e.p. reading meter (both used for measurements, etc., in connection with this article) and to Gordon J. King G4VFV for suggested amendments to the original text.

Table 5

Power Gain Ratio	Power at Antenna*
1	25
2	12·5
3	8·3
4	6·3
5	5
6	4·2
7	3·6
8	3·1
9	2·8
10	2·5
11	2·3
12	2·1
13	1·9
14	1·8
15	1·7
16	1·6

With power gain ratio at 1, antenna = dipole and e.r.p. will be 14dBW (25·12 watts).
Note: 25·12 watts has been "rounded" to 25 for computation.
See also Table 2.
*Remember feed cable and other losses.

Feature

Power in dBW

In recent changes to the Amateur Radio Licence the DTI has adopted a different way of specifying maximum transmitted r.f. power, R. H. Pearson G4FHU explains how this can be easily understood with the help of a chart

The rather odd way of specifying maximum transmitted r.f. power as a logarithmic ratio; decibels relative to 1 watt can be shown as:

$$10 \log_{10} (P/P_{REF})$$

the unit being dBW with $P_{REF} = 1W$

If you do not have a scientific calculator or log tables handy (maybe you can't remember how to use them anyway) the chart here offers a quick and easy way to deal with dBW.

The solid line links power in watts to power ratio in dBW.

The dotted lines link load voltage V_{RMS} to power ratio dBW for commonly used load resistances.

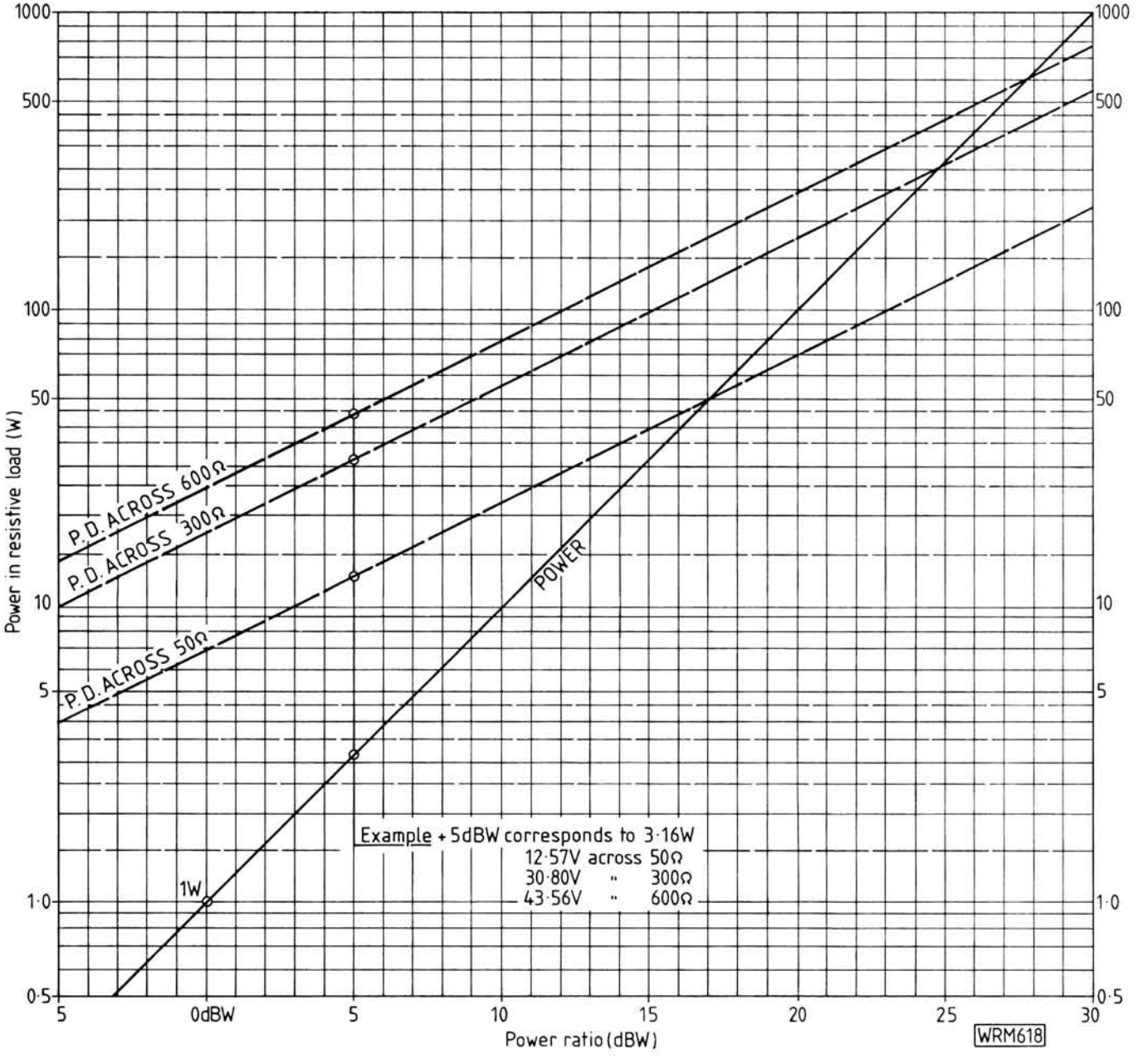
If any attempt is made to measure load or feeder voltage, personal safety is the first priority. Both r.f. voltmeter and oscilloscopes that are not specifically designed to keep both sides of the input insulated from the user must not be used across feeders unless one side of the feeder is definitely earthed. So with balanced feeders one should measure on the unbalanced, transmitter side of the antenna tuning unit and balun. It is, however, a useful check on the degree of unbalance to test in turn from each side of an open wire feeder to earth.

Before using an r.f. voltmeter or an oscilloscope, check that the rated maximum input voltage is well above the sort of figure that the chart predicts.

If you use an oscilloscope (preferably with a 10× attenuator probe) it will be most convenient to measure peak-to-peak voltage, i.e:

$$2\sqrt{2} \times V_{RMS} = 2{\cdot}828V \text{ r.m.s.}$$

Whether the chart is used to predict feeder voltage after measuring power, or the voltage is measured in order to predict power, the relationship is only correct for a resistive load or for a properly matched feeder. Similarly, most ready made power meters are only correct for the specified resistive load. ***PW***



POWER PLAY!

Gerry L. Dexter looks at the broadcasting scene

No-one can say for certain just when it was that the world's international broadcasters took their places on the starting block. Or when, exactly, the gun went off to begin the race to super power use on the shortwave broadcasting bands. The race has already been underway for several years and the contestants show no signs of entering the final lap.

The urge to be heard by as many people as possible has taken a stronger and stronger hold in countries as varied as America and Uganda, Australia and Zanzibar. Transmitters of 100, 250 and 500kW are popping on the air nearly every month, with plans for new high power installations announced almost as a matter of routine.

It is not surprising that "first world" countries are often involved in putting these giant installations on the air. They can afford the high costs involved. But the big money required hasn't stopped many countries which are not in such an enviable position; they're going ahead with big broadcasting just the same. Even so-called third and fourth world nations are in the race, although in some cases what is one country's high power can sometimes be the equivalent of another's peanut whistle. The poorer countries are, however, running the race to the best of their abilities.

The desire to reach areas not currently served by a broadcaster sometimes contributes to the need to expand facilities. Congestion on the high frequency bands is another factor. More punch is often required in order to get a usable signal through to an audience.

So, equipment and transmitter sites are upgraded after years of neglect. New relay sites are sought out, agreed upon and constructed so as to provide better positioning of transmitter versus target area. Some stations make arrangements to share time on each other's facilities as a means of keeping operational costs down while still enjoying the advantages of a better-positioned transmitter. In some cases it is not a question of upgrading but of entirely new stations going on air, usually with minimum powers of 100kW.

Many of these developments are undertaken despite high national debts or cutbacks in the budget of national radio stations. Where there is a will, it seems there is a way.

Practical Wireless readers are well acquainted with the BBC's expansion plans which have run into some opposition over improvements or new facilities in Britain. The Hong Kong relay's pair of 300kW transmitters should be ready by 1987 with the Seychelles relay going on a year later. But the BBC project is just one of several such already completed, in progress, or planned by broadcasters in Europe.

Europe & Asia

Austrian Radio has been on the air with 300 and 500kW transmitters at its Moosbrunn site since the spring of 1983. This installation beams broadcasts to East and Southeast Asia, West Africa, Europe and the Americas and is connected to three steerable antennas.

Radio Denmark, plagued for years by outdated equipment and limited frequency choices, still hopes to join the big boys one of these years. Financial and environmental problems have delayed serious development of a high power broadcasting installation.

Radio Finland International plans to have five Brown Boveri transmitters of 100, 250 and 500kW on the air from its Pori site by 1987 which will help the station improve its reception quality abroad.

Radio France International has for some time employed the commercial station Africa Number One at Moyobi in Gabon as a relay site. Now the station's new relay at Montsinery in French Guiana is fully operational with three Thomson 500kW transmitters providing coverage of North and South America as well as Africa. The station notes that full implementation of the new relay has doubled its audience and provides for a 30 per cent increase in broadcast time. Associated with the expanding facilities is an increase in the number of languages and target areas, a progress still in the growth stage.

In Holland, Radio Netherlands made a large splash when its new Flevoland site ("2000kW under the sea") came into full use in late March 1985. The four 500kW transmitters brought with them a significant increase in broadcasting time for many of Radio Netherlands' target areas.

Sometime ago Norway put two 500kW units on from a new site at Kvitsoy, designed to serve an audience largely in the Eastern Hemisphere. In the next year or two a second facility will be added at Svelo which will broadcast primarily to North and Central America. The original three 500kW transmitters planned for Svelo have been trimmed back to only one due to economic reasons.

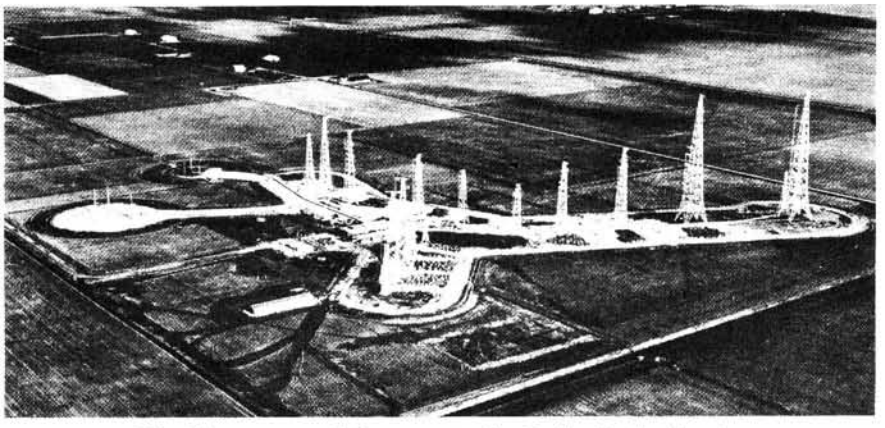
Sweden and Switzerland were early starters in the high power race. Radio Sweden International with its 500kW at Karlsborg and Swiss Radio International with an equally strong outlet at Sottens. The Swiss, additionally, have experimented with the use of the Gabon Africa Number One station, reportedly with success.

West Germany recently added another link in its relay line up, this one in Sri Lanka at Trincomalee. That site features two 300kW units.

The Vatican Radio plans to add a second 500kW transmitter, complete with a new rotatable antenna. Yugoslavia has had a new transmitting complex under construction for some time. When completed sometime this year, it will house four 500kW transmitters and allow Radio Yugoslavia to be "easily received by listeners in all parts of the world".

In the Middle East Syria's Lazarus-like shortwave service returned to the air in 1984 after many years of silence, bringing with it a multi-language service over a 500kW transmitter. The Voice of the United Arab Emirates at Abu Dhabi, long the poor brother of the more powerful UAE Radio and TV at Dubai, has at least the first of four planned 500kW units on the air.

Iran gives us rather conflicting information but there's no question that a major effort is underway to upgrade to the Voice of the Islamic Republic of



The Flevo transmitting centre for Radio Netherlands

Date : 19 · 2 · 85

Sir,

We acknowledge receiving your Reception report on Today about our broadcast dated 28 / 1 / 85 on S wave 60 Metre band 4800 KHZ.

Our Engineering Department has verified your report's details and found them correct/~~wrong~~.

Many thanks for your interest in our Arabic Service and we are pleased to send you this QS L Card for your reference and record.

Sincerely Yours,

DIRECTOR, VOICE OF THE UAE FROM ABU DHABI

THE VOICE OF THE UAE from Abu Dhabi was set up on the 25th of Feb 1969 under the name of Abu Dhabi Radio with six hours transmission in Arabic only. With the formation of the seven Trucial States into a Federation, "The United Arab Emirates" on 2nd December 1972 the Abu Dhabi Radio assumed the Present name and has grown enormously since then.

BROADCAST SCHEDULE:

TIME IN G.M.T	FREQ (KHZ)	METER AND K.W.		LANGUAGE	WAVE
2.15 - 21.30	729	411.52	1500	Arabic	M.W.
2.15 - 05.00	810	370	50	Arabic	M.W.
08.00 - 11.00	810	370	50	English	M.W.
11.00 - 13.00	810	370	50	French	M.W.
13.00 - 16.00	810	370	50	Urdu	M.W.
16.00 - 21.30	9695	31	120	Arabic	S.W.
03.00 - 24.00	93.5 MHZ	—	—	Music	F.M.
2.15 - 12.00	1575	180.5	50	Arabic	M.W.
12.00 - 15.00	1575	190.5	5	Arabic	M.W.
2.15 - 6.00	972	308.6	1	Arabic	M.W.
9.00 - 21.30	972	308.6	1	Arabic	M.W.

A QSL from the UAE

Iran. Supposedly there are now four 500kW units operative. One has tested in the 5MHz (60m) band; another was supposed to have become operative from Kish Island as far back as 1983. Iran has not, it seems, made much of an attempt to increase its broadcasts to the West as a result of these new facilities which leaves open the question just how much of the new installations are actually operative. When completed they are supposed to cover two-thirds of the world.

Bangladesh recently put two 250kW transmitters on the air from sites near Dhaka. Indonesia has attempted to provide improved reception for its Voice of Indonesia overseas broadcasts through a 250kW unit at Pandang which beams generally east and another at Cimanggis for broadcasts in a generally western direction.

India put a 250kW outlet on from Aligarh in Upper Pradesh state several years ago. The installation has now been expanded to include two more, making a total of four such transmitters there for All India Radio's use.

Japan, after a study of its problems being heard clearly in much of the world, experimented with using the Gabon station as a relay and has now come to use it on a regular basis. Radio Japan also makes use of the Radio Trans Europe facility in Portugal. In addition, major renovations and rebuilding are taking place at the Yamata site in Japan where three 300 and four 100kW transmitters are to be added. To improve reception in the western hemisphere, Radio Japan will have a high power relay located in Panama.

The Republic of China and the American religious broadcaster WYFR have had an exchange agreement in effect for a couple of years now. WYFR's 100kW transmitters in the state of Florida relay the Voice of Free China while Taiwan does the opposite for the American station.

The Voice of Turkey has had 500kW Brown Boveri transmitters on the air for some three years and eventually hopes to expand that to ten such units. The additional capacity is being used to beam programmes to Turks abroad as well as to put stronger signals into Australia, North and South America.

Thailand has long wanted to improve its coverage of Asia, the Middle East, Europe and the Americas. As early as 1982 the government had plans for a 250kW transmitter for Radio Thailand. Now they do not have to spend the money. Radio Thailand will make use of one of seven high power units being installed at the new Voice of America relay station there.

In the South

Africa has not seen quite the growth other areas have. And what growth has occurred has, often as not, been on a smaller scale, with powers in the 50kW range, just a tenth of what many big stations have installed.

However, Kenya has registered frequencies in the international bands for future use by at least one 250kW transmitter which will eventually be used by the Voice of Kenya. Zaire has come on the air recently with a 100kW unit. Zimbabwe plans a transmitter of undetermined power at Gweru (formerly Gwelo) in response to anti-Zimbabwe broadcasts from South Africa.

On the lower end of the scale, Tanzania plans to add 20 and 50kW transmitters and a 50kW unit in Zanzibar, constructed with Chinese help. Cuban assistance is being given to Uganda in the effort to upgrade the existing 250kW site at Soroti where an additional transmitter is to be placed.

The Australians have found the money to rebuild the 250kW site at Darwin which was destroyed a decade ago by Typhoon Tracy. The rebuilt site went on the air in 1984 and carries programming for Indonesia, Southeast Asia, China and Japan. 100, 250 and 300kW transmitters have, in recent years, also gone on from Carnarvon.

Radio New Zealand has limped along with antiquated 7·75kW transmitters for decades and has been frequently faced with the spectre of losing shortwave entirely. Now a new government study has recommended full speed ahead for New Zealand's external broadcasting and, with it, the promise of better days and higher power in the future.

The Americas

Extensive and expensive plans have been approved for the Voice of America which involves major revisions and expansions. In addition to the Thailand relay mentioned earlier, new relays are also being constructed in Sri Lanka, Israel and Morocco and the Voice is scouting around for at least two other sites. All existing and future sites will employ 500kW transmitters. There'll also be improvements in antenna systems and a renovation of the Washington DC studios. The VOA claims that at present it reaches only 35 per cent of its potential audience with acceptable signal quality. The upgrade will hike that figure to 85 per cent.

In New Orleans, Louisiana, WRNO Worldwide is adding a second 100kW transmitter. WYFR in Florida has added several 100kW units in recent years. And there are several brand new stations in the US which were due on in 1985 running powers of 50 or 100kW.

Even South America with its preponderance of low power private shortwave broadcasters, is making noises about improvements in international broadcasting facilities. Venezuela's Radio Nacional which added 50kW three years ago, will eventually upgrade this to 250kW with a corresponding increase in hours and languages.

Bolivia has recently registered frequencies in the international bands for its government radio and Peru, with West German help, plans a network of shortwave outlets for its Radio Nacional.

The one million watts or more now being used by some medium wave outlets has not yet arrived on the shortwave scene. And while the World Administrative Radio Conference has discussed limitations on power levels for shortwave broadcasting, one must wonder if that attraction—one million watts—may not represent some sort of finish line off on the horizon, as that high power race continues. Whatever happens—whether the tape has been stretched across the 500kW level, or whether at the 1000kW marker—these must surely be happy times for the companies which manufacture and sell these behemoths of shortwave. ***PW***

Getting Started... The Practical Way

In the second part of this series Rob Mannion GM3XFD looks at the beginner's tool box, simple test equipment, antennas and library before starting on the first project.

Once you have found somewhere to work the next step is tools. Almost certainly you will need a collection of small tools, such as side-cutters, pliers, a soldering iron, a selection of screwdrivers, etc. Your tool-kit can never be complete without the tools that live in the bookcase rather than the tool box! Books, and the information they contain are essential tools, providing an excellent foundation and investment!

Read and Read Again

Information is extremely important to any hobby or pastime, let alone radio and electronics. You could have a magnificent set of tools, a good shack and components—but with little prior knowledge or experience to fall back on you could have great difficulty starting at all! Benefit from the experience of other people—read, and read again is my advice. Start your own scrapbook, with as many interesting circuits as you can find. Collect old copies of *PW*, and copy circuits and details by hand, as this alone helps with retention and learning.

Browsing through a radio magazine, with its crisply written, short, technical feature is an excellent way of learning. It is also a very subtle process, and you can be sure that the information will be up-to-date.

Another extremely important factor is concentration. You should count yourself extremely fortunate if your concentration span on technical subjects is over 15 minutes, an average reading time for short technical magazine articles. Even the most enthusiastic reader can be discouraged by a weighty textbook, despite the fact that it may be excellently written. Read and keep as many magazines as you can, they will always be a useful part of your library. At the same time, you are advised to build up your main reference section, as it is sure to be a solid foundation of knowledge.

The books mentioned below are excellent and will be useful for very many years. Some are expensive such as the ARRL Handbooks, but they are always full of excellent new ideas and designs (the ARRL is the USA equivalent of the RSGB).

Unfortunately, if you wanted to buy all of these, you would have to spend around £100. Fortunately, we have Public Libraries, and they either have, or can get, most of these books for you. In the words of the famous radio programme with the seagulls . . . "If you could take only three with you . . ." my answer would be straightforward! Pat Hawker's book, which is so practical that it is hardly ever out of my shack, the ARRL *Radio Amateurs Handbook* in paperback as they last far longer than you think, even with frequent handling, and the ARRL *Antenna Book*. Of course . . . if you wish to keep up with *Technical Topics* in *Radio Communications* monthly, you should join the RSGB, and get the rest of the magazine with its specialist coverage and very useful *Members' Ads* section.

Before leaving the subject of your library for the moment—and the importance of these particular tools cannot be over emphasised—a unique series of books must be mentioned. They are almost certainly available from your local library, although buying your own copies would be an excellent investment. The *Common Core* series of text books, seem to have created the ideal method of teaching our somewhat complex subject. The balance between readability and instruction is superb. Their series *Basic Electricity* and *Basic Electronics* are invaluable. The approach is simple, with cartoons and a humorous touch . . . with excellent graphics. One of the latest additions is *Basic Colour Television* . . . which was soon added to my library. The amazingly light and informal approach invites regular reading . . . and learning follows close behind. Libraries will almost certainly stock the complete bound editions, rather than the separate thin volumes. As separates, the slim books are ideal for lunchtime study or reading on the train or bus. The books are published by the Technical Press, Oxford—you will find their address at the end of the article.

Multimeters

As you progress, your tool box will fill with useful handtools. However, you should invest in a multimeter as soon as possible. For once the advice will be to buy, not build! Until the orientals came along with their excellent value-for-money meters, most amateurs made their own. Today it is a waste of time, unless you are fortunate in having an excellent surplus moving coil meter movement. Such a movement will cost around £20 or so for a 100mm scale. With a reasonable quality, specially designed, mirror-backed multimeter costing approximately £20 including postage, it is really not worth while making your own. Apart from being perhaps more rugged than an imported meter, you will not have the advantage of large easy-to-read scales and efficient calibration. Fortunately we still have the UK made Avo range —but these are mainly designed for the professional market (the price reflects this fact, although they are incredibly rugged). Actually, the average constructor need not worry about his imported meter, for most of them are very good value for money. There is only one piece of simple advice for you, and that is to buy the largest meter you can afford. The really small models have squeezed up scales, and tend to be extremely difficult to read and use.

Good Book Guide

RSGB *Radio Communication Handbook*
ARRL *Radio Amateurs Handbook* (New edition published annually)
Radio Handbook by William Orr W6SAI (another excellent USA book) published yearly, with good chapters on antennas and propagation.
ARRL Antenna Book. A must. So valued, it is found in Broadcasting Engineers' libraries!
RSGB *Amateur Radio Techniques*. This book is mainly extracted from Pat Hawker's popular and informative *Technical Topics*, published monthly in the RSGB's *Radio Communication* magazine. An excellent read and so useful.

Dip Oscillator

Once you have a meter, the next most important piece of equipment you can possibly have, in the author's opinion, is a grid dip oscillator. Actually I did not have a g.d.o. for many years after starting in the hobby, but after discovering the versatility of these instruments I often wonder how much more I would have progressed with one! They are most useful, so much so, that they are now available in professional users catalogues. Signal Generator, Test Receiver, Unknown Coil Identifier, you have all these in the one instrument!

It must be stressed though, that the g.d.o. cannot replace a properly calibrated signal generator, but it is still an extremely useful rough and ready alternative to nothing.

Various designs are to be found, and apart from portable use, you can still employ the reliable old valve circuits. However, for most uses today, a battery powered portable g.d.o. is far more versatile. The *PW* FET Dip Oscillator (Oct. 85 *PW*) is an excellent project and together with the follow-up article (Dec. 85) you will have a most useful instrument. The frustration often felt, when stuck for a particular coil for a project, need never happen again! With this device, you can wind all your own.

You can buy a commercially made g.d.o., the main advantage being that the dial calibration for frequency coverage has been done for you, but they are not cheap, and I recommend that you build one! Making one is an exercise in itself, and frequency calibrating is not that difficult, especially as 100 per cent accuracy is not required for everyday use.

It does not matter that you may be 500kHz off frequency when winding a coil. It can be adjusted later, when you have the means to calibrate your oscillator.

Antennas

A receiver may be available already, or you may have built a kit and be listening to broadcast and amateur stations. No doubt you will have been confused regarding the choice of antennas, especially if you have a basic library. The choice regarding antenna type is somewhat bewildering for the newcomer—but it need not be.

For receiving, the proverbial piece of wet string will function as an antenna —of sorts!

Despite this, it is to our advantage to make the antennas as efficient as possible in converting the energy contained within the passing wavefronts, and transferring it with minimum loss to the receiver.

First you should provide a good earth system. A copper pipe or old metal milk crate buried near your elected workplace will be ideal. Do not attempt to use the water pipe within the house, as very often it is plastic!

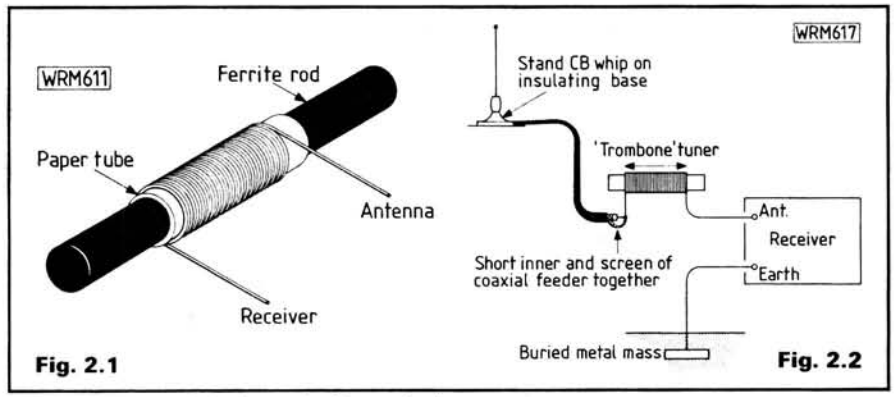


Fig. 2.1 **Fig. 2.2**

Steer well clear of the household earth and arrange your own. Apart from safety it will reduce possible interference. Once the earth—which will help 1·8, 3·5MHz and broadcast band reception—is installed, you can think about your antenna.

With no intended disrespect to the many people who may have spent years perfecting an antenna system, I suggest that for ease of construction you make your antenna as simple as possible. It is unlikely that, in this age of ever decreasing garden size, you will have room for a large antenna. One large national house builder prides himself in the fact he can build double the number of houses per acre of his competitor.

Unfortunately for many of us, this means smaller rooms and even smaller gardens. Often, enthusiasts do not even have a garden, so improvisation, the watchword of this series, must be employed with intelligent forethought.

It would be useful to have a dipole for every band, but they can be an inconvenient antenna for the small garden. However, it must be borne in mind, that a resonant antenna—an antenna of half a wavelength at the chosen frequency, or one that is made to appear so electrically, with loading coils, etc.—is an important aid to the simple receiver's selectivity. This is a most apt term to describe the receiving equipment's ability to select the wanted station whilst rejecting the unwanted ones. Using an untuned antenna can accentuate the lack of selectivity in simple receivers. Despite this drawback, an untuned long wire antenna can often supply a good signal input, providing you do not mind the possibility of listening to the World Service and Radio Moscow at the same time!

We can minimise the problem, by making a simple antenna tuneable to our requirements. For a typical small garden use a random length of wire leading from the house to a tree. Any support, other than electricity supply poles, can be used. If you have a tree in the garden allow enough guy line to ensure that your wire is clear of the branches and leaves. Do not forget also that trees move in the wind! It is best to use a pulley guy or the familiar hook-ended bungee rubber straps used to secure luggage onto car roof racks. This will ensure that the antenna is kept taut with a safe stretch margin.

Whips

A whip antenna—popular with CB operators—can also be used to advantage by shorting the coaxial feed at the set and using the "trombone" resonator/tuner described below. A short length of ferrite rod is needed for our resonator/tuner, and often a suitable piece is in the junk box, recovered from a dropped portable.

Ferrite Rod

Roll a paper tube around the ferrite rod so it can slide in and out of the tube like a piston (Fig. 2.1). Enamelled copper wire any size from 25 to 30 s.w.g. is required. For the medium waveband (500 to 1700kHz) about 80 to 90 turns, wound in a single layer will be sufficient. Do not wind too tightly as the ferrite rod must slide freely within the tube. Obtaining the wire is no problem at all as it is freely available on old transformers! Hopefully you will already be collecting scrap radio and TV sets. Although there are few large transformers in the commonly available scrap 405/625-line TVs they have smoothing chokes and frame blocking oscillator transformers. These, when carefully unwound, provide a useful supply of finer gauge wire. Older colour receivers, on the other hand, provide many useful items. A crystal, transformers, large looms of wire, coil formers—the list is almost endless! Be wise—do not turn away **any potentially** useful source of parts! Connect the system as shown in Fig. 2.2.

When using the "trombone" tuner, finding the required station is a simple matter of sliding the rod in and out while listening for the peak signal point. If you have a meter on your receiver it is even simpler—as the meter is usually far more sensitive to changes in signal level than our ears. For the short waves you can experiment by gradually reducing the number of turns on the coil. There will be a point approaching the high frequency end of the short wavebands when the effect of the trombone is not so noticeable. However, this is unlikely to discourage the user since it is generally a most useful device.

This method is also very useful for transmitting! An old friend, G3RJY used one, and introduced me to this particular use of the "trombone" on 1·8MHz (Top Band) quite a few years

ago. In conjunction with a good earth system, this device enabled his transmissions to be heard extremely well all over Hampshire during daytime using a very low-powered a.m. (amplitude modulation) transmitter.

Regular readers of *Practical Wireless* will have seen the Mobile Rally calendars published every year. At least one rally should be on your spring calendar! The *usual trade stands* displayed in the advertisement is a sure sign that bargain goodies are to be found! Many rallies have a *Bring and Buy* sale which could—if you are early enough—provide a bargain receiver for less than £20!

I have many happy memories of returning from rallies in an overloaded Morris Minor! One particular event provided an oscilloscope—no cabinet, ancient but in good working order—for two pounds. That 'scope was still working ten years later!

Communications receivers will not always be cheap or even available, but surplus equipment may be reasonably priced. The choice can be confusing indeed! Half the battle is knowing what the equipment does! We have no need to worry. The RSGB comes to the rescue with its excellent little *Guide to Amateur Radio*. To introduce you to the rather specialised market of used and surplus equipment, the RSGB has a very useful section in this reasonably priced little book. This is recommended reading for everyone and describes the most common equipment, including government surplus with relevant technical details.

First Project

Now that you have a work place, an antenna of sorts, and hopefully a multimeter and grid dipper a start can be made! In the past many of the younger people who have approached me for help in starting have been surprised at the suggestion that they build a crystal set! However archaic the idea it is still very much in general use every day, hidden within modern portable receivers!

Seriously though, building a simple detector receiver (operating with straight detection, the only supply voltage being that applied directly from the antenna) is an excellent introduction to receiver design problems. A short wave detector receiver can be most effective indeed. One very quickly learns about selectivity—or the lack of it!

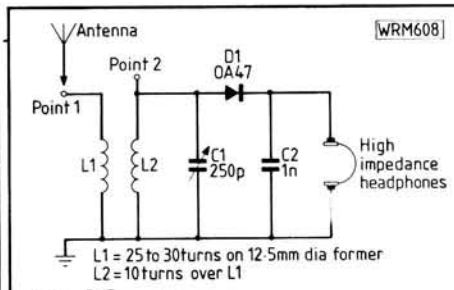


Fig. 2.3

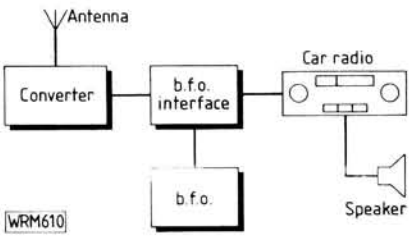


Fig. 2.4

The circuit diagram (Fig. 2.3) shows a simple design using a modern diode. Experiment with the antenna connected first to Point 1 and then Point 2. The increased volume at Point 2 should be immediately apparent, but so also should the *multi-programme* reception—a first lesson in the problems of receiver selectivity!

The Superhet

The modern receiver uses the superheterodyne principle. In action this is quite straightforward and relatively easy to make work in a simple form. For example, let us start with an incoming wanted m.w. station on 1MHz. By the use of an oscillator 400kHz above or below 1MHz in conjunction with a mixer we can produce an intermediate frequency (i.f.) of 400kHz, which, after being selected can be amplified and detected by the hidden crystal set within the radio. The resulting audio signal is fed into the audio amplifier and speaker.

This idea of shifting an incoming signal to a different frequency can be extended to using a "converter" ahead of a receiver to give coverage of another frequency band. Usually, the converter operates at a fixed frequency, and selection of the wanted station is achieved by tuning the receiver. The whole arrangement of converter plus receiver is a form of double-conversion superhet, with the receiver acting as a tuneable i.f.

Although the writer wishes to encourage home-brewing we can, by sensibly using ready-made technology, often save much time and effort. Using a car radio as a tuneable intermediate frequency receiver we can build up a very useful double conversion communications receiving unit; the car radio being an excellent ready-made foundation. If we tune the receiver over part of the medium wave band it can receive the down-converted signals from the short wave bands required, via the output of a suitable converter.

We can gain much, not the least being high selectivity. The screened input and good sensitivity along with other car radio technical features are very much in our favour. For the fortunate, able to afford the Sanyo Short Wave model, there is the added advantage of being able to listen directly to s.w. broadcasts. These receivers will also be very useful for future specialised converter use, such as v.h.f. reception.

Beat Frequency Oscillator

With Morse and modern single sideband suppressed carrier transmissions a beat frequency oscillator (b.f.o.) is needed. In use the b.f.o. is tuned so that a beat note is developed between the two signals, revealing the familiar Morse dits and dahs. Here we have a graphic example of the heterodyning principle working. Without the aid of a b.f.o. the incoming Morse signal is heard as a hissing and thumping sound, the thumping corresponding with the keying. With care and practice you will also be able to resolve s.s.b. speech by adjustment of the b.f.o. control. This specialised form of amplitude modulation has been compared to listening to someone talking through a comb and tissue paper! However, with carrier re-insertion with the b.f.o. you should soon be successfully resolving perfectly readable speech (Fig. 2.4).

Rather than opening up the car radio, and causing possible problems, I suggest that the unit (Fig. 2.5) is built into a tobacco tin fitted with coaxial sockets at either end. The tin is ideal, as you can solder directly to the la-

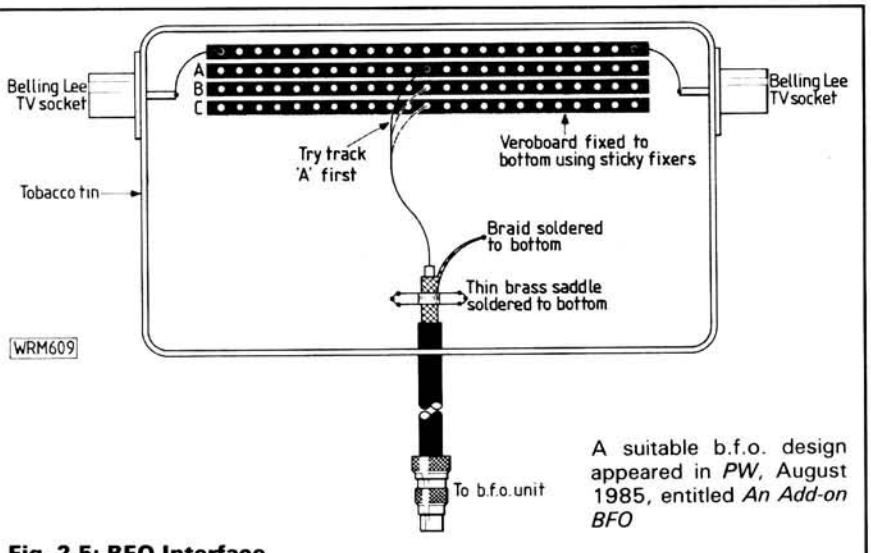


Fig. 2.5: BFO Interface

quered tinplate. The input lead wire to the car radio can then act as a pick-up on its way through. This method ensures that the screening effect of the leads is maintained, whilst allowing the b.f.o. signal to beat with the incoming signal.

Maintaining the screening is most important, as there is nothing more annoying than unwanted m.w. broadcasting stations breaking through in this form of shortwave reception, and you may be assured that it can easily occur!

Printed Circuit Boards

One particularly useful building method, not readily available when I started in the hobby, is the printed circuit board. Whenever possible you should design and make your own. It's not difficult—and lends a professional look to your work. It need not be complicated! You don't need light boxes and tanks, cameras or negatives! With Dalo pens, carrying the etch resist in the pen body, you can design and write directly onto the copper. You can create some very useful little boards around your own projects and components. Try it and see! A Dalo pen costs around £1 and copper-clad off-cuts are cheap. The etchant is ferric chloride obtainable from your chemist.

Experiment! Make a board for the crystal receiver with an added audio amplifier. Make another for the b.f.o. described earlier.

Warning

Ferric Chloride is very corrosive and toxic! Be very careful when handling the stuff and keep it away from your clothes and skin. Also remember that it is illegal to pour it down the sink—not only will the local water authority be very angry but so will the domestic authorities when they find a brown stained sink!

Useful Addresses

Sanyo FT222H Medium and Short Wave Radio (3·2–7·1MHz; 9·4–15·1MHz; 525–1605kHz) from ***Hi-Way Hi-Fi Ltd., 313–315 Edgware Road, Paddington, London W2 1BN. Tel: 01-723 5251.***

Dalo pens, copper-clad board and other parts from ***Maplin Electronic Supplies Ltd., PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 552911.***

Variable capacitors, formers, crystals, etc. ***J. Birkett, 25 The Strait, Lincoln LN2 1JF. Tel: (0522) 20767.*** Look out for their stand at mobile rallies.

4·43MHz crystal. ***Watford Electronics, 250 High Street, Watford WD1 2AN.***

Resistor Kits. (Bulk buying is an excellent way of starting off.) ***Garex Electronics, 7 Norvic Road, Marsworth, Tring, Herts HP23 4LS,*** or ***Marco Trading, The Maltings, Wem, Shropshire SY4 5EN. Tel: (0939) 32763.***

The *Common Core Series* published by ***The Technical Press, Freeland, Oxford OX7 2AP.***

The Modern Book Company, 19–21 Praed Street, Paddington, London W2 1NP. Tel: 01-402 9176. Send for list of mail order radio books.

Practical Wireless, Enefco House, The Quay, Poole, Dorset BH15 1PP. Tel: (0202) 678558 for specialist books and subscriptions to *Practical Wireless* magazine (see page 1 for details).

Component Suppliers

Catalogues and lists are an essential part of your technical library.

Maplin Electronic Supplies Ltd.
J. Birkett.
Garex Electronics.
Marco Trading.

Cricklewood Electronics Ltd., 40 Cricklewood Broadway, London NW2 3ET. Tel: 01-450 0995.

Electrovalue Ltd., 28 St. Judes Road, Englefield Green, Egham, Surrey TW20 0HB. Tel: (0784) 33603.

Initiative

Summing up, it should be obvious that we must use our initiative. Do not turn away any source of recoverable components. Read the small adverts in the magazines—certainly the Members' Ads or the Classified section—that's where you will often find the bargains you're after. Don't be overawed when visiting a main dealer with his rows of immaculate imported equipment. Ask if they have a Bargain Basement. You might be surprised as they may have part exchange bargains to sell, even if they do hide them! Occasionally bargains even arrive from the orient. Some years ago a great number of reject cassette recorders, minus motors, were available for £1. They were wonderfully useful and my supply of cheap, effective audio amplifiers has finally been used up. Time to look again—but that's what our hobby is about, isn't it?

Next

In Part 3 we will look at a practical converter and how to build it.

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*, Enefco House, The Quay, Poole, Dorset BH15 1PP, 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 Dressler D200C excellent condition. Would exchange for any of the following items: AOR2001, MMT144/28R, MML144/100HS, Trio MC85, very heavy duty rotator, PS430 synthesised handheld 144MHz rig, only equipment in g.w.o. considered. John. Tel: 04612 3249 weekends. GM6TVR QTHR. *B391*

Have various UK and US military radio items, 1960 to present. Would exchange for any recent military manpack equipment or accessories, w.h.y? All "Green" Racal equipment particularly sought. Write: Bob. 120 Birmingham Road, Redditch, Worcs B97 6EP. *B405*

Have 48K Spectrum computer, as new, little used. Also have books, tuition tape, Masterfile and RTTY/c.w. receive program and terminal unit. Would exchange for 430/144MHz hand held, must be in good condition. Paul G4RVM. Tel: Lincoln 37751. *B408a*

Have Polaroid Polavision Land Player plus Polavision Instant Movie Land Camera. Both as new, used twice. Would exchange for h.f. receiver or h.f. TX/RX in g.w.o. or sensible offers please. Tel: 01-200 3825. N.W. London. *B417*

Have Jones electric sewing machine in g.w.o. with carry case. Value about £80. Would exchange for any h.f. receiver or h.f. transceiver, age not important, must be in g.w.o. w.h.y? Tel: 01-200 3825. *B418*

Have Trio 9R59 and Trio 9R59DS, RXs both working. Would exchange for working marine v.h.f. TX/RX, 12V. Thompson, 110 St Olaf Street, Lerwick, Shetland. Tel: Lerwick 3999. *B420*

Have Datong broadband amplifier v.g.c. Would exchange for any frequency counter 26·30MHz, must be working. Mark, 3 Windermere Court, Lonsdale Road, Barnes SW13 9AS. *B429*

Have AR2001 scanner in perfect condition. Would exchange for FRG-7700. R. D. Nicholas, 10 Polmeere Road, Treneere, Penzance, Cornwall. *B431*

Have FT-708, speaker mic, p.s.u., 2 helicals, case. Also have Sinclair 48K computer with recorder. Would exchange for FRG-7700 receiver or h.f. transmitter. Must be first class condition. Ken James GW0DPN. Tel: 0492 78234. *B451*

Have antenna PDL II horizontal, vertical, 10/11m or CB, slim line winch tower, lay down. Would exchange for Nordmende TV or similar for UK, European reception or w.h.y. camping touring wise. Tel: Uxbridge 54116. *B456*

County Antrim

Lagen Valley ARS: Jim Jackson GI4TCS, Shantara, 21 Carneagh, Hillsborough, Co. Down. Meets 2nd Mondays, 7.30pm in Rathvarna Teachers Centre, Pond Park Road, Lisburn.

Avon

Bath & District ARC: L. Lear G3FIH (Bath 837539). Meets alternate Wednesdays, 7.45pm in the Englishcombe Inn, Englishcombe Lane, Bath. Next Meeting Aug 20 and Sept 3.
City of Bristol RSGB Group: Colin Hollister G4SQQ (Bristol 508451). Meets 4th Mondays, 7.30pm in the small lecture theatre, Queens Buildings, UoB, Clifton. Aug 18—h.f. equipment by Lowe Electronics; 24th—Mobile Picnic.
North Bristol ARC: Alan Booth G4YQQ (Bristol 690404). Meets Fridays, 7pm in the Self-Help Enterprise Centre, 7 Braemar Crescent, Northville.
South Bristol ARC: Len Baker G4RZY (Whitchurch 834282). Meets Wednesdays, 7.30pm in Whitchurch Folkhouse, East Dundry Road, Whitchurch. Aug 6—Photography.

Bedfordshire

Dunstable Down RC: Philip Morris G6EES (Dunstable 607623). Meets Fridays, 8pm in Room 3, Chews House, 77 High Street South, Dunstable. Aug 15—h.f. night QSO with members on Ramsey Island Expedition GB4RI; 29th—Talk on Lundy Island Expedition; 30th—Summer Barbecue.

Berkshire

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

Buckinghamshire

Chesham & District ARS: John Alldridge, 95 Rose Drive Chesham. Meets Wednesdays, 8pm at Bury Farm, Pednor Road, Chesham.
Milton Keynes & District ARS: Dave White G3ZPA (Milton Keynes 501310). Meets 2nd Mondays, 7.30pm in the Meeting Place, Hodge Lea, North Milton Keynes. Aug 11—Lundy Island DXpedition by G5LP.

Cambridgeshire

Greater Peterborough ARC: Frank Brisley G4NRJ (Peterborough 231848). Meets 4th Thursdays, 7.30pm in Southfields Junior School, Stanground, Peterborough. Aug 28—Social Evening.

Cheshire

Chester & District ARS: Dave Hicks G6IFA (Chester 336639). Meets 2nd, 3rd, 4th and 5th Tuesdays, 8pm in the Chester RUFC, Hare Lane, Vicars Cross, Chester. Aug 26—Talk on Contesting.
Warrington ARC: Paul Forster G0CBN (Warrington 814005). Meets Tuesdays, 7.30pm in the Grappenhall CC, Bellhouse Lane, Warrington. Aug 5—Open Forum; 12th—Barbecue; 19th—G4YZE from Winter Hill IBA station; 26th—RSGB Film; Sept 2—Open Forum.

Clywd

Conwy Valley ARC: Nigel Vicars-Harris (Conwy 636376). Meets 2nd and 4th Thursdays, 8pm in the Green Lawns Hotel, Bay View Road, Colwyn Bay.
Rhyl & District ARC: Bryan Jones (Rhyl 37284). Meets 1st and 3rd Mondays, 7.30pm in the 2nd Rhyl Scout HQ, rear of Little Theatre, Vale Road, Rhyl. Sept 1—AGM.

CLUB SECRETARIES, PLEASE NOTE

Future editions of *Club News* will be compiled in our Poole Editorial offices. Please send details of forthcoming events to **Elaine Richards G4LFM, *Practical Wireless*, Enefco House, The Quay, Poole, Dorset BH15 1PP.** (Please mark "Club News").

Our thanks go to Eric Dowdeswell G4AR for his help in launching and developing the *Club News* feature over recent years.

CLUB NEWS

Compiled by Eric Dowdeswell G4AR

Cumbria

Eden Valley RS: Alison Telford G4XPO, Ivy House, Culgaith, Penrith. Meets 3rd Thursdays, 7.30pm in Ullswater Centre, Penrith or Crown Hotel Eamont Bridge. Aug 21—Barbecue at Church Brough.
Solway RC: D. G. Rayner G0AFP (Cockermouth 826461). Meets Wednesdays in the Maryport Educational Settlement, High Street, Maryport.
South Lakeland ARS: Dave Warburton G6LKB (Barrow-in-Furness 54982). Meets 1st and 3rd Thursdays, 8pm in the Norweb S&SC, Ormsgill Hotel, Barrow-in-Furness.
Westmorland RS: Gordon Chapman G1IIE, 61 Rusland Park, Kendal. Meets 2nd Tuesdays, 8pm in the Strickland Arms, Sizergh, nr Kendal.

Derbyshire

Derby & District ARS: Jack Anthony G3KQF (Derby 772361). Meets Wednesdays, 7.30pm at 119 Green Lane, Derby.
Glossop & District RG: Geoff Sims G4GNQ, 85 Surrey Street, Glossop. Meets last Thursdays, 8pm in the Nags Head, Charlestown Road, Glossop. Aug 28—Japanese Morse Code by Norman Kendrick.
Nunsfield House CA ARG: John Robson G4PZY (Derby 767994). Meets Fridays, 7.45pm in Room 7, Nunsfield House, Boulton Lane, Alvaston. Aug 16—Demo Station at Pastures Hospital.

Devon

Axe Vale ARC: Bob Newland G3VW (Lyme Regis 5282). Meets 1st Fridays, 7.30pm in the Cavalier Inn, West Street, Axminster. Oct 3—AGM.
Exmouth ARC: Hugh Edwards G4RUT (Exmouth 273157). Meets alternate Wednesdays, 7.30pm in the 6th Exmouth Scout Hut, Marpool Hill, Exmouth. Aug 13—Field Night on Woodbury Common; 27th—Novice Construction Contest.
Plymouth Polytechnic ARS: Darren Dalter G1ERM, 92 Alma Road, Pennycomequick, Plymouth. Meets Wednesday afternoons in the Science Block, top floor.
Tiverton (SW) RC: G. Draper G4ZNV (Crediton 235). Meets Tuesdays, 7.30pm in the Half Moon Inn, Fore Street, Tiverton.
Torbay ARS: Brian Wall G1EUA (Teignmouth 78554). Meets Fridays and last Saturdays, 7.30pm in the ECCSC, Ringslade Road, Highweek, Newton Abbot. Aug 24—Torbay Rally.

Dorset

Flight Refuelling ARS: Ashley Hulme (Bournemouth 872503). Meets Sundays, 7.30pm at the FR S&SC, Merley, Wimborne. Aug 10—Hamfest '86; 31st—Packet Radio by G3VPF.
Poole RAS: Phil Dykes G4XYX, 68 Egmont Road, Poole. Meets last Fridays, 7.30pm in Commander House, Constitution Hill Road, Poole. Aug 29—Is 10m dead or alive by G4XYX.

Dumfries & Galloway

Wigtownshire ARC: Gerry Maxwell GM4BAE (Stranraer 2876). Meets Thursdays, 7.30pm in the Stranraer CC, Lewis Street, Stranraer.

Dyfed

Aberporth RAC: Frank Thomas GW0DDR (Llechryd 274). Meets Thursdays, 7pm in Building 17, Royal Aircraft Establishment, Aberporth.
Pembrokeshire RS: Paul Delaney (Letterston 840249). Meets alternate Thursdays in the FE Centre, Tower Hill, Haverfordwest.

Essex

Loughton & District ARS: Dave Thorpe G4FKI, 44 Townfield Road, Flitwick. Meets alternate Fridays, 7pm in Loughton Hall, Rectory Lane, Loughton.
Southend & District RS: Brian Wood G4RDS (South Benfleet 50494). Meets Fridays, 7.30pm in The Rocheway Centre, Rocheway, Rochford.

Fife

Glenrothes & District ARC: Anne Edmondson GM4TCW (Glenrothes 744449). Meets Wednesdays and 3rd Sundays, 7.30pm in Provosts Land, Leslie.

Glamorgan

Barry College of FE RS: John Cooper GW0ACH (Wick 710). Meets Thursdays, 7.30pm in the Annex, Weycoch Cross, Barry.

Grampian

Aberdeen ARS: Don Travis GM4GXD (Pitcapple 251). Meets Fridays, 7.30pm at 35 Thistle Lane, Aberdeen. Aug 17—GB4BGG at Beechgrove Gardens; 29th—Possible visit to Stonehaven Radio.

Gwent

Pontypool ARS: Ivor Wilkinson GW4RJA

(Cwmbran 72110). Meets Tuesdays, 7pm in The Settlement, Rockhill Road, Pontypool.

Gwynedd

Merion ARS: Ken Judge GW4KEV, Tyddyn Mawr, Arthog. Meets 1st Thursdays, 7.30pm in the Dolserau Hall Hotel, Dolgellau.

Hampshire

Andover RAC: Mike Adams G0AMO (Andover 51593). Meets 1st and 3rd Wednesdays, 8pm in the Wolversdene Club, Love Lane, Andover. Aug 20—Calibration evening (bring your rig); Sept 3—Construction Contest.

Basingstoke ARC: Dave Burleigh G4WIZ (Tadley 5185). Meets 1st Mondays, 7.30pm in the Forest Rings CC, Sycamore Way, Winklebury, Basingstoke. Sept 1—Surface-mounted Devices.

Binstead ARS: A. F. Knight G4RTT (IOW 295951). Meets Wednesdays, 7.30pm in the 1st Ryde/1st Binstead Scout HQ, Drill Lane, Binstead.

Farnborough & District RS: Peter Taylor G4MBZ, 12 Dunbar Road, Paddock Hill, Frimley, Camberley. Meets 2nd and 4th Wednesdays, 7.30pm in the Railway Enthusiasts Club, Access Road, Hawley Lane, Farnborough.

Horndean & District ARC: Dan Barnard G4RLE, 36 Guildford Road, Fratton, Portsmouth. Meets 1st Thursdays, 8pm in Marchiston Hall, London Road, Horndean. Aug 7—Special Event Stations by G4RLE; Sept 4—Junk Sale.

Three Counties ARC: Keith Tupman G0BTU (Petersfield 66489). Meets alternate Wednesdays, 8pm in The Railway Hotel, Liphook. Aug 6—On Air Night; 20th—50MHz Operation; Sept 3—Propagation.

Winchester ARC: Gordon Crittell G4ZNO (Southampton 772191). Meets 3rd Saturdays, 7.30pm in The Log Cabin, Stockbridge Road, Winchester.

Hereford & Worcester

Bromsgrove ARS: Alan Kelly G4LVK (021-455 2088). Meets 2nd & 4th Tuesdays, 8pm in the Aston Field WMC, Stoke Road, Bromsgrove.

Droitwich ARC: Gordon Taylor G4HFP (Stourport-on-Severn 3818). Meets 2nd Mondays, 8pm in the Club Shack, 17 Ombersley Street West and 4th Mondays, 8pm in the Scout HQ, Union Lane, Droitwich. Sept 22—Microwave Workshop (your gear aligned).

Hereford ARS: F.E.G. Cox, 35 Thompson Place, Hereford. 1st and 3rd Fridays, 8pm in the County Council CD HQ, Goal Street, Hereford. Sept 5—VHF Working by G4ASR.

Vale of Evesham RAC: M. J. Butler G4UXC, 16 Clevdon Green, South Littleton, Exmouth. Meets 1st Thursdays in the Round of Gras, Badsey and 3rd Thursdays at The Anchor, Fladbury. Sept 4—VHF Matters by G5UM.

Worcester & District ARC: Derek Batchelor G4RBD (Worcester 641733). Meets 1st and 3rd Mondays, 8pm in the Oddfellows Hall, New Street, Worcester.

Hertfordshire

Borehamwood & Elstree ARS: Tony G0DDJ (01-207 3809). Meets 3rd Mondays, 7.30pm in The Wellington, Theobald Street, Borehamwood.

Cheshunt & District ARC: John Watkins (G4VMR (Dane End 250). Meets Wednesdays, 8pm in the Church Room, Church Lane, Wormley.

Harpenden ARC: Peter Simons G1BJC (Harpenden 2455). Meets 2nd and 4th Tuesdays, 8pm in The Silver Cup, St Albans Road, Harpenden. Aug 12—No 62 Radio by G0CXP.

Verulam ARC: Gerry Wimpenny G4OBH (St Albans 52003). Meets 2nd and 4th Tuesdays, 7.30pm in The RAFA HQ, New Kent Road, off Marlborough Road, St Albans. Aug 26—Bring and Buy Sale.

Welwyn Hatfield ARC: Dave Fairbanks G0AII (Welwyn Garden 326138). Meets 1st and 3rd Mondays, 8pm in Knightsfield Scout HQ, Welwyn Garden City. Aug 4—Radio Controlled Model Aircraft by G0AII; 18th—RTTY.

Humberside

Hornsea ARC: Richard Gutteridge G4YTV (Skirlaugh 62498). Meets Wednesdays, 7.30pm in The Mill, Mill House, Atwick Road, Hornsea.

Hull & District RS: David Potter G0DMP, 102 Normandy Avenue, Beverley. Meets Fridays, 8pm in the West Park RC, Walton Street, Hull.

Kent

Bredhurst R&TS: Kelvin Fay G0AMZ (Medway 376991). Meets Thursdays, 8.15pm in Parkwood CC, Parkwood Green, Rainham. Aug 7—Antenna By G5RV; 21st—Talk by G8CCJ.

Cray Valley RS: B. Rowe G4WYG, 19 Madeira Park, Tunbridge Wells. Meets 2nd and 3rd Thursdays in The Admiral Seymour Hall, Eltham SE9.

Edenbridge ARS: J. Grevatt (East Grinstead 24748). Meets 2nd Wednesday in the Scout Hut, High Street, Edenbridge. Aug 13—Thyristors by G6JVT.

Hilderstone RS: Annette Penfold G0BEX (Canterbury 812723). Meets Fridays, 7.30pm in the Hilderstone AEC, St Peters, Broadstairs.

East Kent ARS: A. G. Stone G4UPJ, 86a Joy Lane, Whitstable. Meets 1st and 3rd Thursdays, 7.30pm in Herne Bay YC, The Cabin, Kings Road, Herne Bay.

S.E. Kent YMCA ARC: John Dobson (Dover 211638). Meets Wednesdays, 7.45pm in the Dover YMCA, Godwynehurst, Leyburne Road, Dover. Aug 7—QRP Outside Operating Practice; 13th—144MHz Foxhunt; 20—Barbecue at Walmer; 27th—Visit of Interest; Sept 3—Natter Nite and Committee Meeting.

West Kent ARS: Nigel Peacock G4KIU (Tunbridge Wells 33586). Meets Fridays, 8pm in the AEC Annex, Quarry Road, Tunbridge Wells.

Lancashire

Bury RS: Miss C. J. Ashworth G1PKO (061-764 5018). Meets Tuesdays, 8pm in the Mosses Y&CC, Cecil Street, Bury. Aug 12—DF Hunt.

Douglas Valley ARS: Dave Snape G4GWG, 30 Culcross Avenue, Highfield, Wigan. Meets 1st and 3rd Thursdays, 8pm in the Standish Conservative Club, School Lane, Standish.

Fylde ARS: H. Fenton G8GG (Lytham St Annes 725717). Meets 1st and 3rd Tuesdays, 7.30pm in the Kite Club, Blackpool Airport. Aug 5—Top Band DX by G4OBK.

Morecame Bay ARS: W. E. Delamere G3PER (Heysham 52659). Meets Mondays, 7.30pm in the canteen, Luneside Eng. Co., Mill Lane, Halton.

Preson ARS: George Earnshaw G3ZXC (Preston 718175). Meets 2nd and 4th Thursdays, 7.45pm in the Lonsdale Club, Fulwood.

Rolls Royce ARC: L. Logan G4ILG (Barnoldswick 812288). Meets 1st Wednesdays, 8pm in The RR S&SC, Barnoldswick. Aug 3—Mobile Rally at 11am.

Rossendale RC: Bernard Murray G4VVK (Rossendale 229026). Meets Wednedays, 8pm in the Huntsman, Loveclough, on the A56.

Skelmersdale & District ARC: Gordon Crowhurst G4ZPY (Ormskirk 894299). Meets Thursdays, 7.45pm in the Beacon Park Centre, Dalton Lane, Skelmersdale.

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

Leicestershire

Welland Valley ARS: Judith Bay G6OFZ, POB 16, Market Harborough. Meets Mondays, 7.15pm in the 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 Magna. Aug 31—Treasure Hunt at 3pm then Barbecue and Social.

London

Acton, Brentford & Chiswick ARC: W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London. Meets 3rd Tuesdays, 7.30pm in the Chiswick Town Hall, High Road, Chiswick, London W4. Aug 19—Microprocessors by G1HSM.

Ealing & District ARS: Anton Berg G4SCR (01-997 1416). Meets Tuesdays, 7.30pm in Northfields CC, 71a Northcroft Road, London W13.

Grafton RS: John Kaine G4RPK (01-267 1000). Meets 2nd and 4th Fridays, 8pm in the Haringey Sea Cadet Corp, Training Ship Wizard, White Hart Lane, Wood Lane, London N22.

Southgate ARC: D. C. Elson G4YLL (Waltham Cross 30051). Meets 2nd Thursdays, 7.30pm in the Holy Trinity Church Hall, Green Lanes, Winchmore N21.

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, London SW19. Aug 9/17—Annual Club Camp at Barwell Estate; 25th—Special Event Station at Merton Concours Show, Morden Park; Sept 5—144MHz d.f. Hunt.

Lothian

Leith Nautical College AR&EC: Susan Beech GM4SGB, c/o Club Address. Meets Tuesdays, 5–7pm in T2-4 Electronics Lab, Leith Nautical College, 24 Milton Road East, Edinburgh.

Lothian RS: Robin Thompson GM4YPL (Winchburgh 890177). Meets 2nd and 4th Wednesdays, 7.30pm Harwell House Hotel, Ettrick Road, Edinburgh.

Merseyside

Wirral ARS: R. E. Bridson G3VEB, 14 Zig Zag Road, Wallasey. Meets 1st and 3rd Wednesdays, 7.45pm in the Club HQ, Ivy Farm, Arrowe Park Road, Birkenhead.

Middlesex

Echelford ARS: Peter Coleson G4VAZ (Sunbury 783823). Meets 2nd Mondays and last Thursdays, 7.30pm in The Hall, St Martins Court, Kingston Crescent, Ashford. Aug 11—Surplus Equipment Sale.

RS of Harrow: Dave Atkins G8XBZ (Rickmansworth 779942). Meets Fridays, 8pm in the Harrow AC, High Road, Harrow Weald.

Northumberland

Borders ARS: Matty Bottomley GM1IRN, 4 Home Farm Cottages, Ladykirk, Berwick-on-Tweed. Meets 1st and 3rd Fridays, 8pm in the Tweed View Hotel, Berwick-on-Tweed. Aug 15—Safety in the shack; 24th—Galashiels Open Day; Sept 5—Field Day Preparation.

Nottinghamshire

Mansfield ARS: Angela Fisher G1DZH (Mansfield 652812). Meets 1st Fridays and 3rd Tuesdays in the Victoria Social Club, Princess Street, Mansfield.

ARC of Nottingham: Ian Miller G4JAE (Nottingham 232604). Meets Thursdays, 7.30pm in the Sherwood CC, Woodthorpe House, Mansfield Road, Nottingham. Aug 8—144MHz DF Hunt; 28th—My US Visit by G4MHB: Sept 4—DF Hunt.

Worksop ARS: Carole Gee G4ZUN (Worksop 486614). Meets 2nd and 4th Tuesdays, 7.30 in the Sub-Aqua Club, The Maltkins, Gateford Road, Worksop. Aug 12—Darts Evening with Worksop Branch of British Sub Aqua Club; 26th—DF Hunt; 24/25th—GB2BTF at Bassettlaw Show, Kilton.

Shropshire

Salop ARS: Simon Pryce GOEIY (Shrewsbury 67799). Meets Thursdays, 8pm in the Olde Bucks Head, Frankwell, Shrewsbury. Sept 4—Special h.f. Evening.

South Shropshire RC: G. Cowan BRS 87564 (Telford 581130). Meets Tuesdays, 8pm in the Broseley SC, Broseley.

Somerset

Yeovil ARC: Eric Godfrey G3GC (Yeovil 75533). Meets Thursdays, 7.30pm in the Recreation Centre, Chilton Grove, Yeovil. Aug 14—Oscilloscopes by G3GC; 21st—Sunspot Cycles by G3MYM; Sept 4—Fading and Fade-outs by G3MYM.

Staffordshire

Cannock Chase ARS: B. Robinson G1FEC (Cannock 74521). Meets Thursdays, 8pm in the Bridgetown War Memorial Club, Union Street, Bridgetown.

Strathclyde

West of Scotland ARS: V. J. Kusin GM4HCO (Paisley 2472). Meets Fridays, 7.30pm at 154 Ingram Street, Glasgow.

Suffolk

Felixstowe & District ARS: Paul Whiting G4YQC (Ipswich 642595). Meets alternate Mondays, 8pm in The Feathers, Walton High Street, Felixstowe. Aug 11—Social Evenings: 25th—Projects evening; 28th—Visit to Radio Orwell; 30th—Carnival.

Ipswich RS: Jack Toothill G4IFF (Ipswich 44047). Meets 2nd and last Wednesdays, 8pm in The Rose & Crown Club Room, 77 Norwich Road, Ipswich.

Surrey

Coulsdon ATS: Alan Bartle (01-684 0610). Meets 2nd Mondays and last Thursdays, 7.45pm in St Swithuns Church Hall, Grovelands Road, Purley, Surrey. Aug 11—Construction Contest; 28th—Help Night.

Surrey Radio Contact Club: J. L. Simpkins (01-657 0454). Meets 1st and 3rd Mondays, 8pm in the Waldrons, TS Terra Nova, South Croydon.

Sutton & Cheam RS: Geoff Plucknett G4FKA, 32 West Road, Malden Rushett, Chessington. Meets 3rd Fridays, 7.30pm in the Downs LT Club, Holland Avenue, Cheam. Aug 15—Computers in Amateur Radio.

Sussex

Chichester & District ARC: C. Bryan G4EHG (Chichester 789587). Meets 1st and 3rd Tuesdays, 7.30pm North Lodge Bar, County Hall, Chichester. Next meetings Aug 5 and 19th.

Crawley ARC: Jack Derby G4TVC (Crawley 28612). Meets 2nd and 4th Wednesdays, 8pm in the United Reform Church, Ifield Drive, Ifield.

Hastings E&RC: Dave Shirley G4NVQ (Hastings 420608). Meets 3rd Wednesdays, 7.45pm in the West Hill CC, Croft Road, Hastings and on Fridays, 8pm in the Club House, Downey Close, St Leonards-on-Sea. Aug 20—HF DX by G3BDQ.

Horsham ARC: Paul Drawmer G4YFY, Treforest, Dragon Green, Shipley. Meets 1st Thursdays, 8pm in the Girl Guides HQ, Denne Road, Horsham.

Southdown ARS: Jan Alblas G4XNL (Eastbourne 638653). Meets 1st Monday, 7.30pm in Chaseley Home, Southcliff, Eastbourne and Tuesdays and Fridays in the Wealdon Council Offices, Vicarage Field, Hailsham. Aug 26/28—Club at Exhibition of Transport; Sept 1—50MHz Matters by G8VR.

Worthing & District ARC: Roy Jones G4SWH, POB 599, Worthing. Meets Wednesdays, 7.30pm in Lancing Parish Hall, South Street, Lancing. Aug 6—Satellite TV Demo.

Tyneside

South Tyneside ARS: P. W. Grainger (South Shields 543955). Meets Mondays, 7.30pm in the Martec Club, South Tyneside College, Grosvenor Road, Tyneside.

Warwickshire

Rugby ATS: Kevin Marriott G8TWH, 41 Foxon's Barn Road, Brownsover, Rugby. Meets Tuesdays, 7.30pm in the Cricket Pavilion, BTI Radio Station, "B" Entrance, Hillmorton, Rugby.

Mid-Warwickshire ARS: Stan Hobbs G6XRI (Kenilworth 53099). Meets 2nd and 4th Tuesdays, 8pm at 62 Emscote Road, Warwick. Aug 12—Book Swap Night; 26th—HF Operation in the Field.

West Midlands

Coventry ARS: Robin Tew G4JDO (Coventry 73999). Meets Fridays, 8pm in Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Aug 15—144MHz DF Hunt; 29th—Oscilloscopes.

Dudley ARC: John Tisdale G4NRA (Kingswinford 278300). Meets 1st, 2nd and 4th Mondays, 7.45pm in the Allied Centre, Greenham Alley, off Tower Street, Dudley.

Midland ARS: Tom Brady G8GAZ (021-357 1924). Meets every week night in Unit 5, Henstead House, Henstead Street, Birmingham 5. Aug 19—Summer Outing.

Mirfield RC: C. Marks G4ZPJ, 63 Alvis Walk, Chelmsley Wood, Birmingham. Meets Mondays, Tuesdays, Wednesdays and Thursdays, 7pm in the Mirfield CC, Yockleton Road, Lea Village, Birmingham.

Sandwell ARC: Malcolm Strong G4UMY (021-422 1554). Meets Mondays and Thursdays, 7.30pm in the Broadway, Oldbury, Warley.

Stourbridge & District ARS: Malcolm Davies G8JTL (Lye 4019). Meets 1st and 3rd Mondays, 8pm in the Robin Woods Centre, School Street, Stourbridge. No August Meetings; Sept 1—Informal Gathering.

West Bromwich Central RG: G. Kitson G4ZAD (Bilston 48263). Meets Sundays, 8pm in the Victoria, Lyng Lane, West Bromwich.

Willenhall & District ARS: John Phillips G4UPF (Wombourne 782076). Meets Wednesdays, 8pm in The Cross Keys, Prouds Lane, Willenhall.

Wolverhampton ARS: Keith Jenkinson G1OIA (Wolverhampton 24870). Meets Tuesdays, 8pm in the Wolverhampton Electricity S&SC, St Marks Road, Chapel Ash, Wolverhampton. Aug 12—Black Box or Home-Brew Discussion; 19th—Visit to RAF Cosford Wireless School; 24/25th Demo Station at Town & Country Fair, Weston Park; 31st DF Hunt; Sept 2—Rig Testing by G4WAS.

Wiltshire

Devizes & District ARS: Peter Greed G3MQD, 18 Nurseed Park, Devizes. Meets Fridays, 8pm in the Devizes Football SC, Devizes.

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

Swindon & District ARC: Francis Neufville (Chippenham 890303). Meets Thursdays, 7.30pm in Oakfield School, Marlowe Avenue, Swindon. Sept 4—Broadcasting in the USA by G4YQZ.

Trowbridge & District ARS: Gerry Callaghan G4SPE (Westbury 4532). Meets 4th Tuesdays, 8pm in Southwick Village Hall, Nr Trowbridge.

Yorkshire

Halifax & District ARS: D. L. Moss GODLM (Halifax 202306). Meets 3rd Tuesdays, 7.30pm in The Running Man, Pellon Lane, Halifax. Aug 19—VHF Foxhunt.

Keighley ARS: Kathy Conlon G1IGH (Bradford 496222). Meets last Tuesdays, 8pm in the Victoria Hotel, Keighley.

Sheffield ARS: Peter Cardwell (Sheffield 581766). Meets 1st and 2nd Mondays, Firth Park Pavilion. Aug 11—One Hour Contest and Social; Sept 1—SSTV Demo by G8RWV.

Spen Valley ARS: Tim Clough G4PHR (Mirfield 499397). Meets Thursdays, 8pm in the Old Bank WMC, Mirfield.

Todmorden & District ARS: Val Mitchell G1GZB (Todmorden 7572). Meets 1st and 3rd Mondays, 8pm in the Queen Hotel, Todmorden.

Wakefield & District RS: Walter Parkin G8PBE (Wakefield 378727). Meets alternate Tuesdays, 8pm in the Ossett CC, Prospect Road, Ossett. Aug 19—Car Treasure Hunt.

North Wakefield RS: S. Thompson G4RCH (Morley 536633). Meets Thursdays, 8pm in The White Horse, East Ardsley. Aug 21—Amateur Radio History by G3VTD; 23/25th—Special event station at Harewood Steam Rally; Sept 4—AGM.

FOR YOUR INFORMATION . . .

Clubs supplying regular details of lectures and other events will be mentioned in every issue.

Clubs supplying meeting dates but without details of lecture subject and speaker will be mentioned in alternate issues only.

Newly formed clubs, or those changing their venues, etc., will be mentioned in the next three issues.

Cover Date	Deadline	For events after
November	Aug 22	Oct 9
December	Sept 22	Nov 13
Jan '87	Oct 22	Dec 11

ON THE AIR

AMATEUR BANDS

by Eric Dowdeswell G4AR

Commencing with our November 1986 issue, *Amateur Bands* will be compiled each month by John M. Fell G0API. Future reports for incorporation into the column should be sent to John at 14 Rectory Avenue, Corfe Mullen, Wimborne, Dorset BH21 3EZ.

Our thanks go to Eric Dowdeswell G4AR for his work on the column in recent years. You'll still be seeing his name in the pages of *PW* though, as he's planning to contribute the occasional article from time to time.

There can be little doubt that many would-be amateurs are put off the hobby by the apparent high cost of getting on the air these days. This is not necessarily so as good, used equipment can be picked up at bargain prices especially at club "surplus equipment" sales. There is also a cheap and attractive way into amateur radio by making up kits of parts.

Regular correspondent **Brian Fields G4XDJ** sparked off the above thoughts when, in a letter, he said that although he is unemployed he had managed to keep on the air for the last couple of years at minimum cost, albeit on QRP c.w. He built a direct conversion transceiver running about 1W c.w. for around £10. A length of wire to the edge of the roof was his first antenna. He has had many pleasant QSOs and has worked more than 30 prefixes which has been a great surprise to Brian. He remarks "Just how far will a few quid and a few watts go"? With a good beam antenna, around the world!

On car outings he takes the rig, a length of wire and uses the car battery as power source. He finds that when he calls CQ QRP that he gets many replies, more like a rare DX station, he says. One offshoot of his DX reports in *PW* is an ever-increasing number of other amateurs contacting him to find out how he manages to do so well with QRP c.w., thus building up a circle of friends.

There are plenty of simple, cheap kits of parts on the market, advertised in *PW* and other magazines, for receivers, transceivers and other equipment which can be added on to a station as funds permit. I hope that putting G4XDJ's comments into print will encourage newcomers to amateur radio and prevent them being frightened off on the grounds of cost. Although Brian might hesitate to admit it, he will have become a very proficient c.w. operator by now and the c.w. QRP experience will stand him in good stead when, hopefully, he will be able to afford more powerful equipment in the not too distant future.

General

The previously mentioned International Listeners' Association is gradually getting off the ground and the second newsletter published which includes a list of addresses of s.w. BC stations. A suggested QSL card for BC stations is shown, as used by organiser GW4OXB. So far there is no subscription or membership fee but of course a stamp or s.a.e. is appreciated. The Association will be represented at rallies during the summer. A Broadcast Award has been formulated for logging 100 BC stations. More details from Trevor Morgan GW4OXB, 1 Jersey Street, Hafod, Swansea. In case it might be thought that this copy is out of place in an amateur radio column it should be remembered that large numbers of s.w. BC listeners eventually migrate to the amateur ranks!

Details of the changes to French prefixes may be welcomed by readers. Prefix FA is Class A from 13 years of age with 20W 'fone on the 144MHz band. FB is Class B, from 13, 20W 'fone plus c.w. from 144·05 to 144·09MHz and c.w. on 7, 14, 21 and 28MHz bands. Prefix FC is Class C, from 16 years, with 100W 'fone on the 144MHz band. Prefix FD is Class D, from 16, 100W of c.w. or 'fone on all bands. FE or F is Class E after holding Class D for three years, allowing 250W 'fone/c.w. on all bands. Prefix FF is for radio clubs. The five classes are numbered 1 to 5 and used in French colonial prefixes such as TK5, a Class E licensee.

The Worked All Britain Awards (WAB) is very well known now both by licensed amateurs and s.w.l.s and nets are to be found on several bands, often working mobile stations in rare WAB areas. At the May Drayton Manor Park rally retiring president G3UQT presented 11 WAB Diamond awards for working 3000 WAB areas and four awards for 3500 areas. Four WAB Expedition and mobile awards were presented for activating 1000 areas. First overseas Diamond trophy went to ON6JG while the newly introduced WAB Islands award went to G4WXX for a claim using only the 144MHz band. Frank Parkhurst, an s.w.l., was second recipient for a claim using l.f. bands. The first WAB Sapphire award for 1350 areas on v.h.f. went to G6XLL.

More info on the WAB activities can be obtained from Brian Morris G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford, for an s.a.e. Life membership of WAB is £5 which includes receiving a record book and claim sheets listing all WAB areas.

To celebrate its fourth birthday the Bredhurst R&TS (Kent) ran GB0BRC from a field behind the local pub in Bredhurst Village in May. Unusually the two CB bands, 27 and 934MHz, were operated in addition to the 144MHz and the h.f. bands. Seemingly the CB operation is very popular with CBers and normal special event station practices are observed engendering a great deal of interest in amateur radio. The new Telomasts put a G5RV antenna at 12m fed from an IC-701 for the h.f. bands, using both c.w. and s.s.b. One visitor most welcome was Andrez VP8NE.

DX Bands

Phil Dykes G4XYX of Poole refuses to regard 28MHz as a dead band and advises others to keep an ear open on the band on which he has heard/worked 34 countries this year. He even suggests that the band is better than any time since 1984. He also heard all continents during May and beacons on the 13 out of 25 evenings on which he was able to listen. Phil uses either a modified CB rig for s.s.b. or a 1W c.w. rig. The antenna is a two-element quad at 6m high. Catches included C39OF (Catalonian Language Conference), CE3HFI, CE3HPK, CN2AQ on c.w., CU2AP, CX4HS, EA8AXN, EA9MM, GD4XTT via Sporadic-E, LU1PBL and LU7HJM.

Paul Vernon of Blackpool sends in his first log for the h.f. bands. He runs an FT-101E transceiver plus FRG-7000 and a.t.u. To avoid any temptation to use the transmitter side of the FT-101 Paul has locked the microphone and p.a. valves in a cupboard! Lucky Paul has a full-wave delta loop for the 3·5MHz band which is 6m up at its lowest point, plus a 50m long wire at 10m height. Planned antennas include a 20m vertical with radials and a better earth system. Paul was very impressed with a borrowed Datong Multi Filter so he's saving up for one of his own. On 21MHz Paul found YC6XE and YB6MF on 14MHz. Better on 3·5MHz or thereabouts were K3UZY, ZL4BO, ZL4AP both around 0600Z, VK7BB, 4V7PV (special one-day operation from Haiti on May 18, QSL to HH7PV), 5B4JE and PY6KR and 5R8AL, ZP5AR and VE1SU.

George Hitchins BRS88435 of Frimley stuck mainly to 21MHz with his Panasonic RF3100LBE receiver and 40m-long antenna and FRT-7700 a.t.u. The a.t.u. is a recent acquisition and he says "I've been hearing places this month I never thought I would on my little box". Readers will know

Andy Durrant of Aldershot likes to get out and about with his VR3 Jaybeam trapped dipole or a long wire slung up to a tree. His FRG-8800 and a.t.u. really bring in the DX on all the h.f. and l.f. bands

that I have constantly advocated the use of an antenna tuning unit with long wires or non-resonant antennas. So to George's log and on 14MHz EP3UKK, J37AM, OA4CC, 9J2ML, VE2PAB/4U on the Golan Heights and 4N0IARU in YU land. Up to 21MHz and CX1TH, FK2BRH, HI3HRD, HK3JPS, HV5VO, J73LC (QSL POB 102, Roseau, Dominica), OD5GC (QSL POB 174, Hazmieh, Beirut), TI2ALZ (QSL POB 5236, San Jose), TR8SA (QSL POB 1826 Libreville), VP2MO with cards to WB2LCH, VP8JC, V44KQ and QSL WB2LCH, Z25TJ.

Angela Sitton BRS88639 of Stevenage, Herts, and OM John run a Heathkit HR10B receiver with dipoles for the 28, 21, 14MHz bands and two parallel 11m-long wires for the 7 and 3·5MHz bands. John is a heart sufferer and member of the RAIBC and hopes to be able to upgrade the receiver very soon, and to take his RAE in December. Unusual prefix OD4MH was logged on 28MHz band, usually OD5. On 21MHz just CU2M. For 14MHz it was 4N0IARU, 9K2DZ, VE2PAB/4U, 7X2CE (QSL POB 54 Bordj Menaiel), 3A2EE, HB0/DA1WA DXpedition from Wiesbaden ARC, A2IARU/A, A71BK, and VK2LX on short path at midnight.

QRP enthusiast **Brian Fields G4XDJ** of Billingham, Cleveland, runs a Sommerkamp FR-100B receiver with FL-200B transmitter giving between 1W and 20W on c.w. for his QRP work. Dipoles for the 3·5, 14 and 21MHz bands are connected to a common low impedance feeder, a simple and space-saving design, plus a delta loop used on 7MHz and 3·5MHz. So, on c.w. on 21MHz just a few Euros like DL5LY, HB9AVU, YU7BCF and HA5KAG, with, on 14MHz PT2CW, VE1ZN, JL3TWE, VE6BNP, 5G6N said to be in Casablanca, CU2QN, YV1DX, VP2MDY, 4X6MP. On 3·5MHz the best was LX1GN.

With a Panasonic DR49 receiver and a Datong AD370 active antenna **Michael Sargeant** of Bolton stuck firmly to the 14MHz band and gathered a nice collection in CX6BBY, HR1VFB, JH1CER, J88AQ, OX3HX, VK3MO, VQ9GB, VP9TAE, XE3AAO, ZF1RC, 5X5GK, 6W7GZ and 9L1NS.

Using a Yaesu FT-902DM transceiver and half-wave dipole **Mike Willgoss G4XRR** of Weymouth worked into IK8GGQ, LZ1BY, 4X4VL, PY2TSB, EA7GEZ, TK5EP, IS0OZK, C53FE and CS8DIZ, all on 28MHz s.s.b. which shows what can be done on that band.

Ron Pearce in Bungay, Suffolk, has built himself a one-valve receiver using it with a Partridge VFA antenna. While an outside antenna and a.t.u. would be desirable the receiver can be quite unstable in frequency when the antenna moves in the wind. This would be quite noticeable on copying s.s.b. or c.w. when the receiver is in an oscillating mode. Anyway, Ron has copied lots of Euros and North Americans like VE2PA/P, VE3NEP, K4VCW and KA2PO, and I look forward to better logs in the near future. The vagaries of swinging antennas can be eliminated by adding a tuned or untuned r.f. stage. This all takes me back to my early days on the air with 10W c.w. and an 0-V-1 receiver to a dipole on 14MHz!

Robert Watters down in St Austell, Cornwall, was excited to copy a station signing N1DVI being an aircraft flying towards the Azores at 7900m and working the US mostly. Strictly speaking of course the call should be N1DVI/AM for aeronautical mobile. Robert has a Yaesu FRG-7700 and FRT-7700 a.t.u. fed from a 20m-long wire antenna. Sticking to 14MHz he caught V44IK, EL1C, EK1AO, LG5LG, XT2BR, 5N9SRC, 6W7BZ and 9L1NS.

Andy Durrant of Aldershot has been out and about with his FRG-8800 and a.t.u. with a long wire between any convenient tree and the car plus a VR3 Jaybeam trapped vertical antenna. Main site used was on Butser Hill, Hants, said to be about 270m a.s.l., often staying there till past midnight! Needless to say his log is pretty extensive so here goes. On 21MHz between midday and midnight CE5CQD, CP8LE, CX4HS, C53EZ, EA8AJU, EC9JM, HB0/DA1WA (QSL DA1WA), HK6HFY, HR1FMH (QSL to POB 1030 Tegucigalpa), JY4MB, J6LGH, J73LC, US Navy ship K3QQN/MM and LU5GO. More on 21MHz, TA2G, TU2PZ, VP2EZ, VU2ZAP, V85ER in Brunei, WA7CQE/DV2, YC0EDG, ZF6AJK, ZP5CVI and ZS25TJ, plus ZS5IV in Namibia. Then 4S7VK, 5H3DX, 5N8ZHN (QSL POB 293, Kano), 9L1NS, 9M2CS and 9Y4IBN.

More from Andy's log, on the 14MHz band this time, A92DZ, AP2MQ (QSL to POB 847, Lahore), A71BK, C31YF, G4KJP/EA5, H4YD Solomon Is, JA1ELY, SU1ER, KC4ML at the South Pole at midnight, TA2G, VE2PAB/4U, V44KAR (QSL WB2LCH, XE1JIW, ZS4S, 4N0IARU with cards to YU4FRS, 5Z4EV (QSL POB 3046 Nairobi) and 7X2VMK. On to 7MHz mostly around midnight and CE6GEO, CP5TW, LU6FEC, ZP5JAF, HB0/DA1WA again, and 8R1RPN. Snippets from around 3·5MHz were ZL4AP at 2130Z, 4N0IARU and 5B4MQ. Well done, Andy! Well worth while.

Other reported DX include ZF9SV, K5HK/KP2 on the Virgin Islands unless he has already gone home, UV1OO on Franz Josef Land, all on s.s.b. plus c.w. from BY1QH around 7·005MHz. TK/DL4EF came up on 3·5MHz for Corsica and on 14MHz c.w. CO6OH.

During a recent opening on 28MHz the only odd beacon of note was EA3JA in Barcelona on 28·248MHz, plus I4YM.

Please send your reports by the 15th

RTTY

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

"The higher sun angle of summer and its consequent longer period of ionisation has sustained the reception of data mode loggings, with 69 prefixes including several of 21MHz and a welcome few on 28MHz," writes **Len Fennelow G4ODH** from Wisbech, for the month prior to June 10. Both Len and **Bob Borzych G4WWD** in Liphook found an abundance of AMTOR traffic. While Len clocked up 27 prefixes, Bob (using AMTOR only) worked 3 countries on 3·5MHz, 2 on 7MHz, 15 on 14MHz, 5 on 21MHz and two very good QSOs on 28MHz. These were a 30 minute QSO with PY2FZ at 1828 on May 25 and another QSO with GI4LKG.

The Bulgarian contact that Bob made on 14MHz was LZ2KIM, the students' amateur station who are usually very active. I also copied their RTTY on 28MHz at 1038 on June 7. Just to prove that the band was active, Bob heard 14 other countries on AMTOR. These countries, and the ones Bob worked are marked * in Fig. 1.

In Aldershot, **Peter Lincoln BRS42979**, copied RTTY signals for the first time from Turkey TA1B, RA3UN, TR8DX and a few stations in North America, all on May 19.

Fig. 1: This month's AMTOR chart

Country (Prefix)	Band (MHz) 3·5	7	14	21	28
Andorra (C3)*			X		
Austria (OE)			X		
Brazil (PY)			X		X
Bulgaria (LZ)*			X		
Canada (VE)*			X		
Canary Is (EA8)*			X		
Chile (CE)			X		
Costa Rica (TI)			X		
Cyprus (5B)*			X		
Denmark (OZ)*			X		
England (G)*	X	X	X	X	
France (F)*	X		X		
Greece (SV)*			X		
Greenland (OX)*			X		
Hungary (HA)			X		
Italy (I,IK,IT)*		X	X		
Japan (JA)*			X		
Kuwait (9K)*			X		
Nepal (9N)			X		
Netherlands (PA)*	X	X	X		

Early in June, **Geoffrey Powell** in Tamworth logged 8 countries, mainly European on 14MHz. His station is an R600 receiver and a Telereader RTTY box. **George Haylock G4DHV** in Sidcup uses an Igaduma terminal unit, Scarab interface, RTTY 3 and a Sinclair Spectrum plus computer. He logged RTTY traffic from nine countries on 14MHz, and remarked, "There's no shortage of Italy and Spain."

It's good to see data traffic on 28MHz again and let us hope conditions permit it

Country (Prefix)	Band (MHz) 3·5	7	14	21	28
Northern Ireland (GI)				X	
Norway (LA)*			X		
Oman (A4X)*			X		
Poland (SP)*			X		
Portugal (CT)*			X		
Sicily (IT9)*			X		
South Africa (ZS)*			X		
Spain (EA)*			X	X	
Sudan (ST)*			X		
Sweden (SM)*	X		X		
Switzerland (HB)*		X	X		
Tanzania (5H)			X		
Togo (5V)*			X	X	
USA (A,K,N,W)*			X	X	
Venezuela (YV)*			X		
West Germany (DF,DJ,DK,DL)*	X		X		
West Malaysia (9M2)*			X		
Windward Is (VP2)			X		
Yugoslavia (YU)			X		

to stay that way. I copied "WEDNET DE G4LOA" and "G4LOA DE G3HTP" on 28·15MHz at 2146 on May 21, EA3COU at 1850 on the 22nd, OH1AF around 1915 on the 30th and "AUTOMATIC MAILBOX OF EA3COU" on 28·101MHz at 1530 on June 2. In about an hour from 1038 on the 7th I logged 9 countries, DH, EA, F, I, LZ, SM, YU, 4X4 and 9H1 during a Sporadic-E opening, I think it was a contest.

Between May 15 and June 14, using a Trio R2000 receiver and a Tono 550 terminal, I copied RTTY signals from 2 countries on 3·5MHz, 2 on 7MHz, 28 on 14MHz, 8 on 21MHz and 11 on 28MHz. I was interested to read, "HBO/DA1WA. 11th ANNUAL DXPEDITION TO LIECHTENSTEIN FROM WIESBADEN GERMANY", on 14MHz at 0922 on May 24. I also saw G3DVL print out his callsign, 7 characters high by cleverly distributing each letter of his callsign to make up the right sequence and shape. Then on 1959 on June 8 he printed "CQ RSARS" on 3·5MHz.

My advice to newcomers who are looking for data DX is to tune around 14·090MHz after midnight because at 0059 on June 12, I copied HC5KA, at good strength, working an Italian station and there was more about. Keep a look out for W1AW, the headquarters station of the ARRL in Newington, because their transmissions are usually full of good gen.

My thanks to all contributors for your logs and comments and needless to say, I look forward to your reports coming in.

Country (Prefix)	Band (MHz) 3·5	7	14	21	28
Alaska (AL7,KL7,NL7,WL7)			X		
Andorra (C3)			X		
Ascension Is (ZD8)			X		
Austria (OE)		X	X		
Balearic Is (EA6)			X		
Belgium (ON)			X		
Brazil (PY)			X		
Bulgaria (LZ)			X		X
Canada (VE)			X		
Canary Is (EA8)			X		
Cayman Is (ZF)			X		
Chile (CE)			X		
Cuba (CO)			X		
Cyprus (5B)			X		
Czechoslovakia (OK)			X	X	
Dominican Republic (HI)			X		
East Germany (Y2)			X		
Ecuador (HC)			X		
Eire (EI)			X		
England (G)	X		X		
Finland (OH)			X		X
France (F)	X	X	X		X
Gabon (TR)			X		
Gozo & Comino (9H4)			X		
Greece (SV)			X		
Greenland (OX)			X		
Guernsey (GU)		X			
Hungary (HA)			X	X	
India (VU)			X		
Israel (4X)			X		X
Italy (I)		X	X	X	X
Japan (JA)			X		
Korea (HL)			X		
Lebanon (OD)			X		
Liechtenstein (HBO)			X		
Luxembourg (LX)		X	X		
Malta (9H)			X		X
Martinique (FM)			X		
Moldavia (UO5)			X		
Netherlands (PA)	X		X		
Nigeria (5N)			X		
Northern Ireland (GI)			X		
Norway (LA)			X		
Pakistan (AP)			X		
Panama (HP)			X		
Poland (SP)			X		
Portugal (CT)			X		
Rhodes (SV)			X		
Rumania (YO)			X		
Sardinia (IS)			X		
Scotland (GM)			X		
Sicily (IT9)			X		
South Africa (ZS)			X		
Spain (EA)		X	X	X	X
St Vincent (J8)			X		
Suriname (PZ)			X		
Sweden (SM)			X		X
Switzerland (HB)		X	X		
Tanzania (5H)			X		
Turkey (TA)			X		
Ukraine (UT)			X		
USA (A,K,N,W)			X	X	
USSR (UA,UB)			X		
Vatican (HV)			X		
Venezuela (YV)			X		
Wales (GW)		X	X		
West Germany (DF,DJ,DK,DL)		X	X		X
Yugoslavia (YU)			X	X	X

Fig. 2: The RTTY chart

Please send your reports in by August 15

SPACE & SATELLITES

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

by Pat Gowen G3IOR

OSCAR Problems

It is customary, and socially more acceptable, that the bad news is related before the good, so we commence this month by telling you of what could be interpreted as being sad tidings in the amateur space scene.

Already this year we have learned of the loss of the SAREX "Ham in Space" missions following the American *Challenger* disaster, and of the postponements of both ISKRA-4 and the RS-9 and 10 missions. Now we learn that the loss of the latest Ariane-2 will cause an additional delay to the Phase III-c lift-off, and that the current OSCAR-10 is showing early symptoms of potential failure.

RS-9 and 10

Although you have read this before, the pair of Russian Amateur Spacecraft might still arrive in orbit around the time you read this column, but it is also quite possible that the delay may be again extended to September this year. Whilst the satellites are complete and ready to go, some small further delay has arisen with the launch vehicle.

Leo Labutin UA3CR, on the most recent 14·280MHz 1000 Saturday morning AMSAT European net, stated that the end of May launch plan would not now be met, but that the intent was still to try to place the pair in orbit at the end of July or in early August this year, although no date has yet been given. Full details of both RS-9 and 10 have appeared in recent issues of *PW*, and the telemetry information will be published as soon as it has been firmly finalised.

ISKRA-4

No date can yet be given for the transport to and the ejection from either MIR or Salyut-7 until the prospectus of the incoming students to the Moscow Aviation Institute, UK3ABT, is agreed. All frequencies have to be changed, followed by a thorough systems test and check before the spacecraft is taken to one of the orbiting space stations by the Progress automatic docking supply vehicle. As the new intake of international students does not take place until September this year, we may now be looking to December as the very earliest possible opportunity for this satellite.

Ariane Missions

Readers will have learned from the radio and television media of the failure of the most recent V-18 Ariane-2 launch on 30 May, when again the third stage failed to ignite. It was this problem, undoubtedly due to the fuel pump failure, that caused the sad loss of the first Phase III OSCAR, which is now laying on the bed of the Atlantic Ocean off the coast of French Guiana.

Whilst the initial launch of the V-18 mission, which was carrying the £37 000 000 INTELSAT-V satellite payload, behaved to full expectation, the range safety officer was forced to destroy the launcher and its costly payload after only four minutes of flight when Stage-3 ignition did not occur.

This is the fourth Ariane failure in eighteen launches, and the fourth major Western launch disaster this year, and it will undoubtedly mean a delay of further scheduled ESA missions whilst this problem is investigated and overcome. All Ariane space plans for future launches have been suspended at this time, and no date can yet be supplied for restarting the programme, but six months would be a reasonable estimate.

Thus, the V-21 mission carrying Phase III-c which was last forecast to be in November this year, would now appear to be further delayed, possibly well into 1987. An ESA spokesman quoted the programme postponement to be at least two months, and possibly as much as eight.

Whilst at first sight this delay may appear to be bad news again, it in fact has its good side, as this will enable further work to be accomplished on the memory shielding of Phase III-c, which was considered complete until the recent "amnesia" problems became apparent, as detailed under OSCAR-10 later in this column.

NASA Losses

The other major western launch disasters referred to previously, in addition to the well documented *Challenger* failure, include a Titan-3D lost in April, and a Delta lost in early May. Just how these latter two affect the amateur-radio space efforts is difficult to foresee, but undoubtedly the knock-on effect and the huge accumulating backlog of launches will have a major negative impact upon future launch possibilities of AMSAT spacecraft.

On the other hand, the recent Soviet accomplishments with MIR and Salyut-7 have shown considerable progress and

advancement in the technical field, as well as an inherent reliability that must be the envy of Western launchers. This could be excellent news, as the possibilities of full co-operation in the field of scientific and educational mutual space exploration is now very evident, and has been broached by the Soviet Prime Minister to the United Nations. The Soviet Youth Pravda also published part of a letter from your scribe proposing international co-operation in the amateur radio field with MIR, as international AMSAT groups would soon have transponders ready to fly, but with no means of getting them aloft.

OSCAR-10

On Saturday, 17 May, after almost three years of in-orbit operation, the OSCAR-10 spacecraft displayed the first serious signs of malfunction. The central computer that is called the "IHU" (Internal Housekeeping Unit) failed, producing continuous phase shift keying telemetry instead of switching to c.w. at the 30 minute and RTTY at the 15 minute periods as commanded. What was even worse was that the transponder locked onto Mode "B" without switching off during a Perigee pass, which could have meant serious battery exhaustion when used by over-enthusiastic amateurs during a non-charging period.

As commands to shut off the transponder went unheeded by the computer, an urgent appeal went out to all users to cease transponding operations at once, and this was complied with by all bar a few of the less responsible operators who, as with high power abuse, seemed reluctant to understand the basic technical requirements of the system that they were using.

By the following morning, the circuit diagrams, logic systems, and computer program listing were being closely studied by a hastily assembled team of AMSAT experts in an attempt to analyse the problems, and to attempt to cure them in order to save the satellite. By good fortune, DJ4ZC was in Boulder with the AMSAT-DL team, whilst DK1YQ, ZL1AOX, VE1SAT and KA9Q were already planning to make their way there forthwith.

By 2030 of the same day, ZL1AOX accomplished a reset of the c.p.u. as luckily the spacecraft was virtually overhead at the time. Despite the reloading of the software which runs the numerous spacecraft functions, the IHU crashed again after only 15 minutes. By the Monday, Ian was able to reset and reload the computer, get the telemetry running, and get the transponder turned off.

The transponder will remain in the off-mode whilst diagnostic software is loaded to locate and bypass the faulty memory area, in the hope that a sufficiency remains and does not later fail so as to permit the continuity of the major complex system. Perhaps by the time this is being read, the transponder will be on once again, and usable at the QRP 100W e.i.r.p. level, but, we need to be aware that the problem may well re-occur as other parts of the memory become similarly afflicted. Dr. Karl Meinzer DJ4ZC, believes that the current problem is survivable, and that much of the function may be restored. He adds, however, that sooner or later, with ageing and growing accumulation of the effects of ionising radiation, malfunction of the memory will increase, eventually leading to a condition where recovery becomes impossible.

It seems generally agreed that the root cause of the trouble is most likely to be due to the effects of radiation found in parts of the satellite orbit. A sudden burst of high solar radiation in an otherwise quiet sun period occurred just before the problem, and OSCAR-10 flies right through the intense Van Allen radiation belt that surrounds earth around the equatorial region. OSCAR-10 bisects an intensely "hot" belt twice every orbit, and has thus received a considerable dose of heavy ionising radiation in its lifetime to date.

It is also possible that the e.m.p. resulting from the Pacific Nuclear tests could have been the culprit, as the timings and positions agreed. The UB5 Chernobyl reactor incident is not likely, as the isotopes would not have got higher than the "D" layer, and the actual Gamma radiation would have been insufficient to damage at the satellite height due to the Inverse Square Law constraints.

The AMSAT engineering team have considered the fact that the most likely cause of failure could well be due to the lack of adequate shielding from radiation rather than the previous satellite's main consideration of premature battery loss, and the c.p.u. of OSCAR-10 was a highly radiation resistant COSMAC-1802 from Sandia, a special version of the RCA 1802 micro-processor. The memory itself, whilst not up to the c.p.u. standards, had been hardened by the addition of a sandwich of tantalum and brass, bonded to the top of each of the 16K RAM i.c.s.

Now that the quantitative effects of long term radiation has been shown, and the improvements needed are indicated, the forthcoming Phase III-c shielding can be improved accordingly. Vern Riportella WA2LQQ, President of AMSAT, recognises that some good has come about by the problem now exhibited as it demonstrates the limitations of the present OSCAR-10 radiation hardness precautions. "Furthermore," said Rip, "the delay of the launch of Phase III-c can be seen as an advantage, as it will give the AMSAT team some extra needed time to evaluate, improve and install the necessary shielding for the forthcoming satellite".

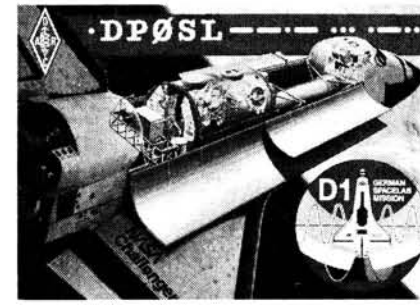
Phase III-c Progress

A few minor discrepancies were encountered during the final thermal-vacuum tests on the new satellite at the Martin-Marietta test facility, but nothing was found to be alarmed about. A few QSOs were tried on the prime transponders, though none yet on Mode "S". Only the kick-motor mounting, antenna mounting, spin balancing and vibration tests, plus a few minor tweaks to the transponders need to be performed now other than the memory shielding improvements mentioned above. The satellite now travels to AMSAT-DL in West Germany to be ready for its final flight.

Phase III-c, like its predecessor, is a truly International satellite, as AMSAT-DL have built the transponders and funded many other parts, AMSAT-UK supplied three solar panel substrates, and AMSAT-SA built two s.h.f. antennas. Contributions and funding have evolved from amateurs all over the world.

OSCAR-9/UoSAT-1

When your author returned from a trip to Bulgaria to meet the AMSAT-LZ clubs and operators, he put the OSCAR-9 weekend bulletin onto tape in order to catch up with the latest news. When the decode programs came up with lots of stars and question marks, the worst was feared. As



it was, all was well, as it later was discovered that the satellite was downlinking c.c.d. space pictures.

Later, the satellite was not heard, and it transpired that it was on 435MHz. This was due to a problem being experienced by the DIARY software and the OBC data port, which is now being investigated. As with OSCAR-10, diagnostic software is being run at this time to locate the source of the problem. Although OSCAR-9 does not fly through the actual Van Allen belt, it could well be the accumulative effect of radiation on the memory hardware that is showing up, as any Solar Flare in space, unattenuated by atmosphere, is quite severe by terrestrial comparison. The e.m.p. effects could be to blame here also.

RS-5 and 7

As of 29 May, both satellites came into eclipse, and were placed in a new type of schedule. RS-5 had its transponder on from 0500 to 1000UTC, and RS-7 from 1000 to 1700UTC, according to command station access to place it on following self-switch off when the battery voltage fell below the function value in shadow. On 10 August both spacecraft return to whole orbit sunlight, and should they survive the cold dark periods, will be on full time once again.

Bill Kelly of Belfast continues to carefully monitor both satellites with regularity, and has logged many new callsigns as well as the many "regulars". Among these are IN3KBZ, OZ1D, UL7CCY, UR2JL, VE5XU, WB1CNM, G3AJX, RA6HKQ, UT4JN, HG5HO, RA9AKJ, UV9FB, UA9XE, RT5UG, RL8PYL, UA5RCP, RW3AA, UL7CBW, EM3W, W0IZ, UC2OX, UZ1AWT, UA3A, RS3A, and a whole lot more.

Bill has been following the Cosmos 19·955MHz passes, and at 0815 on May Day, heard a voice in u.s.b. speaking Russian on the frequency. All the h.f. satellites signals have been noticeably stronger, and with far less QSB, when the solar flux was low.

Salyut/MIR Communications

At present, Soviet manned spacecraft communications are effected by v.h.f. stations spread eastward from European Russia to the Soviet Far East. These stations provide duplex facilities to low orbit spacecraft anywhere over the Northern Hemisphere from Western Europe right across Russia to Alaska.

There are gaps over the Northern Hemisphere for spacecraft from North America to the UK, and over virtually all of the Southern Hemisphere, only partly relieved by h.f. links and communication ships.

Recently the Soviet Space Authorities have announced that they will be locating Geostationary Transmission Data Relay Satellites at three locations, viz. 16° West, 160° West and 265° West. These Geo-

sats will provide full microwave frequency coverage to almost all the whole earth range of possible spacecraft orbits, and will closely match the intended American TDRS Geosat Network, which already has one satellite in position, lost the second in the *Challenger* accident, and has yet to decide when to launch the third. In our last mention of this subject it was said that the LUCH satellites were for this purpose, but it has since been discovered that LUCH are the Geosats that relay the media TV and Audio of the Cosmonauts to earth stations, and are quite distinct from the communications types planned.

Salyut Cosmonaut EVAs

The Salyut-7 cosmonauts were featured on our TV at the end of May when they fixed an experimental pylon mast to Salyut-7 during an "EVA" (Extra-Vehicular-Activity). Some of the EVA orbits took place over the UK, with one at 0824UTC on 31 May that provided excellent signals for listeners, and John Branegan GM4IHJ took full advantage of the occasion to closely monitor the event which evidenced the activity, which was not generally known officially until the following day.

He copied both the cosmonauts and the ground station replies, as they were relaid simultaneously on 20·008MHz a.m. and 142·420MHz f.m. The prior orbit was below the UK horizon to the South-East, but nevertheless reached us by ionospheric propagation of the 20·008MHz a.m. signal, giving a solid signal in Scotland at 0654UTC.

The clarity of the signals gave good evidence that the Cosmonauts were in space-suits, as the voice commentary was very bassy, and the ground control replies had a distinct echoing quality due to sound effects within the space suits. Both the cosmonauts were clearly working hard, as the breathing within the suits and helmets was very pronounced. By 0956 they were back in Salyut-7, but still attired in their spacewear, only without the helmets on, giving an interesting contrast with all of the reverbs and bass bias then missing from the audio.

The above is a beautiful example of how careful observation can yield evidence of activities, which at the time were unknown except to GM4IHJ.

Library

Graham Smith G1JVZ, has found that the "Table of Artificial Satellites launched from 1957 to 1976" published by *Telecommunication Journal* is available at the Hatfield Polytechnic Library in Herts. It is a reference work, and cannot be taken away, but Graham suggests that if demand is high enough, they may well do a reprint from the first satellite to the current.

The University of Surrey has available eighty copies of the UoSAT manual, which will be sent on provision of a large s.a.s.e. and a donation to funds. It is recommended for serious OSCAR-9 experiments, as it adequately describes the whole system.

Dish Material

Graham G1JVZ, further relates that after much hunting he has discovered a source of silver coated nylon mesh, as fine and as flexible as curtain material, ideal for umbrella type microwave dishes, which he may use to bond to a solid fibreglass dish as a preference to metal spraying. It is made for lightweight radar reflectors in the X, C, and S bands. The 1022 type costs £3.65 per running metre, and is 1.37 metres wide. It is claimed to have 95 per cent reflection efficiency in the quoted band, with finer and coarser mesh available. The source is Chemring plc, Alchem Works, Fratton Trading Estate, Portsmouth P4 8SX; Telephone Portsmouth (0705) 735457.

Obituary

Already this year we have learned of the loss of signals from many close satellite colleagues, OH2RK, HB9OP, and W6CG, who were active on satellites from the beginning. Sadly, whilst G3IOR was in Bulgaria, planning a three day meeting with him and the Sofia group, Vassil Teirzhev LZ1AB became a silent key at the age of 57 years. He was highly active on tropo, e.m.e., m.s., Es and satellites, and was LZ AMSAT Co-ordinator.

VHF BANDS

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

by Ron Ham BRS15744

This month, Sporadic-E has provided plenty to talk about, as can be seen from the reports sent in.

Solar

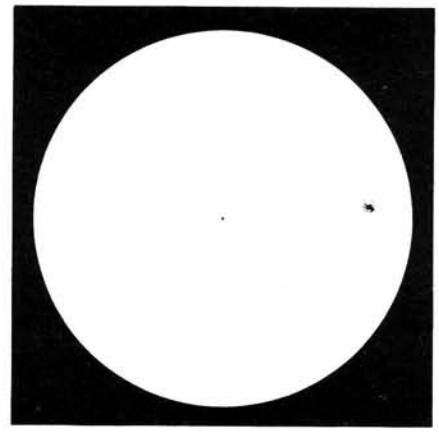
A few days before the late April solar storm, reported in a recent issue, **Patrick Moore** was in Australia. While at Tennants Creek at 2325GMT on the 17th he projected the sun's image through a 3in Questar telescope and recorded the sunspot group seen in Fig. 1. On the 18th he was in Katharine and noted its progress, Fig. 2, at 2330. Note the increase in size and penumbra.

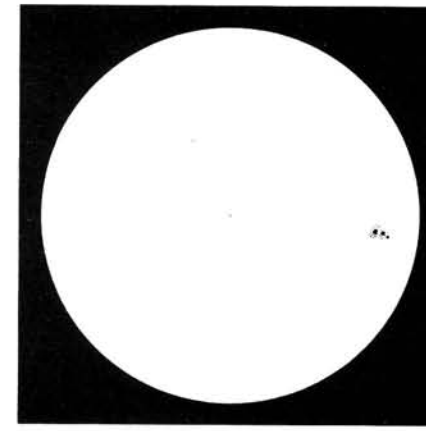
"The Boulder Observatory reported a minor to major magnetic storm disappearing on May 2/3, and active field on the 4th, an active to major magnetic storm on the 6th, unsettled from the 8th to 11th and a minor storm in the high latitudes on the 16/17th," wrote **Ron Livesey** in Glasgow. He is the auroral co-ordinator for the British Astronomical Association. His own magnetometer indicated disturbed conditions on May 15 and 26 and he received visual reports of auroral activity, mainly glows in clouds on the nights of May 2/3, 3/4 and 6/7 from the observers on the weathership *Cumulus*. Stations in Oulu and Helsinki reported multiple rays on 2/3 and active rayed arcs plus homogeneous bands on 6/7 respectively.

In Sevenoaks, **Cmdr Henry Hatfield,** using his spectrohelioscope, found one small sunspot, an inactive plage and a single filament at 1355 on May 16, "very quiet," was his comment. In Bristol, **Ted Waring** located a small sunspot on May 21. Whereas from Johannesburg **Bob Anderson's** team reports seeing one sunspot group from May 15 to 19, two groups from 20 to 22 inclusive and one from the 23rd to 30th. The number of spots counted varied between one on the 15th, five on the 18th, ten on the 24th, seven on the 25th and two on the 29th. "Solar activity continues in low key with no sign of anything in the high latitudes," wrote Bob Anderson.

Unfortunately, sunspot observation is dependent on clear skies, which have not been too plentiful in the UK during the past few months.

Figs. 1 & 2: The Sunspots recorded by Patrick Moore during his trip to Australia





The 144MHz Band

When an extensive Sporadic-E disturbance reached the 144MHz band at around 1000 on May 16, **Phil Williams G3YPQ** worked two OZs, three SMs and had 59 each way QSOs with RQ2GGS and UQ2GJN. He uses a TS-430, muTek transverter and a five-element Yagi (1m lower than his operating position).

Lawrence Morgan GM0ATQ from Greenock made c.w. QSOs with an OK and two SPs and s.s.b. contacts with three SPs early on May 16. You can imagine his surprise to hear from the 144MHz rig, "CQ Sporadic-E from OK2BFM." He also mentions that John Dunlop GM6LNM worked EA1RCA during an EA contest on June 8.

The 50MHz Band

Apart from the times when Sporadic-E openings caused the television pulses on Ch. R1 (49·75MHz) to swamp my receiver, I logged consistent signals from the RSGB beacon GB3NHQ on 50·050MHz daily between May 15 and June 14. A similar report came from **Len Fennelow G4ODH** in Wisbech.

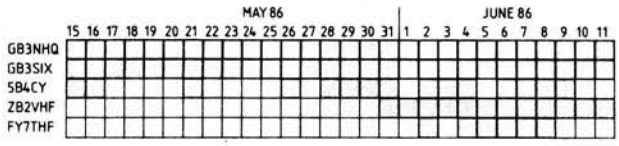


Fig. 3: The 50MHz beacon chart

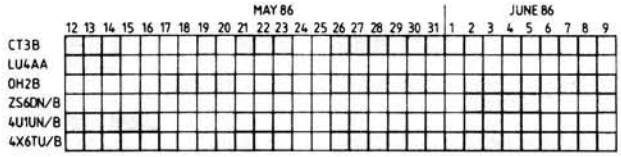


Fig. 5: The 14MHz beacon chart

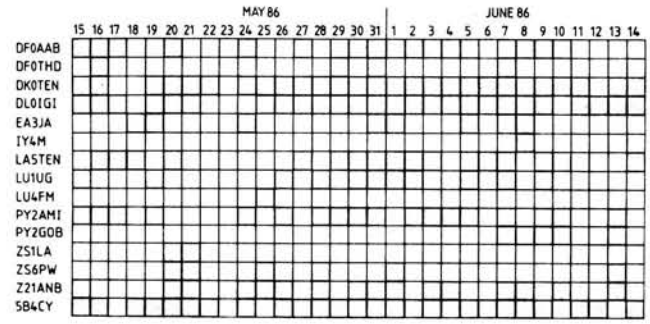


Fig. 4: The 28MHz beacon chart

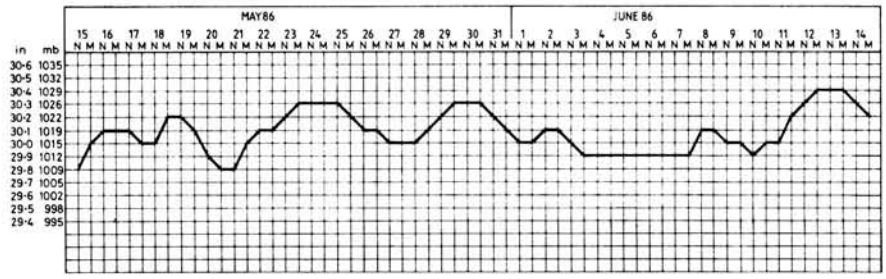


Fig. 6: The barometric pressure chart

Fig. 7

Norman Hyde G2AIH from Epsom Downs received signals from the 50MHz beacons shown in Fig. 3. "The highlight of the period for me was the reception of FY7THF on June 4 and 6. It was strong on the 4th and weaker but more consistent on the 6th," wrote Norman. He also logged ZB2VHF, via meteor trail reflection, at 0730 on the 9th and 0645 on the 11th. He mentioned that the Gibraltar beacon was sending "ZB3VHF info 4m beacon now operational."

Ted Chatfield G3BLG in Clacton-on-Sea heard ZB2VHF on 50·4MHz between 0900 and 1300 on the 8th with slow QSB ranging from S2 to S7. He uses the *PW* Meon transverter feeding a Uniden scanning receiver and a single element quad antenna wound around his lounge window frame facing west/east.

"There has been a lot of interest in 50MHz by stations on the continent this last month," wrote **Gordon Pheasant G4BPY** from Walsall on June 10. He continued," I have managed to make a few crossband contacts on most days and among the stations worked were DL3MBG, DL7YS (W. Berlin), DJ2RE, EA1NBLA, EA3ADW, EA3LL, EA4CGN, F6HS, HB9CRQ, HB9QQ, I5CTE, LA2AB, LA6QBA, OE1XA, OH2TI, OH5IY, OZ1DOQ, OZ7JV, OZ9QV, SM6PU and YO2IS." Gordon also worked CT1WW and ZB2BL both ways on 50MHz, using just 10W. During some very short skip conditions at 1927 on June 9, he exchanged 59 s.s.b. signals with GM3JIJ in Stornoway. Gordon's report has been added to that of Norman Hyde in Fig. 3.

The 28MHz Band

My Tono Theta 550 communications terminal read c.w. signals, mainly from European and Scandinavian countries, during the Sporadic-E disturbances on May 16, 21, 29, 30, 31, June 2, 3, 6, 7, 8, 9 and 14. At times these signals were fantastically strong and in one hour on June 8, starting around 0840, I logged eight countries—DL, EI, F, G, GM, HB9, I and Y37. However, judging by the number of stations that were on at the time, this figure should have been much higher but, as usual during an opening, my time was spent jumping between bands to get some idea of the extent of the disturbance.

Paul Hughes G0BXC from Morden was out mobile on Epsom Downs, whilst parked he worked OZ1LGF in Denmark at midday on May 29; four DLs, EA, EI, HB9, OE and SM between 1053 and 1540 on the 30th; EA3ERT at 1540 on June 1 and SM0NCL at 1826 on the 2nd. All these were worked using a modified CB rig on 28MHz f.m. Paul heard stations in CT1, 4X4 and 5B4 but could not work them.

Around 1000 on June 2, **Chris van den Berg** in The Hague received signals from EA, HB, I, SP, RA, UB5 and YU. Then early on the 8th he heard DL, EA, F, G, GI and YO. "A very welcome trend recently has been the spate of activity in the 28 and 29MHz segments with very strong f.m. traffic in evidence on a number of occasions," wrote Len Fennelow.

From High Wycombe, **Bob Hearn G0BTY** has had 190 contacts on 28MHz so far this year and wrote, "I often call CQ on 28MHz after midnight and all replies are welcome." He uses a Belcom LS102L multimode, a converted Midland 3001 (Spectrum board), a half wave vertical and a three-element beam.

"28MHz came alive during the afternoon of June 6," wrote **Geoffrey Powell** from Tamworth. He copied c.w. signals from several European countries using an R600 receiver, which can be seen with his a.t.u. and RTTY gear in Fig. 7.

"On some days when there was no Es opening, QSOs were possible with CE, CX, LU and PY, but it seems that if there is a Sporadic-E opening, not enough r.f. energy reaches the F2 layer for long distance communications," wrote **Costas Krallis SV1XV** from Athens. On May 15 Costas, SV1PL and SV1VV had a QSO with TA1E at about 500km. Among the other stations that contacted Costas were A71BJ, CN2AQ, CT3DL, EA6WA, OD5RB, TA2G, ZC4AB, EE, NL, 5B4JE and 9H1GY, not to mention several QSOs with stations in Austria, France, Germany, Israel, Italy, Spain and Yugoslavia.

My copy of the *Southern 10m FM Group Newsletter* reminds me that August 31 is a 28MHz activity day, so give it a go and let me have your reports by September 12. Readers wishing to join the group should send £1 to Jim Hicks G4XRU, 33 Hayling Rise, Worthing, W. Sussex BN13 3AL.

"Conditions on 28MHz have been a lot better this month, with plenty of Sporadic-E and occasional F layer signals," writes **Dave Coggins**. He adds, "I have already heard stations in LU, PY, YV, ZS, 4X and 5B, plus Europeans and Scandinavians."

During the hours around sunrise and sometimes up to about 0900, Dave heard a harmonic on 28·6MHz, possibly from a BBC station in the 7MHz band. "The harmonic has all the characteristics of 28MHz propagation, with meteor scatter and at times moving my S-meter to S9," said Dave. He is now using a quad antenna to feed his R1000 receiver. "The quad is really super, it outperforms my two-element beam."

Between May 26 and June 13, **Don Hodgkinson G0EZL** in Hanworth enjoyed the Sporadic-E and worked stations in 13 countries on f.m. and 16 countries on s.s.b. He uses a Yaesu FT-77 and horizontal dipole and ground-plane antenna.

Propagation Beacons

At 0930 on May 16 and 1340 on the 29th, **Bill Kelly** in Belfast logged a German beacon on 28·235MHz sending "DF0TDH QTH JN49HU PSE QSL". **Phil Englehard G0DNB** in Macclesfield logged a Brazilian beacon PY2GOB at 1815 on the 31st. "The odd opening to South America is usually indicated by the appearance of PY2GOB, Box 22, Sao Paulo on

28·050MHz," wrote Phil. He also heard the German beacons DK0TEN and DL0IGI before 0630 on May 30. Interesting but not surprising with the amount of Sporadic-E about at that particular time.

"DK0TEN and DL0IGI were very strong at times," commented Norman Hyde who, like **Fred Pallant G3RNM** in Storrington, **Ted Owen** in Maldon, and most other contributors, heard the Spanish beacon EA3JA on 28·246MHz for the first time.

"At last some old 28MHz beacons have returned," wrote Len Fennelow. He copied signals from the 14MHz beacons on the days indicated in Fig. 5 and remarked, "The 14MHz beacons show a consistent pattern of propagation. ZS6DN appeared again in early June after an unaccountable absence during the past month." My thanks to Chris van den Berg, Phil Englehard, Len Fennelow, Henry Hatfield, Norman Hyde, Bill Kelly, Dave Coggins, Don Hodgkinson, Ted Owen, Lawrence Morgan, Fred Pallant, Gordon Pheasant and Ted Waring for the time that they spend checking the various beacon frequencies and for their logs.

Tropospheric

The readings for the atmospheric pressure chart, Fig. 6, are slightly rounded and were taken at noon and midnight from the weekly chart of a Short and Mason barograph at my QTH. Similar readings came from the barometers used by Norman Hyde and Ted Owen.

Harold Brodribb in St Leonards-on-Sea keeps a regular eye on the weather map in his daily newspaper and many other readers watch the progress of high pressure systems on the television weather reports.

In The Hague, Chris van den Berg received signals, almost daily, between May 16 and June 9, from the RSGB beacon at Wrotham GB3VHF on 144·925MHz and the Norfolk repeater GB3NB on R1. He also heard the Kent repeater GB3KN on R4 on June 2, 6, 7 and 8. Phil Englehard uses a KDK-2025 "chatterbox" with a 5/8 ground plane antenna, mainly for local nattering and for early warnings of a tropospheric opening. Despite the problem with his location and his small antenna, Phil has logged over 30 repeaters during the past three years.

Band II

John Williams reports that Radio Wyvern has moved frequency to 97·6MHz to cover Hereford and 103·8MHz for Worcester. "The announcer now says, 'Beacon and Wyvern', instead of just Wyvern on both channels," said John. From his QTH in Charlton Kings, John often hears the West Midlands local news from Signal Radio. During Sporadic-E openings, on May 16 and 26, he identified signals from East Germany, Italy and Sweden. John normally uses a Deccasound DSC111 and a Fidelity RAD26, but while visiting Harpenden he used his kitchen clock-radio with a short wire antenna; he heard more Italian signals at 1945 on June 10.

At 1220 on the 16th, I counted 10 foreign transmissions between 87 and 103MHz and television sync, strong enough to resolve a picture on Ch. R5 93·25MHz, and possibly the sound channel on 99·75MHz was one of the 10 foreign voices that I counted. Signals in Band II can be influenced by Sporadic-E and tropospheric disturbances and it is not unusual to have both together during the summer months.

On May 15/16, Harold Brodribb listened to France Inter from Abbeville, Caen and Rouen, Musique from Abbeville and a programme from Egem. While on holiday in Plymouth between May 24 and 30 he logged Culture and Inter from Brest, Caen and Riems and Musique from Brest and Caen using a Roberts R505 portable.

I received signals from French stations beween 98 and 100MHz while using my Plustron TVR5D on the South Downs at 1318 on May 30. Then from home at 0910 on the 31st I counted 11 foreign stations between 90 and 103MHz. Phil Englehard has a Toshiba 8360 receiver for Band II and although his QTH is about 150m a.s.l. it is tucked under the western slope of the south Pennines with a 300m ridge within a mile to the east and a peak around 400m high to the south, which can be seen from his shack window. However, he can normally receive signals from a large number of "local" radio stations as far apart as BBC Radios Cumbria, Merseyside, Shropshire and WM, Manx Radio, Marcher Sound, Red Rose and Signal Radio, which under the circumstances is a fine effort.

At 1730 on May 28, Phil noted an opening to Italy and heard several stations in good stereo, and on June 2 he found Manx Radio was up in strength and after tuning around he logged BBC Radio Devon and possibly Radio Na Gaeltachta.

Some Eastern-European countries use the frequency range 66 to 73MHz for their national f.m. broadcast networks and when Sporadic-E is present these normally limited range signals are heard at fantastic strengths in many parts of the UK. Such signals were logged by Harold Brodribb, Ray Howgego and me on May 16, 17, 21, 26, 28, 31, June 3, 7, 8 and 9. The average number of stations is around 20; however, at 1710 on June 7, Harold counted 51, Ray found 30 on the 9th and my peak was 60 at 1220 on the 16th.

Francis Hearne in Bristol has written to tell me of some frequency changes. Leicester Sound has changed to 103·2MHz, GWR Swindon to 97·2, GWR W. Wilts to 102·6, Red Dragon Radio Cardiff to 97·2, Red Dragon Radio Newport to 97·4, County Sound Guildford to 96·4MHz.

Recently he heard Radio Oxford (95·2MHz) at 0800 and Radio Wyvern on 96·2MHz on June 9, both using his Sharp GFA3 receiver with a telescopic antenna.

TELEVISION

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

by Ron Ham BRS15744

Just about every type of programme has been seen this month during various Sporadic-E disturbances. The countries that these programmes were received from are shown in Fig. 1. Although these events only lasted for relatively short periods between May 15 and 31, the amount of Sporadic-E, and the intensity of each event began to increase towards the middle of June.

Band I

"Slow start to the season, but sparse log shows Finland seen for the first time," writes **Keith Chaplin** from Barrow-on-Soar. He now has a SECAM decoder in his Luxor receiver. "Apart from a few days of excellence, it was a pretty poor start to the 1986 Sporadic-E season," writes **Tony and Edwina Mancini** on June 2. They decided they were lucky to have seen Iceland so many times, Fig. 2, which always came on on the back of their antenna whilst they were searching for signals from Portugal and Spain. Most of their pictures seem to have come from the east and north-east, with Sweden being very prominant. Their home in Belper is adorned by a Triax UB92 antenna for u.h.f. and a couple of home-brew Yagis, Fig. 3, for the v.h.f. Bands I and III. Together with Labgear and Fringe Electronics preamplifiers and an Altai rotator on each system gives them a fine installation for television DXing.

In previous years, I have noticed that pictures from Iceland often appear during those events when signals are sparse from the usual catchment area in the east. I experienced this again at 0922 on June 10, when the only signal I could find in Band I was the usual Icelandic test card, RUV Island, on Ch. E3.

Mike Bennett in Slough has a good haul of stations during the major events which occurred on May 15, 17, 21 and 30. He reports that, while his antenna was pointing north, around 1514 on the 30th he saw a nature film with Chinese type titles on Ch. R2, it was showing the migration routes of birds. Any ideas?

At 0900 on the 16th and again at 1829 on the 21st, I received the PRAHA caption, Fig. 4, from Czechoslovakian Television, which I have not seen for some years. In fact, the picture in Fig. 4 and the caption in Fig. 5—most likely from Poland—were seen at my QTH using JVC receivers during the 1978 Sporadic-E season.

From New Radnor, **Simon Hamer's** extensive log includes films and captions received from RTS Albania on May 30 and June 3 and a caption from the USSR, ESSTI TELEVISION, on the 30th. Very few openings that effect Band I go by without reports of signals from the USSR, as shown in Figs. 6 and 7, received respectively by the Mancinis and me.

Newcomers to DXTV may like to know that the caption, TACC C00bWAET, seen at the bottom of Fig. 6, means TASS REPORT and that my JVC CX610GB receiver in Fig. 7, is tuned to Ch. 35 and the picture is coming via my Sanyo VTC9300PN video recorder, which, fortunately, also covers Bands I and III. Video recorders with this facility make useful converters for DXTV.

Among the news titles reported this time are, Aktuelle Kamera from DDR1 (East Germany), BPEMR and HOBOCTN, Fig. 8, from the USSR, Dagsrevyen from NRK (Norway), Dziennik from TVP (Poland), Hirado from MTV (Hungary), Tagesschau from ARD (West Germany), Teleradio from TVE (Spain), Telegiomale from RAI (Italy) and Zeit im bild from ORF (Austria). Such details should help new-

	1	2	3	4	5	6	7	8	9	10	11	12
Albania						X						
Austria	X	X	X			X			X			X
Belgium			X				X				X	
Czechoslovakia	X	X	X		X	X		X	X	X	X	X
Denmark						X	X		X			
East Germany									X		X	
Finland		X	X	X	X	X			X			
Hungary	X			X	X	X	X	X	X	X	X	X
Iceland	X	X			X				X			X
Italy	X	X	X	X	X	X	X		X	X		X
Netherlands	X								X			X
Norway	X		X	X	X	X			X	X	X	X
Poland						X	X	X	X	X		X
Portugal	X			X		X			X			X
Rumania			X	X			X	X				X
Spain	X	X	X	X		X	X	X	X	X		X
Sweden	X	X	X		X	X	X	X	X		X	X
Switzerland						X			X			
USSR	X	X	X	X	X	X			X	X	X	X
West Germany						X			X	X		X
Yugoslavia	X	X	X		X	X	X	X	X	X	X	X

comers to identify the different stations, which often appear on the same or adjacent channels, during an intense and geographical widespread disturbance.

The reception of test cards, with regional identification, reported in letters were from Czechoslovakia—Bratislava (Fig. 9) received by the Mancinis on Ch. R2 on May 30; Norway—Norge Bagn, Bremanger, Gamlemsveten, Greipstad, Gulen, Hemnes, Kongsberg, Melhus and Steigen; Spain—Madrid and Santiago logged by Harold Brodribb on June 7; Yugoslavia—Belgrade, Ljubljana (Fig. 10) and Zagreb.

At 1220 on May 17 I received the test cards from Hemnes and Steigen with their digital clocks, showing 1 hour ahead of BST, in colour. The Mancinis logged an RAI clock caption, Fig. 11, on May 28. I

(1) Mike Bennett
(2) Frank Brisley
(3) Harold Brodribb
(4) Keith Chaplin
(5) Ron Ham
(6) Simon Hamer
(7) Ray Howgego
(8) Ian Mason
(9) Tony & Edwina Mancini
(10) David Meredith
(11) Laurence Morgan
(12) Gordon Pheasant

Fig. 1

recieved a similar clock caption from Hungary, showing 1929, at 1829 and a digital clock showing 2148 beside a YL announcer from the USSR at 1848 on the 21st.

"Conditions on June 7 were exceptional, Band I opened to the whole of Europe, from Spain to Scandinavia, with a ten minute opening to the middle east," wrote **Ray Howgego G4DTC** in Caterham. Between 1430 and 1500 he received an Arabic caption from one station and also saw people in Arab dress on another station on Ch. E4, he thinks possibly Syria and Bahrain respectively.

These sudden and short-lived extensions to an already intense opening are typical of Sporadic-E and, as Ray has proved, are well worth watching for. Ray's receiver was described in his fine article about DXTV in *PW*, June 1986.

In Peterborough **Frank Brisley G4NRJ** uses a Binatone mono portable with a Hugh Cocks up-converter and a dipole outside his shack for Band I and he nominates the event on May 30 as his best day yet.

Conditions were also exceptional on May 16, because at 1440 when I checked Band I there were strong test cards —Norge Melhus and TV1 Sverige—on Chs. E2 and E3. I was using the Plustron TVR5D, at ground level, with its own telescopic whip.

Keith Chaplin, Simon Hamer and **Gordon Pheasant G4BPY** in Walsall all logged Bucharesti, the Rumanian test cards on Ch. R2.

David Meredith in Dudley uses a Waltham 416 receiver and Band I dipole. He saw one of the *Survival* programmes, made by Anglia TV, on RAI at 1646 on May 31.

I also have a query, at 1326 on May 16 I saw a programme called Pedagogiska Magasinet being advertised to start at 1330. This was associated with a logo that looked like the letters UR joined together.

In Catrine, **Ian Mason** does a fair bit of DXing and has put some of the Band I vision frequencies in the memory of his scanning receiver. At 1600 on May 22 the scanner began "growling", so Ian coupled his JVC CX60 into his trapped dipole, switched on and there was a very strong test card from Spain, followed by programmes in good colour. "What astonishes me is that a trapped dipole, meant for up to 30MHz, is suitable for TVDXing in Band I," remarked Ian.

Most of us have found that under Sporadic-E conditions, the size, shape and height of antennas is not critical. In Greenock, **Lawrence Morgan GM0ATQ** uses a JVC receiver and his Slim Jim antenna for Band I DXing.

Tropospheric

Although Sporadic-E has taken the lion's share of space this time, there were a few days between May 15 and June 14 when television signals were received in the UK via enhanced tropospheric propagation. I received negative pictures from France

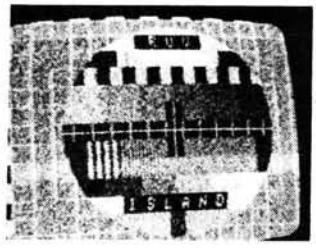


Fig. 2

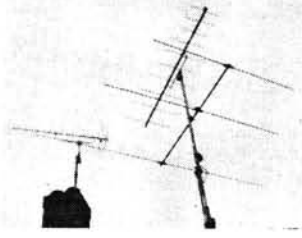


Fig. 3

Fig. 4

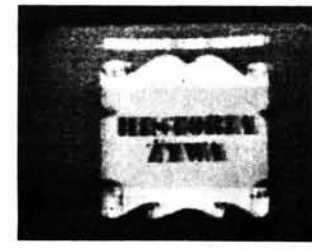


Fig. 5

Fig. 6

Fig. 7

Fig. 8

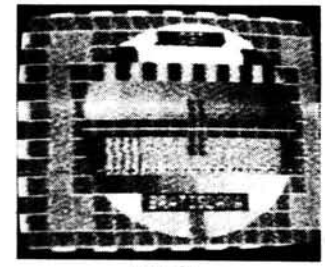


Fig. 9

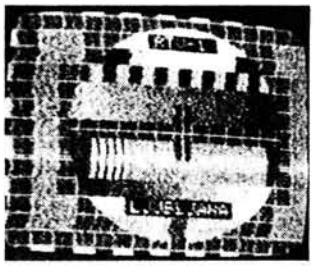


Fig. 10

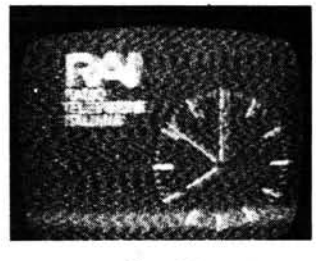


Fig. 11

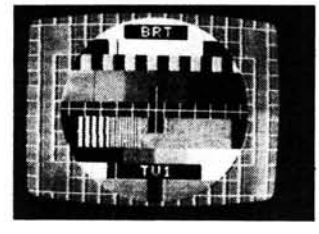


Fig. 12

Don't forget your photographs are always welcome

and a Dutch test card, PTT NED–1, in Band III around 0815 an May 19; French signals at 0900 on the 20th and bursts of PTT NED–1 early on the 25th.

While using my Plustron TVR5D portable at Telegraph Hill on the South Downs at midday on the 30th I received negative pictures from France on Ch. F9. I saw this again from the home QTH during the evening of June 8.

Around 2200 on the 8th and 14th there was persistent patterning on some u.h.f. channels. At 1610 on the 13th I logged a weak test card BRT TV1 from Belgium on Ch. E10.

David Meredith watched a play on Radio Telefis Eireann (RTE–1) between 1100 and 1200 on May 17. Harold Brodribb received v.h.f. and u.h.f. pictures from France at various times on May 16, 17, 19 and 21 and on June 5, 7, 8 and 9. He also logged test cards from Belgium (RTBF–1) on May 17 and Luxemburg (RTL) at 1315 on the 18th. Ian took his JVC colour and Tandy monochrome receivers, a bow-tie antenna and a 12V battery to Portpatrick in the middle of May where he received the RTE test card.

During the high atmospheric pressure on June 13 and 14, I received test cards from Belgium BRT TV1 and Netherlands PTT NED–1 on Chs. E10 and E4 respectively. Around mid-afternoon on the 14th I saw a musical type film and the caption Clip Classic in English and later an advert for Volkswagen cars all on Ch. E4.

Please send your reports by the 15th

MW BROADCAST BAND DX

Reports to: Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, W. Sussex RH20 4NS

by Brian Oddy G3FEX

Already, many m.w. DXers are constructing and testing the Sooper Loop antenna designs by **Dave Mayhew** of Yapton, W. Sussex which appeared in the July 1986 *PW*. A rather novel and very useful addition to this antenna is now used by Dave—a revolving cake stand! By standing his antenna on one of these stands, a very easy means of turning the antenna has been achieved—so essential when DXing, because the loop is very directional. It is this directivity which makes a locp antenna so desirable, since by carefully adjusting the loop for minimum pick-up of an unwanted station, rather than for maximum signal from a wanted station, the unwanted station can be **nulled out**.

Several s.w.l.s are known to be adapting this design for other bands—for example, **Fred Pallant G3RNM** of Storrington, W. Sussex is building a Tropical Band version in an attempt to improve his reception of some of the 5MHz (60m) African stations. Having worked in Africa for a number of years, Fred enjoys listening to their programmes and hearing their names.

Quite a number of Local Radio DXers are now regular listeners to *Red Dragon DX*, which is the s.w.l. programme presented by **Al Dupres**. It is broadcast by ILR Red Dragon Radio, Cardiff, S. Wales on the first and third Friday of each month at 0015UTC. If you have completed the Sooper Loop antenna, this may be a good time to test it out—tune your receiver to either 1305 or 1359kHz, peak up the loop tuning and turn the loop carefully for the best reception. If you manage to track down the Red Dragon or perhaps have some results from experiments with this design which you think may be of interest to other *PW* readers, please send along your name to me for inclusion in this series.

DX report

(Note: All frequencies in kHz: Time UTC = GMT)

Transatlantic DX: Having recently purchased a Trio R600 receiver **Tim Shirley** of Bristol has been checking it out on most of the bands. He was delighted to hear WMRE of Boston, Mass, USA on 1510, while tuning across the m.w. band at 0124—this station specialises in past memories and music and has some interesting programmes.

Over in Belfast, N. Ireland "old timer" **Bill Kelly** found conditions rather poor, but he enjoyed a programme of "oldie" records from WMRE one night at 0330. He also listened to a phone-in programme on nuclear fall-out from WCAU in Philadelphia on 1210—a very good signal at 0505. From Anguilla in the Caribbean, Bill has been hearing good signals on 1610 from Caribbean Beacon, broadcasting evangelical programmes at 0330. Strong signals too were received on several nights from Radio Globo 1220, located in Rio Brazil, S. America—at 0130 one night, Bill listened to a very exciting football commentary broadcast by this station!

Another "old timer", **George Morley** of Redhill, Surrey says he found conditions pretty variable with much static present. Signals from CJYQ 930 of St. Johns, Newfoundland were received on one night just before 0300, but he spent most of his time checking the s.w. bands!

Writing from Randburg, 15km north of Johannesburg, S. Africa **Leo Gieske** says signals from Radio Globo 1220 and Radio Muhler 1260, both in Brazil, have been good in Randburg at 0430. However Radio Dos Mil of Venezuela is only a fair signal at this time. Using a Drake SPR4 receiver in conjunction with a box loop antenna, Leo has also been hearing good signals from Radio Bahamas 1540 and Caribbean Beacon, Anguilla 1610 at 0430. Signals from the VOA relay station, Antigua, W. Indies on 1580 were heard at 0350 and from the TWR Bonaire transmitter, Netherlands Antilles on 800kHz at 0426. Two new stations for Leo, both located on Ascension Island, S. Atlantic—BBC Radio Ascension 1485 and Radio Volcano 1602—were both logged at 0435.

Other DX: At his listening post in Pontypridd, S. Wales **Graham Powell** has been checking the band with his Trio R2000 receiver during the evenings and has heard the interval signal and station identification in Russian from Radio Beijing on 1521 at 2100 on several occasions during the last few weeks. Tim Shirley says he has also been hearing this station but at 0124 broadcasting in Chinese and he is now awaiting their QSL. In his report Graham mentioned that excellent signals from UAE RCTV Dubai were heard on 1481 at 2120 and also from BSKSA Saudi Arabia on 1512 at 2246.

Using an ITT Golf 330 receiver plus the internal whip antenna **David Jones** of Walton, Liverpool says that his best DX for some while was the reception of the BBC Radio Scotland/Radio Solway transmitter on 585kHz—this runs only 2kW in Dumfries. Two other low power 2kW transmitters—BBC Radio 4 from Newcastle on 603 and BBC Radio Wales/Radio Clwyd on 657 were also logged by David. His interesting report of stations received from Europe includes RTE Radio 1, Tullamore 567 and RTE Radio 2, Athlone 612—both in S. Ireland; AFN Frankfurt, W. Germany 873, which he says broadcasts some good American football games between September and February; RSI Sweden 1179; Radio Polonia, Warsaw 1503 and BRT Brussels, Belgium 1512. Belgium's *Radio World* programme is also mentioned by Wyn Mainwaring G8AWT of Cowes, Isle of Wight and is popular on Sundays at 2100.

Leo Gieske has now received a QSL for his reception of ILR Capital Radio, London 1548 in S. Africa and has subsequently logged this station again at 0350! Other signals noted in his log include Radio Mauritius 648; Nice, France 1350; Saarbrucken, W. Germany 1422; Marnach, Luxemburg 1440; TWR Monte-Carlo, Monaco 1467; Deutsche Welle via their relay in Trincomalee, Sri Lanka 1548; Saren, Switzerland 1566; VOA via their Bankok, Thailand relay 1575 and the BBC Masirah Island, Oman relay 1605.

The construction of the little m.w. Reflex receiver design sent along to me by **John Ratcliffe** of Southport, Queensland, Australia has been undertaken by many *PW* readers throughout the world. **David Howe** of Christchurch, New Zealand has now completed the construction of his set and says "I have the unit working on a p.c.b. with ferrite rod—it has already brought in Fiji on 558kHz and some powerful Asians around 600kHz as well as various Australians. As I live very close to several m.w. stations I won't be able to test it further until I can get out of town and use it with a loop. It is very sensitive and selective when not being overloaded by the locals. Before long I hope to have some news of the *Q*-Multiplier and some out of town experience with the set".

The main receivers used by David are the 9R59 with a matched longwire and a National RF-2900 with a ferrite rod antenna. He recently received QSLs for his reception of two low power stations—7RPH in Tasmania, which runs 500 watts on 1620kHz and 3WL, Warnambool, NSW, Australia, which is on 1602 with a mere 200 watts!

Robert Taylor of Edinburgh, Scotland has won a consolation prize in one of the competitions run by DLF Cologne, W. Germany—a lovely book on the port city of Cuxhaven. He is a regular listener to their *DX Circle* programme which is broadcast on Tuesday evenings on 1269kHz. While checking the band with his Toshiba RP-F11L receiver during the evening, Robert heard Manx Radio for the first time—their transmitter, located in Foxdale on the Isle of Man, runs only 2kW on 1368kHz.

Several low power stations have been received in the early evening by **John**

Freq (kHz)	Station	ILR/ BBC	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1242	Invicta Sound	ILR	X								
1251	Saxon Radio	ILR	X								
1260	Leicester Sound	ILR	X								
1305	Red Dragon	ILR	X				X				
1323	Southern Sound	ILR		X							
1332	Hereward Radio	ILR	X								X
1359	Mercia Sound	ILR	X								
1359	Red Dragon	ILR		X			X				
1431	Radio 210	ILR	X								
1431	Essex Radio	ILR	X	X							
1449	Radio Cambridgeshire	BBC	X								
1458	Radio Manchester	BBC				X					
1476	County Sound	ILR	X	X							
1485	Radio Merseyside	BBC				X		X			
1485	Radio Oxford	BBC	X								
1503	Radio Stoke-on-Trent	BBC		X							
1521	Radio Mercury	ILR	X								
1530	Radio Wyvern	ILR	X	X							
1548	Capital Radio	ILR	X		X						
1548	Radio City	ILR				X					
1548	Radio Forth	ILR		X					X		X
1548	Radio Hallam	ILR							X		
1557	Hereward Radio	ILR	X								X
1557	Radio Lancashire	BBC		X							
1584	Radio Nottingham	BBC	X								
1584	Radio Tay	ILR		X							X
1602	Radio Kent	BBC	X						X		

Freq (kHz)	Station	ILR/ BBC	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
603	Invicta Sound	ILR	X	X							
630	Radio Bedfordshire	BBC	X							X	
630	Radio Cornwall	BBC		X							
666	Devonair Radio	ILR	X								
666	Radio York	BBC		X					X		
756	Radio Shropshire	BBC	X			X				X	
774	Radio Kent	BBC	X						X		
774	Radio Leeds	BBC		X		X				X	
774	Severn Sound	ILR							X		
792	Chiltern Radio	ILR	X								
801	Radio Devon	BBC	X		X					X	
828	Chiltern Radio	ILR	X								
828	Radio WM	BBC								X	
837	Radio Leicester	BBC	X								
855	Radio Lancashire	BBC								X	
873	Radio Norfolk	BBC	X								
999	Red Rose Radio	ILR				X					X
1026	Radio Cambridgeshire	BBC	X								
1035	Radio Kent	BBC	X								
1035	Northsound Radio	ILR									X
1107	Moray Firth Radio	ILR									X
1107	Radio Northampton	BBC	X								
1152	Radio Clyde	ILR									X
1152	LBC	ILR	X								
1152	Piccadilly Radio	ILR				X					
1161	Radio Bedfordshire	BBC	X								
1161	Radio Tay	ILR				X					

Fig. 1

Key
(1) D. Jenks—Hemel Hempstead, Herts
(2) Bill Kelly—Belfast, N. Ireland
(3) Andrew Hill—Cheslyn Hay, Staffs
(4) David Jones—Liverpool
(5) Peter Jones—Abertillery, S. Wales
(6) Robert Taylor—Edinburgh, Scotland
(7) John Sheridan—Mapperley, Derbyshire
(8) John Parry G4AKX—Northwich, Cheshire
(9) Stewart Russell—Forfar, Scotland

Sheridan of Mapperley Village, Derbyshire, who uses an RCA AR88D receiver plus wire antenna—these include BBC Radio Scotland, Dumfries 585 and BBC Radio Wales, Wrexham 657, which run 2kW; also the new BBC Radio Wales transmitter in LLandrindod Wells which runs a mere 1kW on 1125kHz. The m.w. broadcasts from Switzerland are not often received during daylight hours by DXers in the UK, but John has been hearing weak fluctuating signals on 765 from their 500kW Sottens stations at 1115—SINPO 22433. Also heard during daylight hours were RTE-1 Tullamore, 567 and RTE-2 Athlone, 612—both in S. Ireland.

In N. Ireland, Bill Kelly has been searching the band during the night between 0100 and 0400 and logged Les Trembles, Algeria 549; Becher, Algeria 576 and Sebaa Aioun, Morocco 612—all broadcasting in Arabic. He also listened to Marseille, France at 0230 on 675 and to Leningrad, USSR on 1566 at 0300. A talk in Gaelic, broadcast by Radio Na Gaeltachta via their transmitter in Connemara on 540, was also noted in his log—this station is seldom mentioned in s.w.l. reports.

In an interesting letter in connection with the l.w. band changes which I mentioned in the June 1986 *PW*, page 64, **Tony Bernascombe** of North Ormesby, Cleveland asks "Surely Stimme der DDR (Voice of DDR) East Germany—750kW, isn't sharing 180kHz with Europe No. 1 West Germany—2000kW?" A very good point Tony! Up to the time of the implementation of the new band plan, these stations were both scheduled to operate on 182kHz—but they were in fact operating on 179 and 185kHz. Since the plan took effect, they appear to be operating on 177 (DDR) and 183kHz, so it would appear that your assumptions were correct, Tony! A check on the l.w. band here suggests that most of the changes detailed in the June issue have now taken place.

Your m.w. DX reports are always welcome. Please ensure they arrive by the 15th

Local Radio DX

Once again there are some interesting entries in the chart this month—take for example some of Bill Kelly's list—who would have thought that BBC Radio Cornwall, Lancashire, Leeds, Stoke-on-Trent and York or ILR Radio Forth and Tay could be received in Belfast during daylight hours?

Listening at 2345 to his ITT Golf 330 receiver with just the whip antenna, David Jones says "Radio Tay gave out Dundee 'phone numbers—I was very surprised I got that!" An FRG-7 receiver plus a 1m loop antenna made from the *PW* design in *Out Of Thin Air* was used by **D. Jenks** of Hemel Hempstead, Hertfordshire to compile his impressive log—he says "This is my first time of using a loop antenna—I must say it performs well".

Writing from Cheslyn Hay, Staffordshire **Andrew Hill** says that Capital Radio is often heard there as a weak signal during daylight hours. Andrew, who uses a B40 receiver says, "I stumbled upon Radio Devon the other day on 801kHz . . . I received a QSL and two car stickers from them this morning"—see Fig. 2.

Quite a number of Local Radio DXers have been looking for ILR Red Dragon Radio, following my comments in the July 1986 *PW*, page 64. The reception of their two transmitters in some areas of S. Wales is unpredictable—although Graham Powell seems to be hearing them well at night in Pontypridd. **Peter Jones** in Abertillery, Gwent says he is unable to pick them up after dark—apparently both transmitters provide perfect reception during the day, despite the local mountains! Their signals are reaching many other areas of England and N. Ireland, however Robert Taylor says "Sorry, no reception of Red Dragon Radio up here in Edinburgh" and **Stewart Russell** of Forfar, Angus says "Unfortunately I can't receive Red Dragon up here, but I think Al's idea is a great one!"

QSL Addresses

BBC Radio Leicester, Epic House, Charles Street, Leicester, LE1 3SH.

BBC Radio Northampton, P.O. Box 1107, Abingdon Street, Northampton, NN1 2BE.

BBC Radio Sheffield, Ashdell Grove, 60 Westbourne Road, Sheffield, S10 2QU.

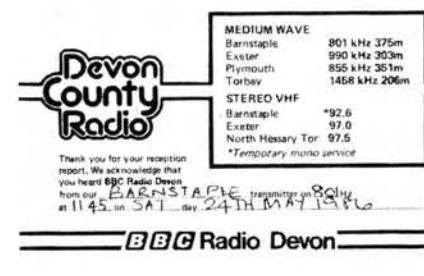


Fig. 2

SW BROADCAST BANDS

Reports: as for Medium Wave DX, but please keep separate

by Brian Oddy G3FEX

For the Newcomer SWL

The successful reception of distant shortwave stations is dependant upon a number of factors, many of which have a direct relationship with solar events and activity. Some of these have already been discussed in this series (*PW* October '85, March and July '86). There are two factors however, which are under the direct control of the s.w.l. and provide the key to successful DXing—the possession of a good receiver and a good antenna!

The general principles of superheterodyne receivers and some of the problems associated with them have also been discussed in this series (*PW* December '85, April and May '86) and irrespective of how good the performance of a receiver may be, it cannot function correctly without a good antenna. The vital role of any antenna is to intercept the **electromagnetic waves** in its immediate vicinity and to convert them as efficiently as possible into tiny electrical currrents, which may then be led to a receiver for processing. This fact is so often overlooked by s.w.l.s who spend large amounts of cash on a good receiver and then expect it to perform well with just any old piece of wire attached to it as an antenna! Although some of the high power s.w. transmitters used by broadcasters may make it possible to hear their signals on an inefficient antenna and receiver, the only way to receive the real DX is to employ a good receiver in conjunction with a good antenna, so that both are working together efficiently as a team!

What exactly is a good antenna? There is no one answer to that question, as each antenna has special features. The basic facts about antennas need to be understood first so let us consider them.

In simple terms, an antenna is a special kind of tuned circuit and is said to be **resonant** or **self-tuned** to a particular frequency and this depends on the length of wire. The shortest length of wire which will **resonate** to a given frequency is one which is just long enough to allow an electric charge to travel from one end to the other and back in the time of one radio frequency cycle. If the charge travels at the speed or **velocity of light** (v) = 300 000 000 metres per second (actually 299 793 077 metres per second), but for practical purposes in this case, we can forget that figure!) then the actual distance covered in one cycle will be the **wavelength** (λ) **in metres** and this can be calculated by dividing the velocity (v) by the **frequency (f) in hertz**—see wavelength, frequency and velocity also radio frequency energy and fields in September 1985 *PW*, pages 55/56. The length of wire needed to allow a charge to travel one wavelength will be only half the wavelength long, because the charge will in fact have travelled twice along the wire in one cycle—to the end and back. Therefore, **the shortest possible resonant wire will be one half wavelength long.**

A simple formula gives the resonant length of wire required for a particular frequency, this is:

$$L = 150/f$$

where L = length of wire in metres and f = chosen frequency in megahertz (MHz).

In practice, if a wire antenna is constructed from this formula, it will be found to resonate at a slightly lower frequency than expected—in other words, it will be a little too long—so why is this? In order to support the wire antenna, it will be necessary to use ceramic or glass insulators at each end and these introduce a capacitive loading to the antenna—usually called **end effect**—this capacitance will in fact cause the resonant frequency to be lowered, just as when adding more capacitance to a normal tuned circuit. This end effect makes it necessary to reduce the length of wire needed for resonance at a particular frequency by about 5 per cent on the figures calculated from the formula above. A new set of formula can be derived to take account of this problem by incorporating a figure of 0·95 into the original formula:

$$L = 150 \times 0{\cdot}95/f \text{ or } L = 142{\cdot}5/f$$

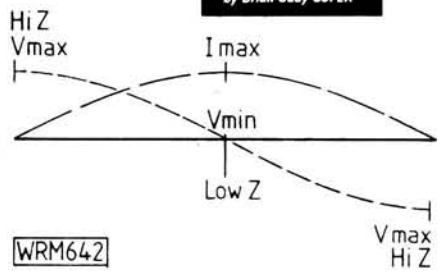
where L is now the practical length in metres and f = chosen frequency in MHz.

Let us take a practical example:
What is the length of antenna wire required for the (19m) 15·2MHz band?
Answer:

$$L = 142{\cdot}5/f, \text{ so } 142{\cdot}5/15{\cdot}2 = 9{\cdot}375\text{m}$$

Since most broadcast bands are narrow, taking the centre frequency of the band concerned will be acceptable, so if you get out your calculator, you can now work things out for yourself.

Halfwave or **Hertz** antennas form the basis of many interesting antennas and one simple design uses an **Inverted L** configuration, which allows one end of the wire to be connected directly to the receiver antenna terminal—see Fig. 1. By cutting the overall length (L) for your favourite band the antenna will perform well there—reception on the other bands, however, will be less effective.



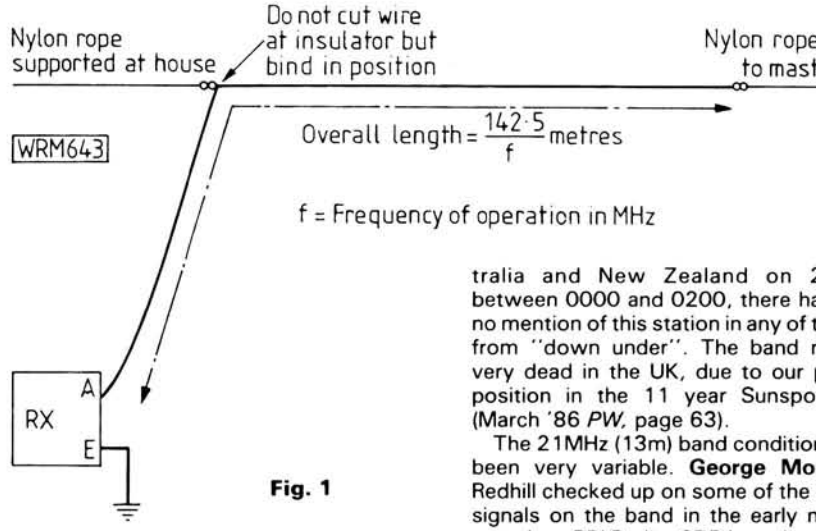


Fig. 1

By now you will probably have come to the conclusion that separate halfwave antennas are necessary for each band—while this may be true as far as a Broadcast Station is concerned it is unlikely that any s.w.l. will have a large enough garden to allow that to be contemplated! A halfwave antenna can be operated on **harmonics** of the fundamental frequency to which it is cut. More in the future . . .

Conditions on 25 and 21MHz

(Note: Frequencies in MHz. Time in UTC = GMT)

Although VOA is known to be operating on the 25MHz (11m) band from their Poro, Philippines, relay station, beaming to Australia and New Zealand on 26·000 between 0000 and 0200, there has been no mention of this station in any of the logs from "down under". The band remains very dead in the UK, due to our present position in the 11 year Sunspot cycle (March '86 *PW*, page 63).

The 21MHz (13m) band conditions have been very variable. **George Morley** of Redhill checked up on some of the weaker signals on the band in the early morning —such as RBI Berlin, GDR beaming to Asia on 21·540 at 0600 and to the transmission beamed to the Middle East by Radio Nederlands, via their Madagascar relay on 21·475 at 0700—these signals are usually quite weak but on some mornings they were only just audible or non existent. Signals intended for Europe can be found on the band later in the day and George listened to Radio Japan via their Moyabi, Gabon, relay on 21·625 on several occasions at 1500.

UAE Radio Dubai, mentioned by **Simon Hamer** of New Radnor, S. Wales, broadcasts to Europe on two frequencies on this band at 1330, namely, 21·605 and 21·700 and these transmissions are usually excellent—they welcome reports and have an attractive QSL and pennant.

Robert Taylor of Edinburgh heard a broadcast from Radio RSA Johannesburg, on 21·590 one day at 1445—this station beams to Europe at 1100 and again at 1300. Detailed reports on their signals are always welcome and their coloured QSL cards are very attractive and varied, see Fig. 3 from Mat Jusoh of Selangor, Malaysia.

With careful listening on this band, broadcasts beamed to areas other than Europe may often be received in the UK around mid-day, either by means of a direct signal off the back or side of the beam antenna concerned, or via a propagation process called "back scatter" when signals travelling towards a target area via the ionosphere may be scattered

Freq (MHz)	Station	Country	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
3·230	Radio RSA	S. Africa					0345						
3·270	SWABC 1	Namibia	2250								0040		
3·330	Radio Rwanda	Kigali, Rwanda					0315						
3·346	ZBS, Lusaka	Zambia					0350						
3·356	Radio Botswana	Botswana					0455						
3·366	GBC Radio 2	Ghana	2230								2250		
3·915	BBC Kranji	Singapore	2235								2210		
4·220	Xinjiang	China									2240		1850
4·770	FRCN, Kaduna	Nigeria	2130				2215			2133			2040
4·770	Radio Mundial, Bolivar	Venezuela									0110		
4·785	Baku, Azerbaidjan	USSR					0200						
4·795	Radio Douala	Cameroon						2045			2100	2107	
4·805	R. Diff Do Amazonas	Brazil										0209	
4·815	R. Diff TV Burkina	Ouagadougou						2020					
4·820	La Voz Evangelica	Honduras					0215					0235	
4·830	Africa No. 1	Gabon			1915		2040					2048	1700
4·830	Radio Tachira	Venezuela										0046	
4·832	Radio Reloj	Costa Rica	0430									0439	
4·835	RTM Bamako	Mali	2112					2020					2230
4·845	Nouakchott	Mauritania	2030							2131			
4·845	Radio Nacional, Manus	Brazil				0219	0230					0317	
4·870	Radio Cotonou	Benin								2130			1950
4·890	ORTS, Dakar	Senegal	2155					2015					
4·895	Ashkhabad	USSR	2115										
4·905	N'djamena	Chad	2125					2015			2115		
4·905	Radio Relegio, Rio	Brazil										0129	
4·915	Radio Anhanguere	Brazil										0323	
4·915	Accra	Ghana						2042			2315		
4·920	Radio Quito	Ecuador									0050		
4·926	Radio Nacional, Bata	Eq. Guinea						2015					
4·945	Caracol, Neiva	Colombia										0336	
4·970	Radio Rumbos	Venezuela										0129	
4·980	Ecos del Torbes	Venezuela	0415	0216		0204						2306	
4·990	FRCN, Lagos	Nigeria	2130					2044		2120			
4·990	Radio RSA	South Africa	0405				0250						
4·990	Yerevan	USSR					0240						
5·004	Radio Nacional, Bata	Eq. Guinea	2130							2125			
5·005	Radio Nepal	Khumalter							**				
5·010	Radio Garoua	Cameroon	2100										2200
5·015	Arkhangelsk	USSR	2040										
5·035	Alma Ata	USSR	2040										
5·040	R. Libertad de Junin	Peru										0404	
5·045	R. Cultura do Para	Brazil	0355										
5·047	Toglekope	Togo	2310							2127			2300
5·057	Gjirokaster	Albania	2005										
5·095	R. Sutatenza	Bogota Colombia										0027	

(1) Neil Dove, Lockerbie, Scotland
(2) Al Dupres, Cardiff, S. Wales
(3) Simon Hamer, New Radnor
(4) Brian Johnson, Hemel Hempstead
(5) Bill Kelly, Belfast
(6) Fred Pallant, Storrington
(7) John Parry, Northwich
(8) Philip Rambaut, Macclesfield
(9) Michael Sargeant, Bolton
(10) John Sheridan, Mapperley
(11) Tim Shirley, Bristol

Fig. 2

back to areas behind the country of origin. Since these transmissions may be in a foreign language this may make identification more difficult. **Philip Rambaut** of Macclesfied listened to Vatican Radio beaming to S. Africa at 1302 on 21·725 with programmes in Portuguese and Spanish and to a transmission in German beamed to the Middle East from the Julich, W. Germany, transmitter of Radio DW Cologne, FRG on 21·680 at 1330. Similarly Radio Prague, Czechoslovakia, beaming to Africa at 1753 on 21·505 has been heard by **Darren Taplin** in Tunbridge Wells, Kent, and by **Tommy Dougan** in Belfast, N. Ireland.

Signals on 21·685 from the Bonaire, Nederlands Antilles, relay transmitter of Radio Nederlands are intended for Africa at 1800, but they are frequently good in the UK too! **Neil Dove** of Lockerbie, Scotland, has been listening to their DX programme at 1910 and made an entry in his log of SINPO 45444.

The 17 and 15MHz Bands

The reception of signals from several continents has been possible during many days of the month on the 17MHz (16m) band, although conditions have not always been reliable. Radio Australia can usually be heard on this band in the early morning on 17·715. **Jonathan Creaser** of Hilingdon has obtained a QSL for reception of their signals at 0840 on his "old trusty valve receiver"—a Bush Radio, model EU3A.

Some of the stations in the log from **Tim Shirley** of Bristol include All India Radio, New Delhi, on 17·785, which may be heard between 1000 and 1100; UAE Radio Dubai 17·865 beaming to Europe at 1030 and also at 1330; Radio Pakistan 17·660 beaming to Europe at 1100; Radio Moscow (World service) 17·625 at 1330 and HCJB Quito, Ecuador 17·790 at 1900.

Neil Dove noted HCJB on 17·90 as SINPO 55544 at 2130 in his log and also heard WYFR via Okeechobee, Florida, broadcasting to Europe on 17·750 in Italian at 2155. Transmitters at Okeechobee are also used to relay the Voice of Free China around 2100—their popular programmes in English, mentioned by **Harry Armstrong** of Co. Armagh, can be heard on 17·845. Harry has two receivers—a Russian Selena B210 and a Zenith Trans Oceanic 2000 model from the USA and would like to hear from any other *PW* reader who has a Zenith receiver.

Conditions on the 15MHz (19m) band have been rather more dependable and signals form a number of interesting places can usually be found there. In the early morning for example, George Morley received the News in English direct from the Voice of Nigeria at 0550 on 15·120 and he listened to Radio Pakistan, which beams to Europe at 0715 on 15·605. A programme in Arabic intended for European listeners, can be received from Radio Baghdad on 15·195 from 0400 until 1000—although you may not understand the language, this may be of interest if you are making language identification recordings—see February '86 *PW*, page 64.

Tim Shirley has been listening to the latest world and other news from the USA, broadcast by AFRTS in Los Angeles and relayed by a station in Munich, W. Germany, at 0700 on 15·265. News direct from Tokyo, Japan, can be heard at 0900 on 15·235—although this transmission is intended for Australia and the Pacific areas, Tim reports their signal as good in Bristol.

Graham Powell of Pontypridd heard excellent signals from Radio Damascus, Syria, broadcasting in Arabic to Africa on 15·020 from 0900 to 1500. On 15·525 he received a programme in English at 1230 from Radio Bangladesh in Dhaka. Both Graham and Philip Rambaut mention a new 250kW transmitter site in Nador, N.E. Morocco, which appears to be the origin of the excellent signals from Radio Monte-Carlo, heard around 1300 on 15·465.

In Walton, Liverpool, **David Jones** has been exploring the 19m band with his ITT Golf 330 receiver and has logged a station which is not often reported by s.w.l.s—Radio Norway Int.Oslo, on 15·185 at 1000. Others logged were the BBC World Service, from a UK based transmitter on 15·070 at 1553—overseas readers may like to look for the station; also RCI Montreal, Canada, with News at 2118 on 15·150.

Using a Racal RA17L receiver plus a 5m vertical whip antenna **Brian Johnson** of Hemel Hempstead heard many different stations during the evening, including VOIRI Tehran, Iran 15·084 in Farsi at 1775; RNB Brasilia, Brazil 15·155 in Ger-

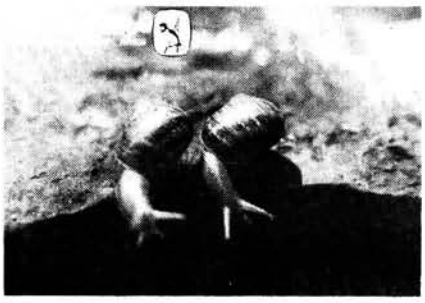


Fig. 3

man at 1905—English programmes are from 1800 to 1850; RCI from Montreal, Canada, on 15·325 with news in English at 2011; Morocco on 15·330 and 15·335 in Arabic at 2021; HCJB Quito, Ecuador 15·270 at 2130 in English; WINB Red Lion, PA USA 15·185 at 2030 in English and Radio Australia 15·160 at 2200.

Following a reception report to the Voice of Free China, **Peter Vlietinck** of London received a booklet about VOFC which contains their operating schedule, a copy of *The Free China Journal* and an attractive QSL confirming his reception of their signals on his Vega 206 receiver used with its whip antenna! **John Parry G4AKX** of Northwich and **Craige Harris** of Laceby have also been hearing VOFC—this station can be heard on 15·440, via a relay transmitter at Okeechobee, Florida, USA, at 2100. The Antigua, W. Indies, relay station used by Radio DW, Cologne, on 15·410 at 2200 was just one station in Craige's log. Others were Radio Korea, Seoul, S. Korea 15·575, with an hour long programme in English at 1800; Voice of Vietnam, Hanoi 15·010 at 1900—also noted by Darren Taplin at 1800; Radio Sophia, Bulgaria on 15·330 at 2130 and VOA, via their Greenville, E. USA transmitter on 15·400 at 2030.

The 11, 9, 7 and 6MHz Bands

In view of the conditions on the higher frequency bands, many broadcasters are making extensive use of these bands in an attempt to ensure that their programmes reach their chosen target area, consequently considerable congestion exists!

There are numerous regular broadcasts to look out for during the day on the 11MHz (25m) band, but sometimes signals from unexpected places appear too—for example signals from Radio Australia, intended for the Pacific area in the early morning on 11·910, are audible some mornings in the UK—Simon Hamer has been hearing them in Wales at 0620.

There are certainly plenty of programmes to choose from on this band! According to his log, **Alan Hollingworth** of Southsea tunes his Vega fairly regularly to 11·795 at 1100 to hear a variety of programmes from SRI Berne, Switzerland—also mentioned was Radio Finland, Helsinki on 11·945 at 1200. In Bolton, Lancashire, **Michael Sargeant** used a Datong AD 370 Active antenna with his Panasonic DR49 receiver to listen to a transmission destined for Asia from Radio Peace and Progress, Moscow on 11·660 at 1400. One of the most frequently reported broadcasters in the evening was mentioned by Michael—All India Radio, New Delhi, which can be heard with a variety of programmes in English on 11·620 between 1845 and 2230.

Another Vega owner—**Andrew Hill** of Cheslyn Hay, Staffordshire, has been listening to Radio Beijing, China on 11·515 at 1930, beaming to Africa. RHC, Habana Cuba, logged by **Peter Jones** of Abertillery is beamed to Europe from a relay in the USSR at 2200 on 11·705. Programmes from the Voice of Vietnam on 10040 are often intersting and well received in the UK at 2030—in fact in Stockton-on-Tees **Alan Curry** noted their signal as SINPO 55545 in his log! Alan has been checking the 9MHz (31m) band in the early morning and found that HCJB Quito, Ecuador, was SINPO 55555 on 9·845 at 0800—**Sheila Hughes** of Morden, Surrey, is a regualr listener to this transmission too and has been especially interested in their *Happiness is* programme at 0730.

In Bungay, **Ron Pearce** says he would like to see a section in this series devoted each month to DXing with a simple "home-brew" s.w. receiver, perhaps based on a maximum of two valves or transistors—what a splendid idea! Using the home constructed 1 valve set shown in Fig. 4, Ron heard the Voice of Israel on 9·435 at 2300 and sent off a report to them with the details. They were delighted, QSLed by return and played a Big Band jazz record for him on their Shalom programme!! As Ron says ". . . squeezing some choice DX from a simple RX that you have constructed, far exceeds the feeling of acheivement you get from pressing the memory button on a £400 black box!" So please send along some results and details to get this new section really under way!

Fig. 4

Up in Buckie, Scotland, **Julian Wood** has been monitoring the 31m band during the evening and heard All India Radio for the first time on 9·910 with programmes in English at 2000—this station can sometimes be heard on the 7MHz (41m) band at 1530 on 7·160. The 41m transmission in the afternoon from Radio Australia is usually well received in the UK on 7·205 from 1430—they operate on the 6MHz (49m) band too, on 6·035 from 1530 and welcome reports—**Maurice Andries** of Dendermonde, Belgium, was delighted to receive a QSL from them in only three weeks, because he finds that some stations take many months to QSL and others just ignore his reports.

The 5, 4, 3 and 2MHz Bands

There has been plenty of activity on these bands—see Fig. 2.

Station Addresses

Radio Korea, Korean Broadcasting System, 46 Yoido-dong, Youngdungpo-ku, Seoul 150, Rep. Korea.

Radio Peace & Progress, The Voice of Soviet Public Opinion, Moscow, USSR.

Radio Tirana, External Service, Rua Ismail Quemal, Tirana, Albania.

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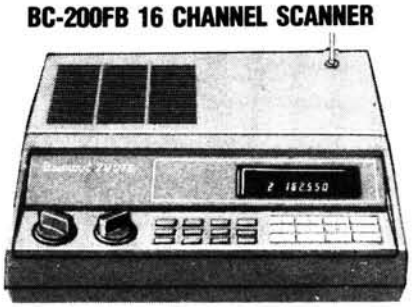

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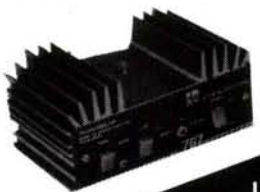

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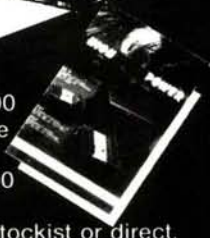

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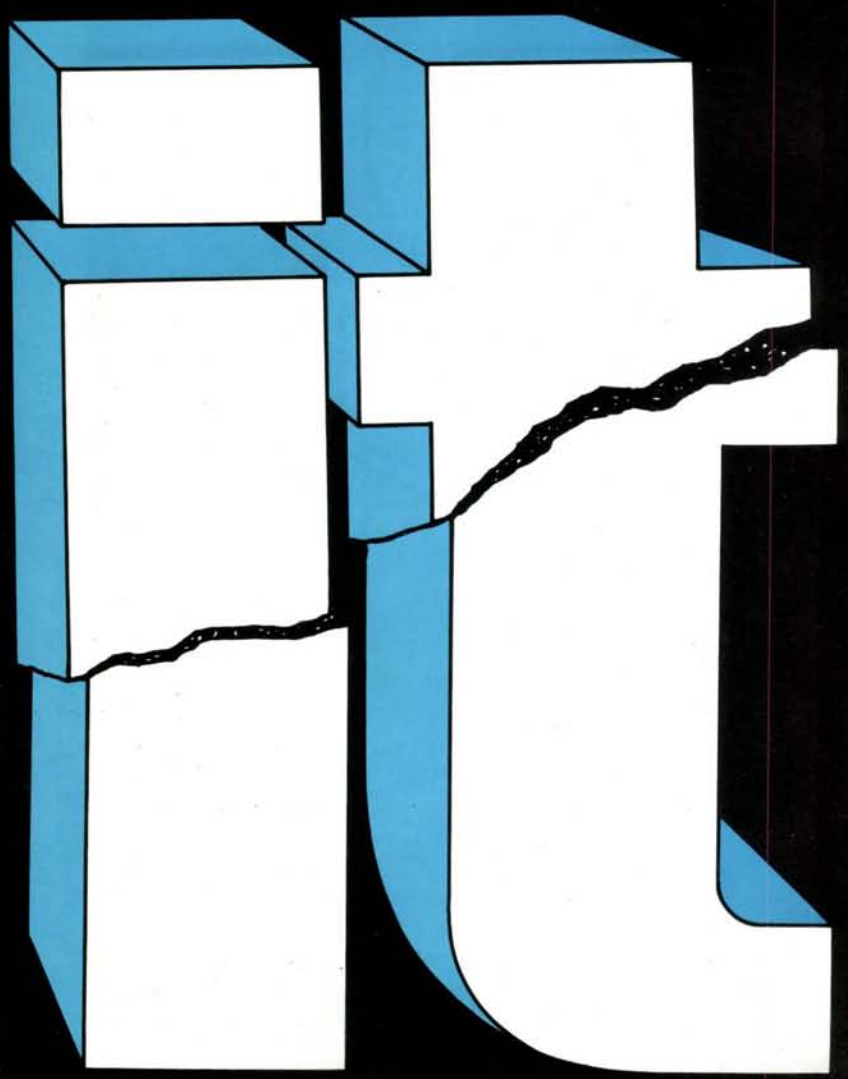

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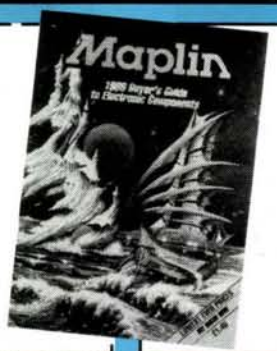

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